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Final report

project

Impacts of the policy and institutional environment on ACIAR research in the South Pacific

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2 Executive summary

This report presents the findings of a scoping study aimed at assessing the policy and institutional environment affecting the development of agriculture, forestry and fisheries in the South Pacific. The study was structured around consultations with project leaders for a number of recent ACIAR projects in countries where ACIAR is currently active (Fiji, Kiribati, Samoa, Solomon Islands, Tonga and Vanuatu). The consultations were designed to elicit perspectives on the effect of the policy and institutional environment on the likely impact of research. The results of these consultations were discussed with representatives of stakeholders in agricultural research at a workshop, where factors affecting rural development and the impact of research were considered, along with possible strategies that ACIAR could adopt for dealing with them.

The challenge

Agriculture, forestry and fisheries play a substantial role in the economies of the Pacific Island Countries. Across the six countries covered by this study (Fiji, Kiribati, Samoa, Solomon Islands, Tonga and Vanuatu) around 65 per cent of total population live in rural areas and depend on these sectors for their livelihoods. Official statistics suggest that these sectors account for around 16 per cent of GDP of these countries: but the data almost certainly seriously underestimates the contribution of subsistence agriculture and fishing. The traditional quasi-subsistence livelihoods that many rural Pacific households employ (along with migration and remittance strategies) have long proved robust to internal and external shocks: but they are coming under intensifying pressures, especially from population growth. Enhancing rural productivity will have to play a key role in adaptation to these pressures.

It is clear that geography and climate play an important role in shaping the scope and type of primary activities that are undertaken in the Pacific, and the potential for enhancing productivity. The population of the six PICs is spread across a number of islands, all of which are a long way away from the large and growing economies of the Pacific Rim. Smallness, fragmentation and isolation reduce incentives for specialisation and trade, and in some locations exposure to inclement weather such as cyclones and excessive rainfall add to the risks of specialisation and intensification of rural production.

These conditions make producers naturally wary of adopting new products, technologies or production systems, which has important implications for their willingness to adopt results of technical research. However, there is a strong consensus that governments in these countries have often exacerbated this wariness by unhelpful policies and failures to promote development of institutions that enable producers to engage with the market economy and to manage risks.

A number of recent diagnostic studies have examined recent economic performance in the Pacific (which is generally accepted to have been fairly disappointing.) Their analysis has pointed to some key policy and institutional issues that are affecting the ability of Pacific Countries to provide their people with improving standards of living. Many of the issues are perceived to be related to problems of governance: one diagnosis (AusAID, 2006a) argued that in most Pacific countries:

- government activities are not transparent, and government institutions responsible for law and order and macroeconomic stability need to be strengthened
- market institutions do not work well — reforms are needed to improve infrastructure, reduce regulatory barriers and improve property rights, particularly relating to land
- social service provision and public investment in improving and maintaining human capital through the education and health systems is typically weak

- public sector regulation to address market failures — for example in the area of environmental sustainability — is often inadequate and sometimes corrupted.

For the rural sector, these problems are seen to manifest themselves in, among other things: poor delivery of transport, communication and energy infrastructure services, which constrain or raise costs of market access; limitations on access to new technology and market information; monopolistic marketing arrangements, inadequate means for enacting property rights over forestry and marine resources, poor delivery of biosecurity and quarantine systems; and poorly developed financial services.

Consultations

The consultations with the ACIAR project leaders identified a range of problems that affected conduct of research and the probability of adoption of research results. Many of these, such as lack of appropriate extension capabilities, constrained access to chemicals and fertilisers and inadequate regulation of natural resource use, were readily linked to the factors identified in the diagnostic studies used to frame the approach in this study.

The workshop with stakeholders focused on a range of constraints including:

- lack of secure property rights; inadequate government funding of agricultural research and extension, and inherent weaknesses of government institutions supporting agriculture (including agencies responsible for sanitary and phytosanitary systems, and weak capacity to absorb and use policy analysis)
- low levels of trust across different communities. This, together with weak formal institutions to support commercial contracting, erodes development of forward and backward linkages in supply chains and disables growth of contract growing
- the impact of regulation, taxation and inadequate transport infrastructure on costs and availability of inputs
- limited capacity and willingness to enforce legislation, distortions created by government involvement in marketing, and a deteriorating law and order situation.

Suggestions

Project leaders and workshop participants suggested a number of strategies for ACIAR to work within the prevailing policy and institutional framework. By and large they did not advocate that ACIAR should only work on projects where the constraints are not so acute (for example, where commercial operators are driving the industry, or where a biological control agent can be developed and allowed to operate without need for a supporting policy/institutional environment). Rather, they suggested extending ACIAR projects to address adoption and technology transfer, and/or to embed projects in broader initiatives that are tackling key constraints. There was a fairly strong message from the workshop that ACIAR may have to consider more comprehensive project scoping and identification activities and adding components to technical projects that deal with some of the socio-economic dimensions of technology uptake in the Pacific.

There were also suggestions for policy linkage and scoping studies that could help inform development of ACIAR's portfolio in the Pacific and that could provide input into attempts to improve the policy and institutional environment for rural investment in new technology. Specifically, it was suggested that ACIAR consider undertaking:

- a more detailed assessment of its Pacific portfolio to assess factors bearing on project impact which would:
  - characterise the impact of ACIAR's portfolio of completed and ongoing projects in the South Pacific using the Desktop Impact Assessment methodology

  - assess the experience of a sample of projects with respect to socioeconomic factors bearing on project success and the rate of policy and institutional constraints in sharing the environment for project impact
  - assess the effect of the economic, policy and institutional environment for adoption and impact of projects, and suggest strategies for future identification and development of project opportunities in the region that take account of the incentive for adoption of research findings.

- a study of the funding and delivery of services to the primary sector in the Pacific, summarising previous diagnostic work and examining issues such as:
  - what services are government agencies charged with providing, and how well are they perceived to be performing by key stakeholders and informants?
  - what role are the private and NGO sectors playing in service delivery, and what stands in the way of increasing that role?
  - what has been the impact of donor funding on the direction and sustainability of service delivery?
  - are there inherent weaknesses in extension services — such as in the status, training, funding of operational expenditures, and linkages to research activities?
  - does ACIAR help by providing professional skilled people for a limited time?
  - how could ACIAR build better relationships with agencies and enterprises that might transmit research results?
- a study on the environment for contract farming in the South Pacific, which could:
  - carry out some case studies of existing contract production arrangements, detailing the value chains that are involved, investigating their experiences in technology transfer and canvassing some of the issues confronted by parties to the contracts
  - summarise work on the impact of land tenure and customary ownership of marine resources on credit mobilisation and investment in contract production arrangements
  - assess the applicability of alternative approaches developed to provide securitization for working capital (for example, corporatisation by communities of individual livestock assets or the warehousing of produce to provide security for credit) — these may require investigating aspects of the legal arrangements surrounding contracts and their enforcement.

3 Background

In May 2004, ACIAR's Board of Management approved a strategy where the Centre would make greater use of pilot or scoping studies that assess policy issues before making major technical research investments. The Board also felt that it may be important to have research on these important policy issues and their economic implications undertaken alongside or integrated with the technical research.

Understanding the policy environment is important to ensure that the technical research takes the impact of policy into account or endeavours to change policies that act as constraints. The logic of this decision was reinforced in a recent review of ACIAR's research on agricultural policy (Pearce 2005), which argued that policy settings have the potential to be a major influence on the effectiveness and impacts of particular technical research projects.

The review pointed out that policy settings could 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 also lead to situations where the introduction of new techniques that have counter-intuitive and sometimes counter-productive effects. 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.

It is with these considerations in mind that ACIAR commissioned the Centre for International Economics (CIE) to undertake a scoping study into the policy and institutional environment facing the agriculture, forestry and fishery sectors of South Pacific, where the Centre has a long-standing and significant engagement (box 3.1). The study targets countries where ACIAR is currently active, namely:

- Fiji; Solomon Islands and Vanuatu in Melanesia
- Tonga and Samoa in Polynesia
- Kiribati in Micronesia.

3.1 ACIAR's engagement with the South Pacific

Since its establishment in 1982, ACIAR has supported around a hundred projects involving South Pacific countries. As at November 2006, 30 of these projects were being implemented, with a total budget of around $A18 million, and a further 17 projects were under development. ACIAR's current priorities for collaboration in they Pacific fall under four subprograms:

- improving incomes through more productive farming systems
- sustainable management of forestry and fishery resources
- biosecurity and pest and disease management
- farming systems economics and marketing.

The current portfolio includes research on coastal and oceanic fisheries, aquaculture, food crops (including taro, squash, yams, sweet potato and brassica), commercial development of indigenous trees and shrubs, livestock (poultry) and animal health, land use and land management, forestry, as well as economic policy, environmental management and biosecurity.

3.2 Approach to the study

This study, whose terms of reference are presented in box 3.2, was designed to be a first step in understanding whether the wider policy and institutional environment create significant impediments to the uptake of ACIAR project outcomes.

The relationship between the policy and institutional environment and benefits to host nations from ACIAR projects was assessed through case study analysis of specific ACIAR projects, and a workshop involving researchers, industry representatives and officials from government and regional agencies.

3.3 Terms of reference for scoping study

The objective of the scoping study is to assess the policy and institutional environment affecting the development of agriculture, forestry and fisheries in the South Pacific and:

- advise whether this environment is likely to have an impact on current and potential ACIAR projects in the South Pacific
- indicate the nature and potential significance of these impacts
- advise if a policy linkage/economic analysis project is required to complement technical projects, and if so which ones
- identify key personnel involved in policy formulation and decision making relevant to the issues raised in the study, and suggest people to engage with and involve in the policy linkage projects to maximise the probability of improving the policy environment.

Seven ACIAR projects were chosen as case studies, one from each of the six South Pacific countries that ACIAR is active in, and one 'regional' project. The projects, and the countries targeted in the studies were as follows.

- Regional — SFS/2001/036 Maximising the economic benefits to Pacific Island Nations from management of migratory tuna stocks.
- Fiji — CP/2000/044 Taro beetle management in PNG and Fiji.
- Solomon Islands — FST/1996/085 Nutrition of tropical hardwood species in plantations in the south-western Pacific.
- Vanuatu — SMCN/1998/028 Diagnosis and correction of nutritional disorders of yams.
- Samoa — HORT/2004/063 Integrated pest management in a sustainable production system for Brassica crops in Fiji and Samoa.
- Tonga — HORT/2003/046 Integrated disease control strategies for powdery mildew and other problems in squash in Tonga.
- Kiribati — FIS/1997/031 Pearl oyster resource development in the Western Pacific.

The purpose of the case studies was to help in identifying:

- whether policies are impeding (or may impede) the uptake of project findings, and if so, what can be done (and by whom) to improve the policy and institutional environment
- whether policy impediments are significant or not, and where in the production chain they act
- whether there are any 'commonalities' between projects/countries that can be leveraged off

- whether there are any ‘good news’ stories — where have policies helped in the uptake of ACIAR project findings, and/or where have projects addressed or found ways around impediments?

Project leaders were surveyed to get their perspectives regarding areas where the prevailing policy and institutional environment may be acting to impede (or accelerate) the uptake of project findings. The findings from this survey were used as a basis for an issues paper then used to inform participants in a workshop held in Suva with key ACIAR South Pacific stakeholders on 6-7 March 2007.

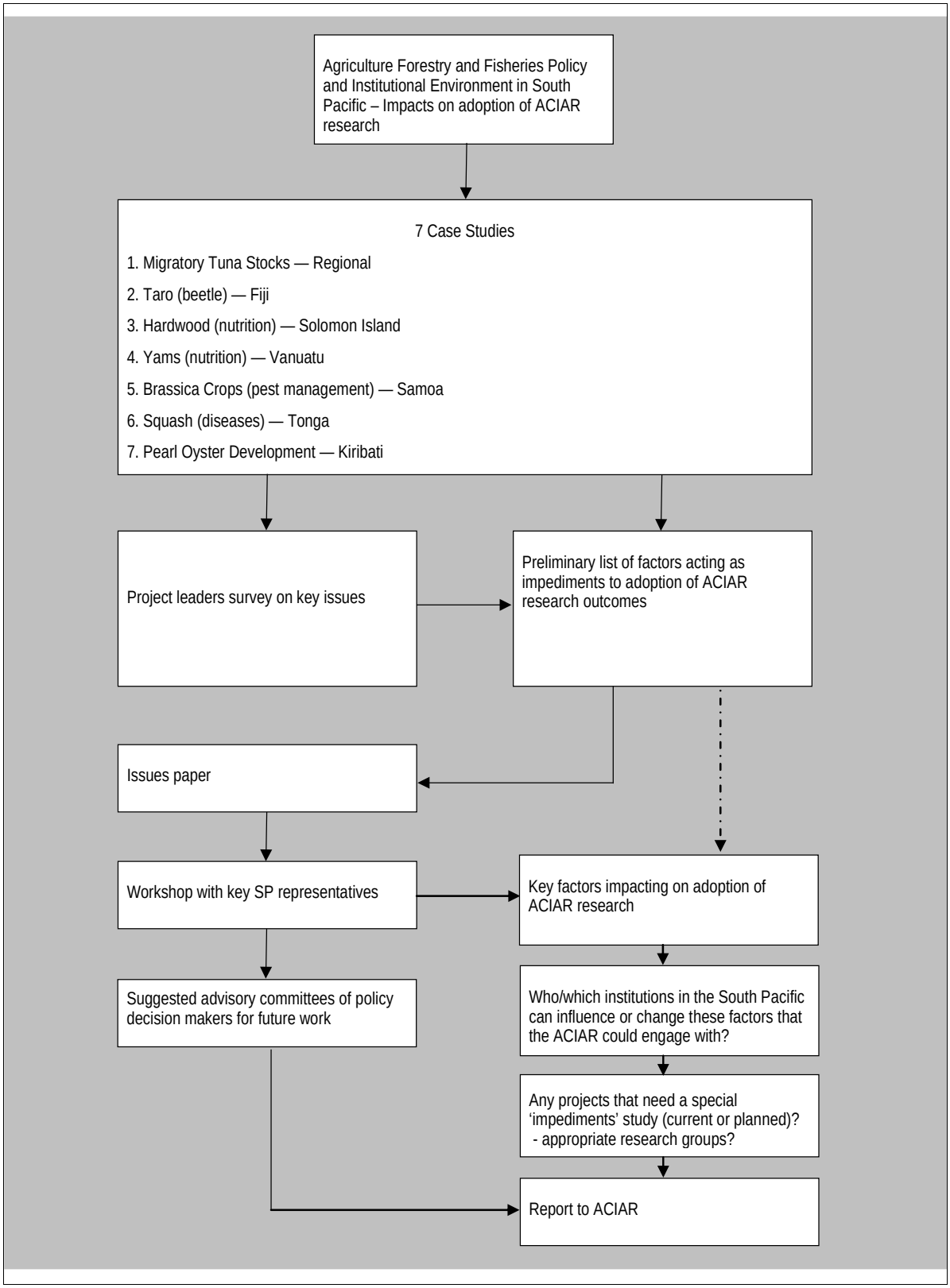
Table 3.1 illustrates the CIE’s broad approach to the scoping study.

3.3.1 Structure of the report

This report has the following structure. Section 4 summarises the economic performance, and general policy and institutional environment of the PICs. Section 5 discusses how policy and institutional impediments may affect agricultural, forestry and fisheries investment in the South Pacific what this may mean for the adoption of research outputs. Section 6 reports on the consultations with project leaders and workshop participants on the key factors impacting on the uptake of ACIAR project findings. Section 7 discusses possible approaches to dealing with policy and institutional impediments, and presents some suggestions for further work to develop appropriate strategies to improve the uptake of ACIAR research.

Section 8 presents references used in the study and section 9 contains a set of appendixes, including a glossary of terms, summaries of the various ACIAR projects serving as case studies, other background indicators of the institutional and policy environment in the Pacific Island Countries (PICs), and details of the people consulted during the study, including the participants at the workshop.

Table 3.1. CIE approach to scoping study



4 The economic, policy and institutional environment

The primary industries — agriculture, forestry and fisheries — are very important to economic output, and hence living standards, in the Pacific Island Countries (PICs). Across the six PICs under consideration, some 1.3 million people, or 65 per cent of total population, live in rural areas and depend on agriculture, forestry and fishing activities for their livelihoods. National statistics show that primary industries in these countries account for around 16 per cent of GDP: but these statistics almost certainly understate the contribution of subsistence agriculture and fishing to domestic production[1]. Large scale commercial agriculture is generally limited, as plantations developed prior to independence have largely reverted to local landowners and smallholder management.

Geography and climate play an important role in shaping the scope and type of primary activities that are undertaken in the Pacific. The population of the six PICs is spread across a number of islands, all of which are long way away from the large and growing economies of the Pacific Rim. Smallness, fragmentation and isolation reduce incentives for specialisation and trade, and in some locations exposure to inclement weather such as cyclones and excessive rainfall add to the risks of specialisation and intensification of rural production. The quasi-subsistence livelihoods that households pursue (combined in some countries with migration and remittance strategies) prove to be quite robust to the risk of internal and external shocks. These conditions make producers naturally wary of adopting new products, technologies or production systems, which has important implications for their willingness to adopt results of technical research. But there is a strong consensus that governments in these countries have often exacerbated this wariness by unhelpful policies and failures to promote development of institutions that enable producers to manage risks.

4.1 Definitions

Before proceeding it is important to define what we mean by the 'policy and institutional environment'. The term 'policy environment' refers to government actions and activities that impact on the economy and the society. For instance legislation, regulations, rules and Ministerial statements are all key factors in establishing the policy environment.

'Institutions' can be defined as those social norms that characterise and underpin the operation of the economy and society. For example, the institutions underpinning successful economies are said to comprise (amongst others) transparent decision making in government, rules based rather than ad-hoc decision making, and well defined and enforced property rights. The institutional environment also encompasses the political system itself (democratic, monarchic, or dictatorship), the judicial system, and the provision of essential services including education. The way the political and judicial systems interplay and impact on the economy and community is also referred to as the 'governance' system. Essentially, the prevailing institutions define the 'rules of the game', and they reduce uncertainty by providing a structure in which individuals can operate.

[1] *Recent estimates of staple food production in Solomon Islands indicate that the country produces around 430 000 tonnes of food crops, nearly all of which is consumed by the producing households. It is valued at around 3 times the combined value of the country's exports of cocoa and copra. In Vanuatu, using a consumption approach to measure the value of non-market agricultural production suggests that the subsistence sector contributes around 16 per cent of GDP, compared to the 7 per cent in the official statistics (AusAID 2006c).*

> The term, institution, is commonly applied to customs and behaviour patterns important to a society, as well as to particular formal organisations of government and public service… As mechanisms of social cooperation, institutions are manifest in both objectively real, formal organizations, such as (parliament, churches or banks) and, also, in informal social order and organisation, reflecting human psychology, culture, habits and customs. (Wikipedia 2007)

An important institutional issue is that in some PICs social capital and the trust that are critical elements of social and economic interaction do not easily reach outside of the tribal, clan or language group boundaries. This can make it hard to envisage contracting across these boundaries, which may have profound implications for marketing and distribution of rural produce. (Warner 2007)

Governance is an important component of the policy and institutional environment. The World Bank defines governance as:

> …the traditions and institutions by which authority in a country is exercised for the common good. This includes (i) the process by which those in authority are selected, monitored and replaced, (ii) the capacity of the government to effectively manage its resources and implement sound policies, and (iii) the respect of citizens and the state for the institutions that govern economic and social interactions among them.

Geographic fragmentation of most PICs exacerbates the challenge for societies within these countries to establish a consensus on what comprises the common good and to establish and maintain state capacity to pursue this common good.

4.2 Economic performance of the PICs

4.2.1 Economic performance has been poor

Broadly speaking, economic performance in the PICs has been poor in the past 20 years, creating an environment of high unemployment, political instability and a range of social and environmental problems. Within this poorly performing regional economy, there are key policy and institutional constraints that need to be overcome relating to governance, infrastructure, regional cooperation; and policy inertia that has culminated in failure to implement required reforms (AusAID 2006a).

Some basic indicators for the six PICs are presented in table 4.1. As can be seen, countries typically have very small populations, with only Fiji having a population of more than 500 000. In the relatively land rich countries (Solomon Islands and Fiji), the small populations translate into low population densities (17 and 46 people/square kilometre respectively), while the land poor countries (Kiribati and Tonga) have much higher population densities (136 and 142 people/square kilometre). More than half of the population of PICs lives in rural areas: except for Fiji and Kiribati, the proportion is closer to 80 per cent.

Table 4.1. Basic indicators for the six PICs (2005)

Country	Land area	Population	Rural population	GDP per person	Trade balance
	sq km	'000 persons	% total population	US$	% of GDP
Fiji	18 270	848	49	3 315	-30
Kiribati	730	99	53	772	-71
Samoa	2 830	185	78	2 158	-46
Solomon Islands	27 990	478	83	598	-6
Tonga	720	103	76	2 389	-40
Vanuatu	12 190	211	77	1 611	-29

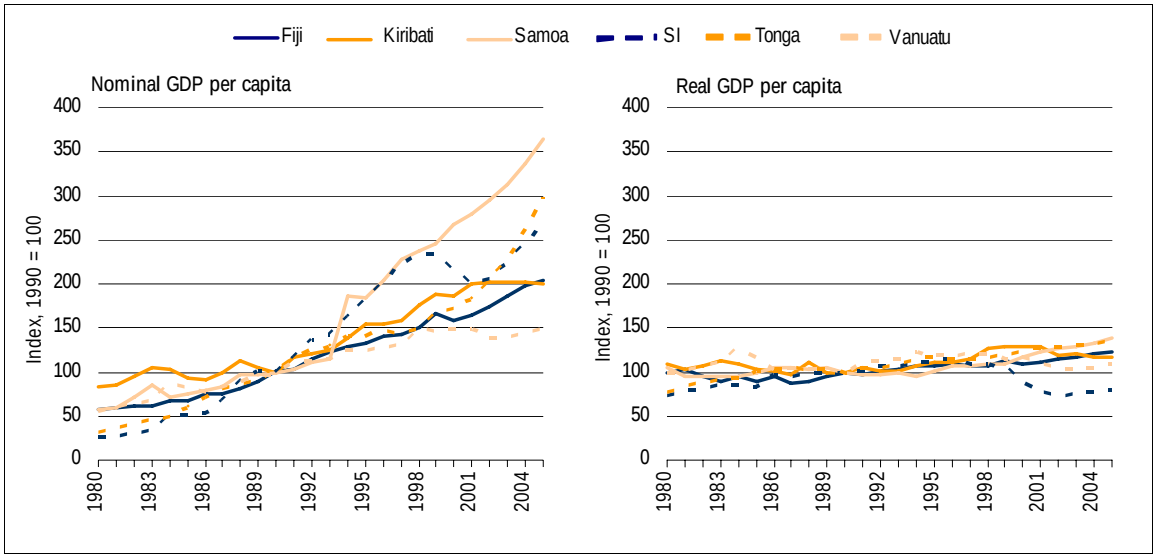
Source: World Bank World Development Indicators (online database).

Not only does Fiji have the largest population, but it also has the highest level of GDP per person. The Solomon Islands and Kiribati are the poorest nations in terms of GDP per head. All six countries run (merchandise) trade account deficits, and for some countries these deficits are substantial. For example, in 2005 Kiribati's merchandise imports exceeded its exports by around US$54 million, equivalent to 71 per cent of GDP in that year. These deficits are largely being financed by remittances and foreign aid.

Low growth and stagnant per capita GDP

In all countries, growth in nominal GDP has exceeded population growth, and this has seen GDP per capita increasing. Over the period 1980–2005, per capita growth rates ranged between 3.5 per cent in Kiribati and 10 per cent in the Solomon Islands (see left hand panel of table 4.2).

Table 4.2. GDP per capita a (1980–2005)

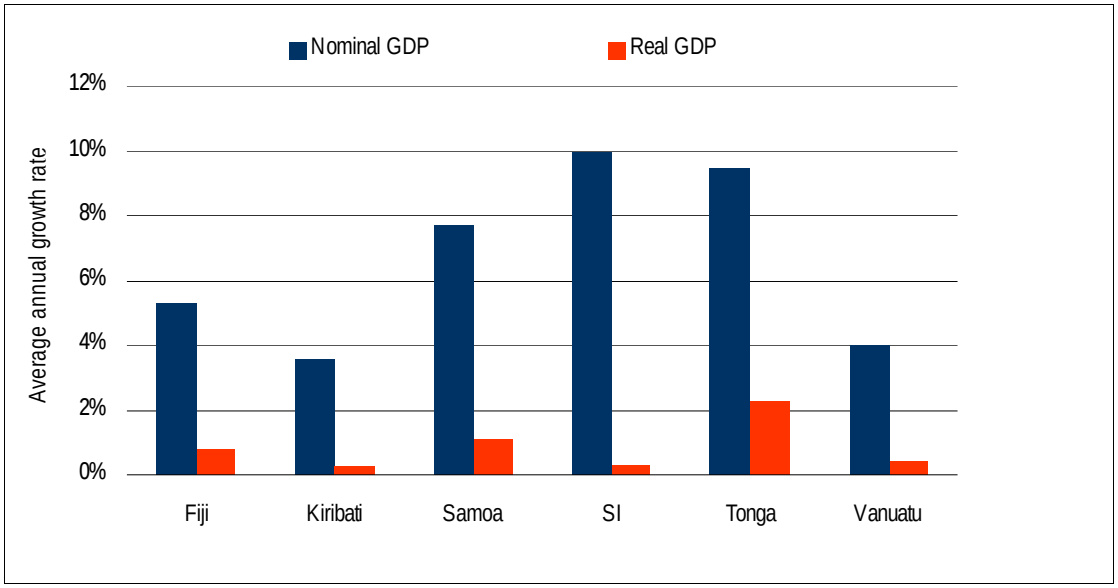


a Real GDP per capita figures were derived using a GDP price deflator to convert nominal to real GDP figures. Data source: World Bank World Development Indicators (online database) and CIE calculations.

However, when inflation is taken into account, a very different picture emerges. Across the various PICs, inflation ran at between 3.6 per cent (Kiribati) to nearly 10 per cent (Solomon Islands) per annum over 1980 to 2005. With inflation approximating the nominal increase in per capita GDP, average growth in real GDP was poor, ranging between 0.3 per cent (Solomon Islands) and 2.3 per cent (Tonga) per annum (see right hand panel of chart 4.2).

Average annual growth rates in nominal and real GDP over 1980 to 2005 for each PIC are reported in table 4.3.

Table 4.3. Average annual growth rates in GDPa (1980–2005)



[a] Real GDP per capita figures were derived using a GDP price deflator to convert nominal to real GDP figures. Data source: World Bank World Development Indicators (online database) and CIE calculations.

High dependence on aid and remittances

The large merchandise trade imbalances are funded by foreign aid, remittances from nationals working overseas, and for some PICs, increasing service (tourism) exports. As is shown in table 4.4, the PICs are highly dependent on foreign aid and remittances, which when taken together, are equivalent to a significant proportion of GDP. For example, in 2003 Tonga received US$26 million in aid and US$66 million in remittances, equivalent to nearly 56 per cent of GDP in that year.

Table 4.4. Aid and remittances (2003)

Country	Foreign aid	Remittances	Aid plus Remittances
	% of GDP	% of GDP	% of GDP
Fiji	2.3	7	9.3
Kiribati	29.0	12.0	41.0
Samoa	10.7	14.2	24.9
Solomon Islands	26.4	0	26.4
Tonga	16.3	39.2	55.5
Vanuatu	11.7	3.3	15.0

Source: World Bank World Development Indicators (online database).

PICs typically have a narrow economic base

The PIC economies are typically based on the primary and service (predominantly public administration and tourism) sectors. What manufacturing activity there is typically involves processing of primary products to produce goods such as coconut oil, sugar, canned fish etc which are then exported. The notable exceptions are Fiji and Samoa, both of which have relatively large industrial bases (accounting for at least 20 per cent of GDP).

The narrow resource base of the PICs has necessitated specialisation in a few commodities/activities. As a consequence, the economic base is likewise narrow, and this makes the PICs susceptible to fluctuations in commodity prices, failed crops and downturns in international tourism (such as that experienced following the events of 9/11, or after each coup in Fiji). The large fluctuations in GDP per capita seen in chart 4.2 will in part reflect the narrowness of the economic base.

Agriculture, forestry and fisheries are important components in the economies of most of the PICs. Table 4.5 reports the proportion of (monetary) GDP accounted for by these sectors in each of the six countries. As can be seen, the Solomon Islands have the highest proportion, at nearly 44 per cent of GDP. If subsistence agriculture was fully taken into account, the figures in table 4.5 would be much higher. For example, the ADB reports that around 70 per cent of the Fijian labour force — some 270 000 people, or 590 000 if dependents are taken into account — still depend on subsistence agriculture (ADB 2006).

Table 4.5. Sectoral shares in GDPa

Country	**Sector of GDP**		
	Agriculture, forestry, fishery (%)	Industry (%)	Services (%)
Fiji	14.5	23.2	65.6
Kiribati	10.1	12.3	77.6
Samoa	13.1	27.5	60.9
Solomon Islands	43.6	8.2	48.2
Tonga	28.5	15.3	60.2
Vanuatu	15.0	8.2	76.8

aNote that the GDP share figures for the Solomon Islands and Tonga relate to 2004. Data for other countries relate to 2005. Source: Asian Development Bank Key Indicators 2006 and CIE calculations

4.2.2 Agriculture

Table 4.6 summarises the importance of agriculture in the six PIC economies. Agriculture provides more employment than any other sector.

Farming systems in the PICs vary from those typical of atolls to multi-layered agro-forestry systems. However, many of the ecosystems are very fragile, deforestation is occurring very rapidly and unsuitable land is increasingly being used for cultivation of food and cash crops. Consequently, loss of soil and fertility is becoming increasingly common. Therefore there is a need to develop ‘strategies to improve the productivity — and therefore the welfare — of those involved in agriculture in a manner that is equitable and sustainable’ (FAO 1998).

Table 4.6. Importance of agriculture to Pacific Island Countries

Country	Agric. land area (% of total)	Rural population (% of total)	Geographic type	Importance of agricultural sector
	''000 hectares	'000 people		
Fiji	460 (25%)	417 (49%)	High islands. A few minor atolls	Fundamental. Main employer and net foreign exchange earner. Subsistence a significant proportion of GDP
Kiribati	37 (51%)	52 (53%)	Predominantly atolls	Considerable. Important for subsistence. Copra is important for outer-island cash income and some foreign exchange
Samoa	131 (46%)	144 (78%)	High islands	Fundamental. Traditional agriculture is the underlying strength of the economy
Solomon Islands	117 (4%)	397 (83%)	High islands and a few atolls	Fundamental. Predominant source of employment. Provides a substantial proportion of net export earnings, Subsistence is a significant component of GDP
Tonga	30 (42%)	78 (76%)	High islands and a few small atolls	Fundamental. Agriculture has led economic growth recently
Vanuatu	147 (12%)	162 (77%)	High islands and a few small atolls	Fundamental. Predominant source of employment. Provides a substantial proportion of net export earnings. Subsistence is a significant component of GDP

Source: AusAID 2006a.

The available evidence shows that the crop, livestock and food production sector has achieved only poor to moderate average annual growth rates over the past 25 years (see table 4.7).

Table 4.7. Growth in agricultural production (1980-2004)

Country	Average annual growth rate		
	Crops (%)	Livestock (%)	Food (%)
Fiji	-0.1	1.6	0.1
Kiribati	1.9	2.4	0.5
Samoa	-1.2	1.9	2.0
Solomon Islands	2.2	1.0	-0.6
Tonga	-1.8	0.5	2.2
Vanuatu	0.2	1.8	-1.3

Source: CIE calculations based on World Bank World Development Indicator (online database) data.

A recent paper examining changes in agricultural productivity since 1970 observes that over the last 30 years, land, labour and total productivity have been declining in Fiji and Vanuatu, while total factor productivity has been also been declining in Tonga (table 4.8). Only in relatively land rich Solomon Islands does the data suggest that land productivity has been rising.

Table 4.8. Trends in agricultural productivity in selected PICs (1970-2002)

Country	Total factor productivity (%)	Labour productivity (%)	Land productivity (%)
Fiji	-1.35 (-6.01)	-0.07 (-3.25	-1.68 (-6.82)
Solomon Islands	-0.11 (-0.62)	-0.14 (-0.81)	1.05 (4.89)
Tonga	-2.9 (-13.91)	-0.51 (-1.98)	0.10 (0.39)
Vanuatu	-0.73 (-2.95)	-0.63 (-2.88)	-2.07 (-10.17)

Note: (figures in brackets are t-ratios). Source: Fleming 2007

4.2.3 Forestry

Some PICs depend to a large extent on their forestry sectors. For example, in the Solomon Islands forestry is estimated to account for around 17 per cent of monetary GDP, 65 per cent of export receipts and 10–12 per cent of formal employment.

However, the natural logging industry in many PICs is in crisis. In Solomon Islands, for example, it has been estimated that the major accessible natural forests are likely to be logged out by 2020 (or earlier) if current unsustainable practices continue (AusAID, 2006d). On a positive note, Vanuatu and Fiji are moving towards sustainable harvesting of natural forests.

Plantation forestry offers the prospect of more sustainable production, and there is a widespread view that community-level plantations offering considerable potential. Such 'household level' forestry may involve nucleus/outgrower arrangements where commercial plantations contract with households to grow trees, or households planting high valued species on their own initiative. The establishment of large plantations will require resolution of a number of land tenure issues. Fast growing, specialty, small-wood plantations may offer the main economic opportunity.

Table 4.9 indicates that forestry resources are most abundant in the Solomon Islands, Samoa and Fiji (note that not all of the stands included in the estimates of forest area may be commercially viable).

Table 4.9. Forest cover in Pacific Island Countries

	Land area	Forest area	Forest area as a share of total land area
	'000 ha	'000 ha	%
Fiji	1 827	1 000	54.7
Kiribati	73	2	4.1
Samoa	283	171	60.4
Solomon Islands	2 799	2 172	77.6
Tonga	75	4	5.3
Vanuatu	1 219	440	36.1

Source: AusAID 2006a

4.2.4 Fisheries

The marine environments of the PICs support extensive fisheries resources, including oceanic fisheries (especially tuna), coastal fisheries (critical to food security) and aquaculture (food security and exports). However, there is a need for improvement in fisheries management to better utilise these resources. Oceanic fisheries are approaching the limits of sustainability after decades of growth in catches and a rising incidence of

illegal fishing. Coastal fisheries face increasing environmental risks due to degradation of reef, lagoon and coastal mangrove systems.

Table 4.10 indicates that fishing is significant to the economy in the Solomon Islands, Kiribati, Samoa and Tonga. The Kiribati economy, in particular, relies heavily on fishery access fees paid by (foreign) tuna fleets, which account for nearly 43 per cent of GDP. Note that the figures in table 4.9 exclude subsistence fishing (largely coastal).

Table 4.10. Importance of fishing to Pacific Island Countries (latest data, 1997)

Country	Fishing contribution to GDP (%)	Fishery exports as a share of total exports (%)	Access fees as a share of GDP (%)
Fiji	2.3	6.0	0.01
Kiribati	11.8	16.9	42.8
Samoa	8.0	61.5	0.1
Solomon Islands			0.1
Tonga	7.1	23.8	0.1
Vanuatu	1.0	<1.0	0.1

Source: AusAID (2006b), Pacific 2020 — Background Paper: Fisheries (January 2006).

4.3 Policy and institutional environment

In its recent paper on growth in the Pacific AusAID identified a number of policy and institutional factors that explain much of the poor economic performance of most PICs. These factors are (AusAID 2006a):

- Government activities are not transparent, and government institutions responsible for law and order and macroeconomic stability need to be strengthened.
- Market institutions do not work well — reforms are needed to improve infrastructure, reduce regulatory barriers and improve property rights, particularly relating to land.
- Social service provision and public investment in improving and maintaining human capital through the education and health systems is typically weak.
- Public sector regulation to address market failures — for example in the area of environmental sustainability — is often inadequate and sometimes corrupted.

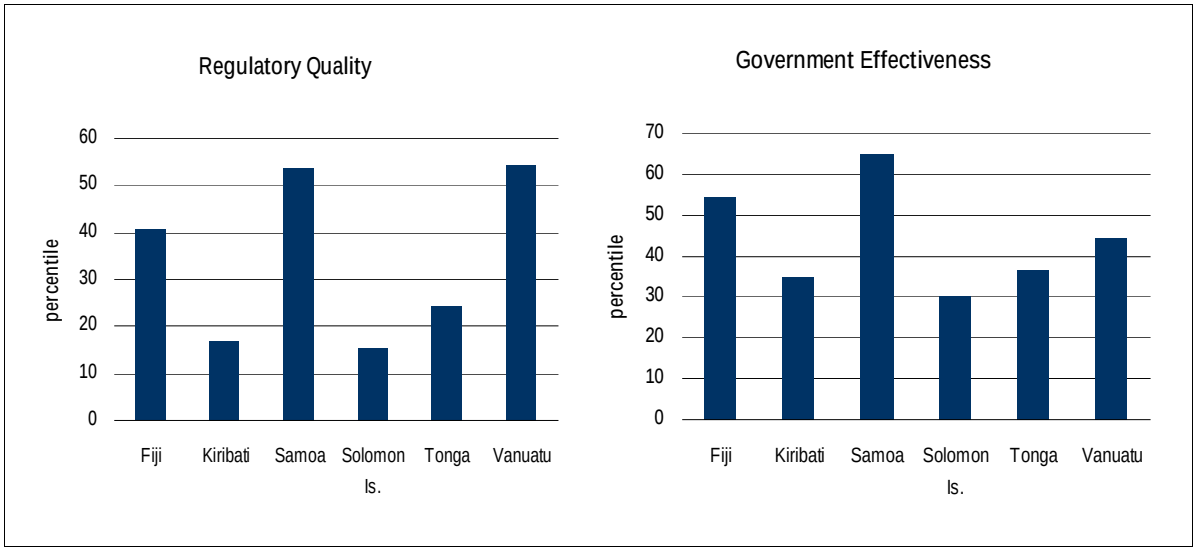
The Pacific 2020 report characterised the underlying problems as ones of poor governance. Certainly most PICs rank poorly on international measures of governance quality. The World Bank has been collecting world wide governance indicators on 213 countries since 1996 (World Bank 2006). These indicators cover government effectiveness, regulatory quality, the rule of law and control of corruption. The PICs covered by the data set generally rank below the 60th percentile in these indicators. As chart 4.11 shows the PICs are typically below the 50th percentile of countries evaluated in the two key areas of regulatory quality and government effectiveness. Only Samoa lies in the top half of countries on both measures. (Appendix 9.9 sets out the World Bank data in more detail.)

Some analyses suggest that the origins of poor governance are not simply technocratic failings of systems, structures or processes, but are intertwined with the political culture of the countries involved. For example, a recent paper prepared for the World Bank that tried to identify the binding obstacles to economic growth in a group of PICs concluded that clientilist politics[2] was the binding constraint to investment and growth in Kiribati and

[2] *By clientilist politics the authors were referring to a predatory rent seeking model of politics in which the voters (clients) expect that if their candidate (patron) is elected, then he/she will deliver benefits in some form, which involves concentration on delivering individual benefits rather than widespread public goods (Duncan and Nakagawa, 2007)*

Vanuatu, that continuing political instability was the key constraint in Fiji (Duncan and Nakagawa, 2007).

Table 4.11. Regulatory quality and government effectiveness (2005)



Data source: World Bank (2006)

4.3.1 Impacts on rural activities

These broad factors manifest themselves in specific constraints for the rural activities in PICs. Many PIC farmers continue to stay engaged in quasi-subsistence agricultural and fishing activities, foregoing the gains from specialisation and greater engagement with the market. In many cases this is a rational response to an uncertain world. Exposure to natural disasters is exacerbated by political and policy induced instability that disrupts access to local and international markets, constrained access to financial services and the scope they provide for managing risk, and policies that increase the risks associated with specialisation. Farmers are particularly affected by (AusAID 2006c)

- insufficient investment in roads, jetties, wharves, airfields, market facilities as well as energy and communications infrastructure, along with regulation which often constrains entry and competition in these services which are critical to development of and access to markets for agricultural produce
- insufficient access to new technology and market information due to lack of industry-led research and extension, limited contracting out of extension services and impediments to commercial provision of inputs, know how and market information by traders and agricultural service firms
- marketing arrangements that require farmers to sell to particular buyers
- limitations on access to international markets due to poor quarantine and quality assurance services.

In the forestry sector, ineffective governance and poor forestry management are contributing to serious degradation of the forest resource and significant environmental impacts, with logging in some PICs operating at two or three times sustainable yields (AusAID 2006d). Further, local communities often receive limited benefits from natural forest logging, and plantation forestry, whether large scale, village or household often faces strong disincentives. Problems in the sector include:

- lack of adequate legislative frameworks for conservation
- inadequate implementation and enforcement of existing policy and legal requirements, leading to illegal logging and transfer pricing to avoid resource taxes

- inadequate arrangements to ensure transparency, accountability, information flows consistent application of policies and laws relating to forest exploitation
- limited capabilities to monitor and control logging intensities, including resolution of any property right issues that may see land owners being entitled to compensation for property rights foregone
- difficulties in developing and ensuring adherence to appropriate contractual arrangements between landowners and loggers
- poor incentives to encourage reforestation and use of plantation timbers, because in some countries plantation timber exports are taxed the same as natural forest timber exports, combined with difficulties with respect to customary land and resource tenure systems.

Sustainable development of the fisheries sector is constrained by similar problems with respect to public sector governance and capacity to develop and enforce mechanisms for resource management. Commercial exploitation of offshore fishing resources is affected by policy instability, high taxation, slow immigration processes, investment insecurity, administrative blockages, corruption and poor dialogue between government and industry (AusAID 2006b). The sector is also hamstrung by inadequate and poorly operated port infrastructure, and limited facilities and services to assist meeting seafood quality standards in export markets and to maintain biosecurity and quarantine protections. Sustainable management of regional fisheries in the Pacific is also affected by gaps in cooperative arrangements, and fisheries management agencies suffer from limited technical and analytical capabilities. Ensuring the sustainability of coastal fisheries is affected by the absence of appropriate mechanisms to define and manage over-fishing, and ways of interacting with and strengthening traditional management systems.

Development of rural activities is also impeded by institutional and policy problems whose immediate impact is outside of the primary sector. For example where foreign and domestic investment in distribution, transport, trading and communications is discouraged, these services may not be provided — or are provided at high cost — and there will be limited incentives for rural enterprises to increase production or to explore alternative livelihoods.

5 Impediments and adoption of research

When producers, processors, distributors or traders decide to adopt the results of research, they are making a decision to invest: incurring costs in the expectation of a future return. Even if they do not have to pay for the technology, they inevitably have to devote time to understanding what is involved and how to implement the new ideas, and often complementary expenditure of cash or labour is required. They will only do this if they have an expectation that there will be some kind of return, whether in terms of higher incomes, reduced effort or better management of risk. If policies and institutions reduce the incentives to invest, people will be reluctant to experiment with new ideas or to adopt research results.

An important question, then, is how the broader policy and institutional issues raised in chapter 2 impact on the costs of and returns to investment in rural activities. Answering this will help to establish how these policy and institutional factors may create impediments to the uptake, effectiveness and hence impact of particular ACIAR research projects.

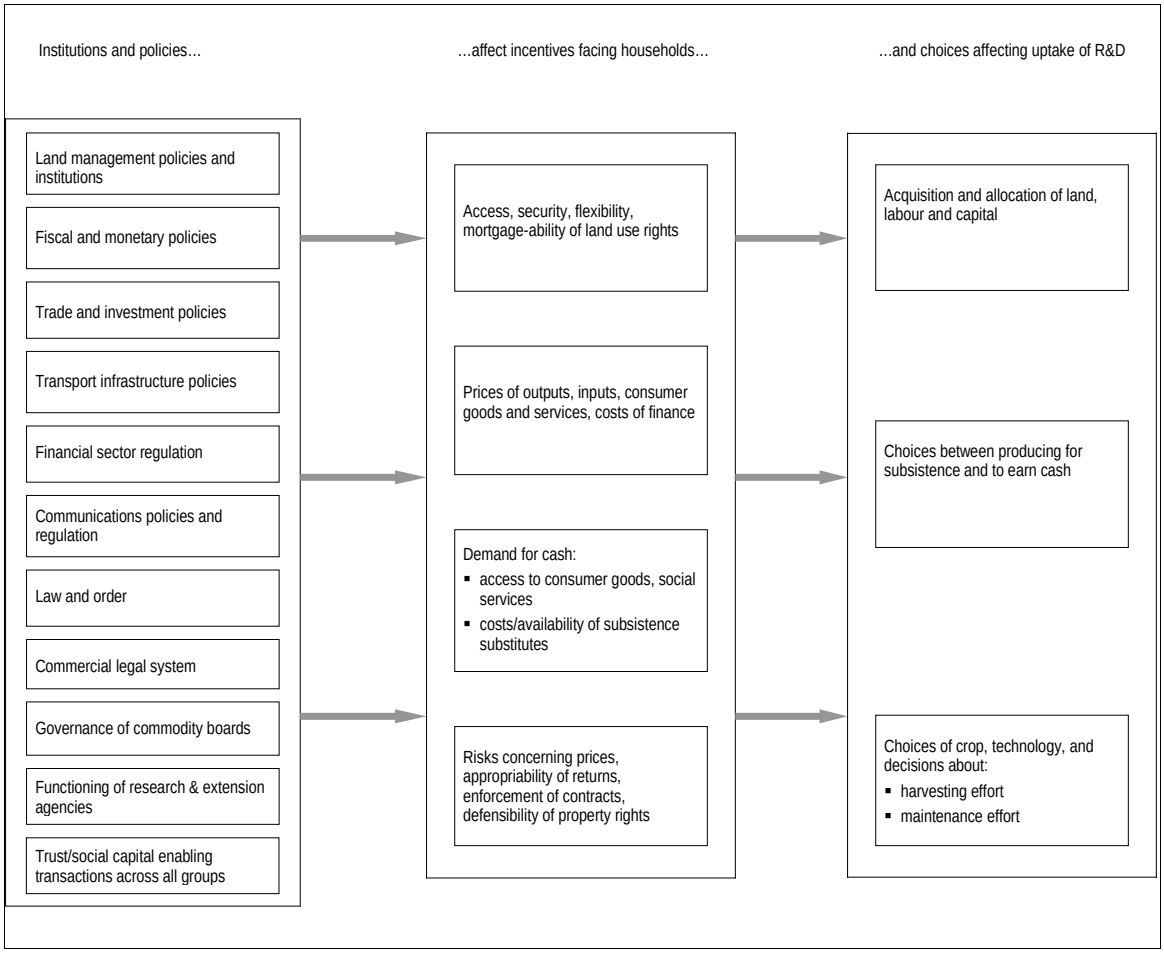
5.1 Impacts on the uptake of ACIAR research

Chart 5.1 presents a stylised framework for thinking about the effects of policy and institutional factors on the uptake of ACIAR research. Because so many producers in PICs are smallholders engaged in a mix of subsistence and cash activities, often the main channel through which these constraints are transmitted stems from how they impact on the provision of services throughout the value chain.

A critical ingredient is impact on channels for transmission of the outputs of research to the ultimate users. There can be many pathways to adoption, including commercialisation, communication, capacity building and in some cases government regulation. In many countries government extension services have been developed to transmit information to producers, although in practice in the Pacific it is often commercial channels — traders and input suppliers — that carry out this function. Policies and institutions affect these channels: either through the quality and reach of government delivered or funded services, or through their effect on the incentives that the private sector has to transmit information and on their ability to recoup the costs involved. Often this hinges on the ease with which entrepreneurs can enter into and enforce contracts with growers. And at the same time, the policy and institutional environment shape the confidence that producers and processors have that they will be able to achieve reasonable returns on investment in new technologies: here defensibility of property rights, as well as predictability of policy often play a key role.

The following discussion explores in more detail how policy and institutional factors can blunt incentives for transmission and uptake of agricultural research findings.

Table *5.1. How institution and policies affect uptake of R&D*



Source: adapted from Quirke, Harding and Warner, 2007

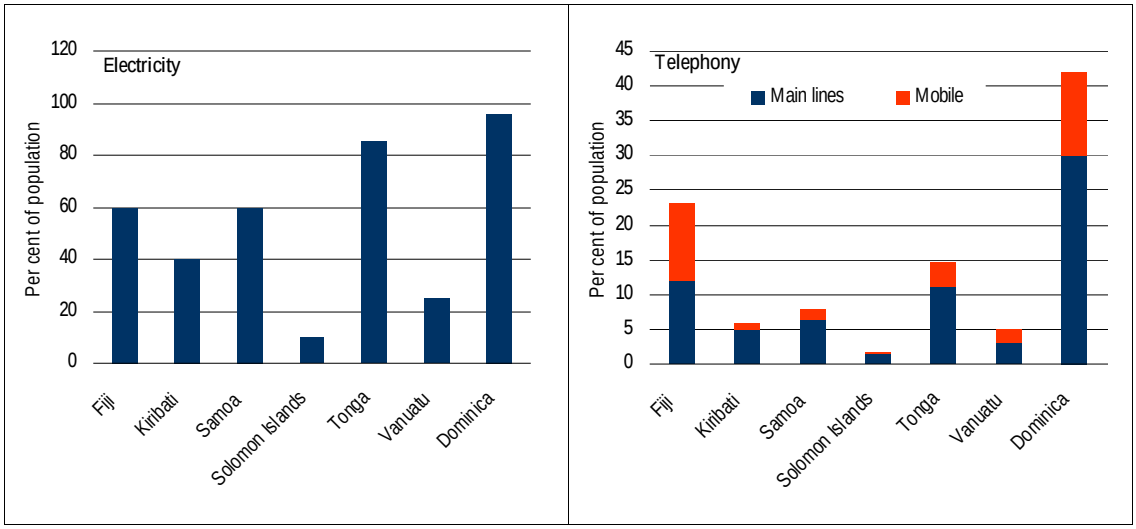
Poor infrastructure services raise production costs

In any production process, infrastructure and utility services are important. Power is needed to drive machinery/refrigeration; transport is needed to get products to market; and telecommunications are needed to allow buyers and sellers to locate one another and to trade.

Because most PICs are geographically isolated from the main world markets, and typically comprise collections of islands, many quite small, transport and communications and delivery of utility services are inevitably costly. Unfortunately, in many PICs, inefficient state owned and operated monopoly utilities see infrastructure costs being inflated, and this in turn raises operating costs and reduces competitiveness.

A recent review of infrastructure in the Pacific reported that ‘Pacific countries generally have lower levels of access to telecommunications, electricity and improved water and sanitation than similar countries with the same level of income as the Caribbean Islands or the Philippines (where a significant proportion of the population live on small islands)’ (World Bank 2006b).

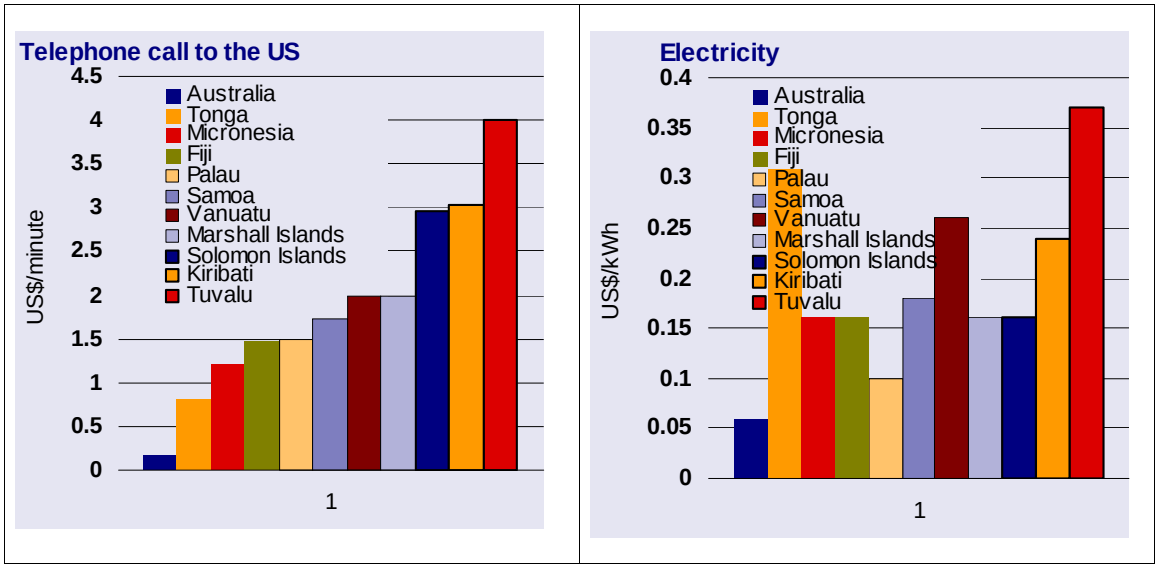
Chart 5.2. Access to electricity and telephones



Data source: World Bank 2006b

As chart 5.2 shows, the cost of international telephone calls ranges from 5 to 25 times the charge in Australia. Isolation and size account for some of this difference, but it is also driven by policy towards the sector, which frequently underpins monopolisation. As the chart shows, Tonga, which has allowed competitive entry, has much lower charges than the other countries. Electricity charges are similarly very high, ranging up to 6 times the cost in Australia. Smallness and fragmentation explain some of this cost, but policy also plays a role in high utility and infrastructure charges (see box 5.3).

Box 5.3. Telephone and electricity charges



Data source: (Holden, Bale and Holden, 2004)

Transport is expensive; with inter island transport often unreliable. This is often due to neglect of infrastructure and restrictions on entry in to transport service provision. A recent paper on smallholder agriculture in Solomon Islands pointed out that the decline in shipping, exacerbated by the effects of the ethnic tensions, left many rural people without cost-effective, regular and/or predictable links to markets and services (Warner, McGregor, Wore and Pelomo, 2006). The paper observed that:

> Formal and informal regulation and taxation have constrained entry into inter-island shipping. The vital role that inter-island shipping plays in the nation's economy has consistently triggered interventionism. In the past, provincial governments, with support from donors and central government have approached the provision of

shipping as a public service and a source of revenue. Implicit and explicit subsidisation (through gifting of ships or allowing companies to run indefinitely at a loss) and restrictive licensing have crowded out provision of competitive private services.

In a similar vein, the ADB's review of Vanuatu's agriculture and fisheries sectors observed that 'high cost and unreliability of interisland shipping because of anticompetitive practices, poor communications and high fuel and other input costs' were a major constraint to development of these sectors (ADB 2000). The ADB's private sector assessment for Vanuatu reported an example of a nascent fish export industry, in which a trader provided ice and ice boxes to small fishing communities in the outer islands and returned to collect the fish for export, was stymied by unreliable airfreight services. (ADB 2003).

5.1.1 Examples of restraints on competition in provision of utility services

The ADB assessment of the Pacific private sector presented a range of examples where governments had created legal monopolies in the provision of utility services and prohibited any form of private sector competition. They included:

- In Samoa the power company does not allow owners of private generators (who install them because of the unreliability of power supply) to operate them except during power failures, unless they are granted approval from the company. No such permission has been given.
- In Kiribati, the government-owned public utilities and energy company provide all utilities to the country, but service is poor because of frequent power supply, water and sewerage problems.
- In Vanuatu, the power and water companies are jointly owned by the Government and a foreign state-owned power company. Power is delivered reliably, but at rates that are among the highest in the world. Similarly, one company has monopoly right to handle freight, and port-handling charges are also among the highest in the world Vanuatu. (Holden, Bale and Holden, 2004, p 101)

The inability to get produce to market and/or be cost competitive places a question mark over the motivation for adopting new production techniques developed by ACIAR funded projects.

Taxes also raise costs and distort incentives

Many PIC Governments use border taxes (such as tariffs and export duties) to raise a large share of taxation revenue. Import tariffs are an important source of revenue in most PICs. Table 5.2 presents information on the role that import duties play in government revenues, and on average implied duty rates (ration tariff revenue to value of imports) for the PICs covered by this study.

Table 5.2. Reliance on import duties

	Average tariff rate 1994-1995	Revenues as a share of tax revenue (2000)	Revenues as a share of total revenue (2000)
	%	%	%
Fiji	11.2	32.8	21.9
Kiribati	22.1	64.1	22.2
Samoa	17.8	34.0	16.4
Solomon Islands	10.9	23.7	14.3
Tonga	15.0	30.7	21.2
Vanuatu	22.5	57.5	48.1

Source: CIE 1998, Scollay 2001

Tariffs act to push up the cost of imports. With most production inputs (fertiliser, machinery etc) being imported, tariffs raise operating costs and reduce competitiveness. (In the case of Solomon Islands, high nominal tariffs have been accompanied by a very discretionary system for granting tax duty exemptions. With duty collections amounting to around 11 per cent of the value of imports, this means that some imports are taxed very heavily. Further, interactions with domestic taxes often lead to total tax rates of 45 per cent on some imported commodities (Warner, McGregor, Wore and Pelomo, op cit).) Export duties lower the return from exports, and hence reduce incentives to export and earn foreign exchange. High tax rates generally reduce incentives to be productive; can introduce distortions into the economy that adversely impact on some sectors: and influence production decisions. Taxes will act to lower the return to effort, and in so doing will impact on the uptake of ACIAR funded research.

Functioning markets are critical

Historically, markets were typically physical buildings/locations where products were traded, such as a vegetable market. However, with the advent of telecommunications, markets today can also be networks of buyers and sellers physically linked via phone and/or computer networks and linked institutionally via trading rules and conventions.

The marketplace price for a particular good conveys information about the relative demand for that good and the relative costs of providing it. Prices provide an incentive to increase profitable activities and to decrease unprofitable activities. That is, prices provide motivation for decision makers. If markets are working efficiently, then prices will reflect all available information and resources will be allocated to their highest valued activities.

The policy and institutional environment can impede the operation of markets. Ultimately, such impediments will be related to either physically limiting market access (products cannot get to market), or the ability to access consumer demand (cannot compete on price). For example, high transaction costs (due to say poor transport infrastructure) may prevent some would be producers from physically accessing some markets. And even if they can get their products to market, the high transaction costs may mean they are not price competitive. Inadequate financial services will likely limit participation in the cash economy, and hence prevent farmers moving from subsistence agriculture into higher valued cash crop agriculture.

If markets cannot be accessed, then there may be little incentive to adopt ACIAR funded research that targets commercial production activities.

Land tenure constraints have widespread impact

Access to productive land is a necessary requirement for a viable and successful primary sector. With around 90 per cent of land in the PICs under customary ownership, securing access (whether freehold, lease, cooperative ownership etc) can be a time consuming and costly process for investors who are not part of the group in which ownership is

vested. Unclear land use rights present problems for many would be producers, as does identifying the land owners with whom tenure/use negotiations must be held. Producers are unlikely to invest in/improve land if their rights are uncertain or face risks associated with (largely undocumented) customary laws.

Customary ownership of land also precludes using land as collateral for loans, as lenders cannot take possession of the land in the event of a loan default. In all developed countries, mortgages and other sources of credit that depend on land as collateral are the main sources of credit (Holden, Bale and Holden 2004). This can only happen if land tenure arrangements are formalised and underpinned by official recordings noting ownership, property boundaries and land use rights.

For some commercial operations, such as plantation forestry and palm tree oil, people are finding ways around some of these land tenure constraints. For example, nucleus estates with out-growers seem to be quite successful with palm oil, but less so with other tree crops. (Box 5.6 explains some of the factors underlying the success of oil palm in Papua New Guinea. The company which runs these operations has recently acquired Solomon Islands' plantation, and is putting in place similar operations to work with smallholders growing palms on customary land.).

Contracting is difficult

In many PICs the general legal, institutional and policy environment for investment is not conducive to investment in services to agriculture: trading, finance, information provision and input supply. The problems range from poor legal and judicial support for enforcement of contracts and pledging collateral, to costly, time consuming and frustrating processes for company registration (Holden Bale and Holden, op cit).

The limited reach and impact of legal and judicial underpinnings of a market economy make it difficult to enter into and enforce contractual arrangements. This in particular works against the widespread development of contract growing, an important way for entrepreneurs to act as the interface between smallholders and domestic and international markets. Traditional institutions may make contracting feasible within closely knit communities: but some PICs are ethnically and linguistically heterogeneous, where trust between communities is typically and historically low. People find ways of dealing with the limitations of these institutions, but the absence of widely 'accepted' norms about contractual behaviour add to the risk, uncertainty and costs of doing business. And, of course, recurrent breakdowns in law and order, with associated destruction of property do not assist in building trust.

5.2 Oil Palm In PNG

New Britain Palm Oil Limited's (NBPOL) operation in New Britain has proved to be a very successful application of a nucleus estate/outgrower model involving smallholder cash crop production on land with a range of tenure characteristics, including customary tenure. The company is highly competitive with producers in Indonesia and even exports genetic materials. There are several possible reasons for this:

- processing of production is centralised, where smallholders supply fruit to a mill operated by a nucleus estate company
- processors provide smallholders with access to credit and extension services
- growers receive price signals more readily than in other industries
- oil palm has benefited from a reasonably coordinated approach to land, where alienated land was subdivided into smallholdings with the clear intention of developing an oil palm nucleus estate-smallholder scheme.

The major difference between oil palm and other tree crop industries in PNG appears to be the coordinated, centralised processing that is facilitated by the nucleus model. There are clear advantages in centralising processing; particularly that it assists in maintaining a consistent product standard and quality. In PNG's oil palm industry, effective communication and extension services also assist this process by alerting producers to any problems with their produce and ways to rectify these problems.

Allowing grower's access to credit through processing companies provides oil palm smallholders with a major advantage over smallholders involved in other tree crops. A major constraint in the adoption of new technology by smallholders in other industries is a lack of access to credit. The nucleus estate model provides credit to growers by taking advantage of the incentives of processing companies to secure supply and ensure product quality.

In addition to providing extension and credit to growers, some estate companies also take responsibility for transporting smallholder fruit to their processing mills. Access to transport is an extremely important consideration. Since it also enables communication between the processor and growers.

The clear implication of the success of oil palm in PNG is that it is not easily replicated in other industries. That is not to say that some of the characteristics that have assisted oil palm production are not amenable to other industries. However, some characteristics inherent in the coffee and cocoa industries make it unlikely that the oil palm production system could be widely adopted by the coffee and cocoa industries. The major restriction facing these industries is that are geographically dispersed and so cannot reap the benefits of large scale processing, and the associated provision of information and extension services. The major lessons from oil palm in relation to the coffee and cocoa industries are the importance of efficient post harvest handling and good communication and information flows to growers. It is clear that both these issues are major constraints on the coffee and cocoa industries and the challenge is how to improve them, largely within the current industry structure.

NBPOL has recently acquired Solomon Islands Plantation Limited's oil palm plantation in Guadalcanal which closed in 2000, in part because of problems with landowners and frictions with plantation workers that had come from other islands. The company plans to adopt the same approach to introducing oil palm cultivation that it has used in Papua New Guinea. The model for Solomon Islands involves a central processing facility in a nucleus estate and out-growers with 4 hectare blocks, in which 1 hectare is reserved for gardens. The company will provide a guaranteed market outlet for out-growers, as well as technical extension services and credit in the form of production inputs. It can provide credit because it can deduct repayments from growers' returns: and because there are significant economies of scale in processing, it will not face the problem that other tree crop processors/input providers have when growers sell output to competing entities. (Quirke, Harding and Warner, 2007, Warner, McGregor, Wore and Pelomo, 2006.)

The near-absence of legal and judicial support for contracting, combined with the dominance of customary land tenure (and chronic problems with the management of alienated land) works against extension of the reach of the financial sector in the country. If traders cannot pledge security to receive credit, then they will not be able to enter into credit related arrangements with farmers: and yet the credit offered by traders and input suppliers is often the main interface between farmers and the formal financial system.

While constrained access to credit is one consequence, an equally important problem is the limited provision of other financial services, particularly savings and cash management. Traders purchasing rural produce, or supplying trade goods into rural areas are hamstrung by the lack of mechanisms to make and receive payments, and must often carry significant amounts of cash. Some rural entrepreneurs have quite large cash balances, and wish to be able to find a secure way of saving these balances. Rural people also lack the risk management potential that financial savings can offer.

5.3 Where do the identified impediments impact?

Policy and institutional constraints can impact anywhere in the value chain for rural produce: they may directly affect inputs into farm production, or farm gate prices for produce, or they may affect processing, transport and distribution of output and inputs, or they may impact on the willingness and ability of consumers to purchase produce. However, wherever they have their direct effect, they will almost invariably impact on rural households. Anything that impacts elsewhere in the value chain will have an indirect effect at the farm level. For example, an export tax on processed food products will reduce the return to exporters, as they are generally price-takers in international trade and thus must internalise the cost of taxes. Some of this price reduction will be passed back onto farmers: it will not all be borne by traders. Similarly, the absence of legal and judicial support for entering into and enforcing contracts will diminish the willingness of producers and traders to engage in transactions to supply markets, which will impact on farm returns.

Thus while some of the policy and institutional problems identified in chapter 2 may not seem to directly affect rural households, they will still constrain opportunities and reduce returns to investment in new technologies. Chart 5.7, which provides an example of a value chain, illustrates this, as it shows how important, for example, the service sector is in intermediating between farmers and final consumers. ACIAR activities often target these kinds of off-farm activities, such as post harvest processing off-farm, transport, cold chain technology, meeting export sanitary and phytosanitary protocols etc.

5.4 Assessing the impact of impediments

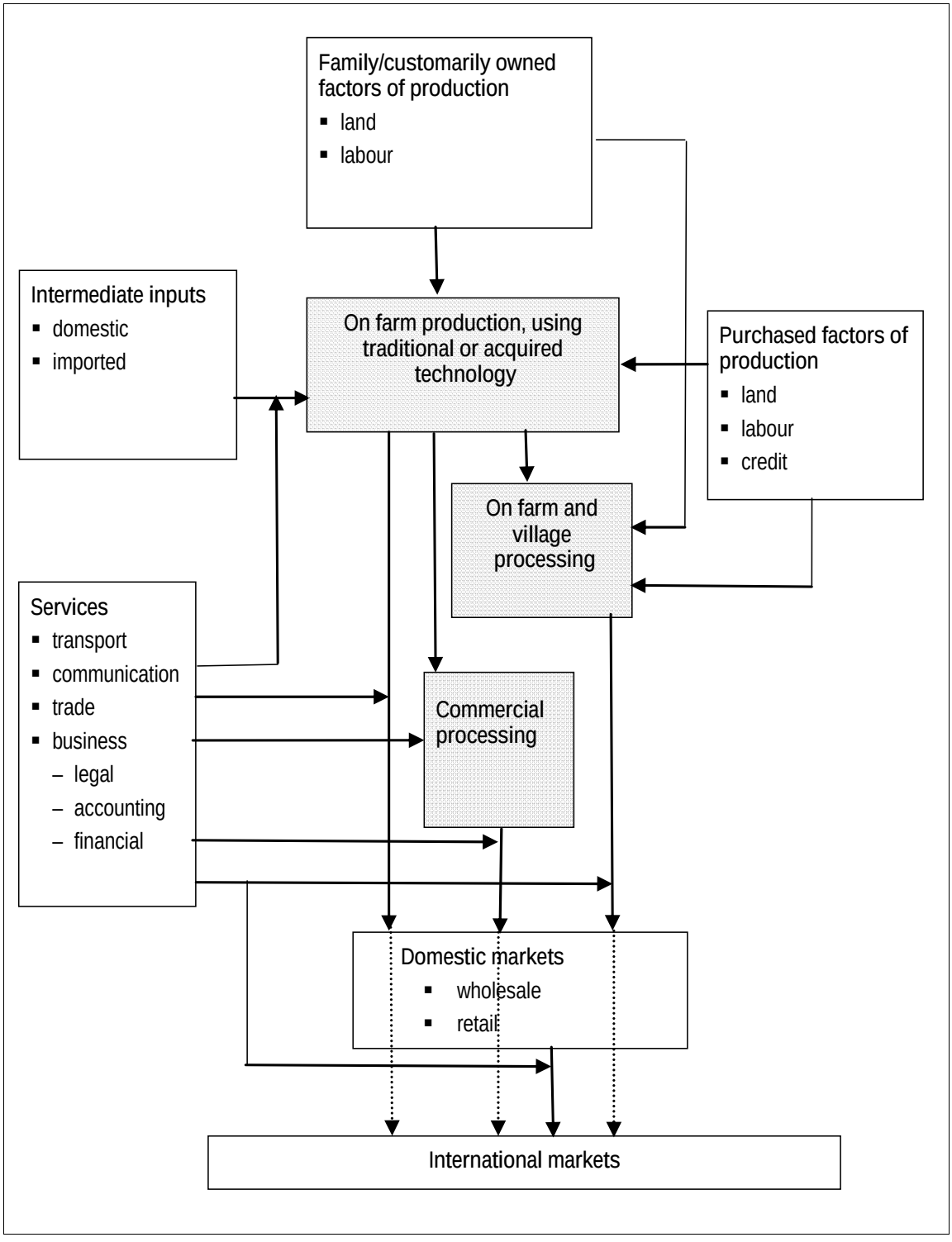
Institutional impediments may create inefficiencies increased risks, and social disharmony

Institutional and policy impediments can impact in a number of ways. Some examples are provided below (note that some impacts, such as increasing production costs, can arise from both institutional and policy impediments).

Institutional impediments may lead to:

- limitation of transactions to only known parties, thus not allowing scale economies to be exploited
- increased risks and uncertainties associated with some activities, thus increasing costs and reducing the incentive to be involved with that activity
- limiting the functionality and efficient operation of markets
- restricted access to land
- misuse of collected taxation revenue and poor provision of government services
- social disharmony with some citizens being treated more favourably than others in the community
- the government being subjected to excessive (and aggressive) lobbying by those who stand to gain from discretionary decision making.

Figure 5.7.A stylised value chain



Policy impediments may create lower productivity, higher costs and lower economic activity

Policy impediments may lead to:

- reduced incentives to innovate as 'rewards' from innovation cannot be captured
- decreased productivity
- increased production costs (and hence loss of competitiveness and decreased sales)
- inefficient use of natural resources (land, water, forestry and fish stocks etc)

- reduced private sector development and movement from a subsistence to cash economy
- lower household income, GDP and economic development.

The impacts of institutional and policy impediments can therefore have a financial, social and/or environmental dimension.

Financial imposts can be assessed through investigating the impact on production costs, prices received and profitability at the various production stages. Intangibles such as decreased incentives to innovate, participation in the market can only be assessed qualitatively.

Estimating any social impost is difficult…

Assessing imposts at the social dimension is much more difficult as values need to be placed against any dislocation or inequity that certain groups in the community believe that they are experiencing. A further difficultly concerns verifying whether inequity is actually occurring. Identifying the improvement (and valuing this) in the quality of government services provided to the community if resources were not misused can also be difficult.

…as is determining any environmental impost

Considering the impacts at the environmental level raises the issue of sustainable resource use, and the implications for future generations if natural resource use is not sustainable. The (future) impost associated with an institutional and policy environment that allows over exploitation of natural resources can be estimated by quantifying the economic activity, employment etc that will be lost if resource management does not improve

6 Outcome of consultations

To help move from the general discussion of potential impediments presented in the reports summarised in sections 4 and 5, this study:

- consulted with leaders of some ongoing ACIAR projects in the Pacific, to get their perspectives on the impact of the policy and institutional environment on the likely uptake of research
- drawing on the results of these consultations, held a workshop with representatives of stakeholders in agricultural research to explore the issue of impediments and possible strategies for dealing with them.

This chapter summarises the key observations arising from these interactions.

6.1 The survey of project leaders

Table 6.1 summarises the main factors impacting on the implementation of ACIAR research raised by project leaders. Project leaders identified a number of actual and potential impediments, including:

- difficulties in gaining regional cooperation to address common problems
- a lack of appropriate extension capability to implement the findings
- lack of an entrepreneurial culture
- concerns over the impact of modern agricultural methods on the environment (pesticides, chemical fertilisers)
- government intervention in the project outcomes (for example, to exclude the private sector)
- poor access to inputs such as fertilisers and insecticides
- concerns over the impact commercialisation of an agricultural crop may have on subsistence farming in that crop
- distortions caused by the use of transfer pricing.

Table 6.1. Key issues raised by survey of project leaders

Project	Project leader responses
Regional — maximising economic benefits of Tuna migratory stock	expected lack of cooperation between the regional stakeholders to implement project outcomes PICS unable to maximise returns on their fish stocks due to: • lack of a united front to set common fee rates for distant water fishing nation (DWFN) access • small domestic markets create reliance on access to DWFN markets • DWFN tend to negotiate fees and aid on a bilateral, rather than multilateral basis.
Solomon Islands — hardwood nutrition	unsustainable forestry practices ethnic tensions subsistence farming political instability transfer pricing need to ensure private sector involvement for project success lack of an entrepreneurial culture.

Fiji — taro beetle management	environmental degradation from use of pesticides possible over-production of taro may lead to a marketing problem and therefore lack of interest in the crop commercialisation of the crop may reduce incentives for subsistence farming.
Vanuatu — yam nutritional disorders	lack of continuity and integration of the research effort and integration with ongoing development effort deep-seated resistance to use of fertilisers on traditional crops lack of suitably trained extension personnel.
Tonga — squash disease control	poor returns to squash crops squash perceived to be environmentally damaging exporters buy inputs for farmers and instruct them how to grow the crop – so new technologies need to be targeted at exporters also delays in research program due to death of the king and subsequent unrest.
Samoa — Brassica crops pest management	access to appropriate insecticides lack of adequate extension support and advice.
Kiribati — pearl oyster resource development	government intervention in the project outcomes (for example, to exclude the private sector) lack of adequate extension support and advice inter and intra-island politics impacting on choice of (inappropriate) farming sites.

Source: CIE survey of project leaders.

6.2 The workshop

The workshop involved a range of stakeholders from the research community, regional institutions, private firms and farmers' organisations. Participants drew on an issues paper discussing some of the diagnosis of policy and institutional problems summarised in section 4, and the results of the survey of ACIAR project leaders. In addition to discussing impediments to adoption of research, the workshop also identified areas where ACIAR might undertake policy studies to gain a better understanding of problems and strategies for dealing with them.

One of the persistent themes from the workshop was that ACIAR's project selection and design methods sometimes fail to take adequate account of questions of commercial viability and the link between commercial involvement and adoption. The methods were thought to involve insufficient:

- market and risk analysis
- consultation with the private sector and engagement during project life
- analysis of incentives shaping decisions by quasi-subsistence farmers[3]
- recognition of incentives driving researchers — publication can be more important than impact of the research
- consideration of appropriate contractual arrangements with private sector collaborators.

Participants also emphasised a need to take account of what were described as cultural factors that shaped the responses that smallholders in the Pacific may make to new opportunities created by research. Participants advised that:

[3] *It was noted at the workshop that it will be necessary to be very careful who provides this analysis. It is possible that farmers in Fiji may give answers they think donors want to hear, so the aid will not be impeded. Sometimes government extension officers may influence what farmers say, so that project funding proceeds.*

- an understanding of cultural issues is lacking in a lot of overseas funded projects in the South Pacific where the donor assumes the community will value commercial outcomes of a project exactly the same as other communities, such as Asia or the West
- there is a need for sociological as well as scientific and economic components in the design of the projects.

Specific institutional and policy factors affecting investment in adoption

The workshop discussed problems being encountered by the case study projects, and identified a range of barriers to adoption of research findings for each project. These are summarised in table 6.2.

Table 6.2. Barriers to adoption of ACIAR R&D — identified at workshop

Project	Top barriers
Fiji — Taro beetle management in PNG and Fiji	Cost of chemicals – pesticide too expensive due to local monopoly brand Method of application – not user friendly Culture aspects – need education about pesticide use Risk relating to the natural environment and security of the crop (up to 10% stolen) Environmental degradation (cultural education needed for safe use of the pesticide).
Vanuatu — Diagnosis and correction of nutritional disorders of yams	Resistance to fertiliser use (need for education) Poor quality of extension service linked to poor resources in departments of agriculture Lack of continuity in work, issues, once the ACIAR project end.
Samoa — Integrated pest management in a sustainable production system for Brassica crops in Fiji and Samoa	Competitiveness of the cost of the new pesticide Weak linkages between players Enforcement of the pesticides law Pesticide residue and health concerns (poor regulation) Question of what happens when ACIAR project ends.
Tonga — Integrated disease control strategies for powdery mildew and other problems in squash in Tonga	Market price is too low Land tenure creates land availability problem Lack of credit facilities (interest rates and lack of security for credit).
Solomon Islands — Nutrition of tropical hardwood species in plantations in the south-western Pacific	Lack of clarity in project outcomes/objectives between the private company (KFPL), forestry department and others (relates to project design) Shift in project priorities over the life of the project Technology restricted to the private company (not available to small holder farmers) Cost of fertiliser and of setting up the nursery.
Kiribati — Pearl oyster resource development in the Western Pacific	Poor links to economic/marketing information - commercialisation of the trials will be difficult Interference in site selection (government concern to prevent urban drift) Barriers to investment – need security in property tenure and more secure rights for entrepreneurs Unrealistic expectations at outset of project.
Regional — Maximising the economic benefits to Pacific Island Nations from management of migratory tuna stocks	Biological basis of market Ability to undertake national level analysis Model very complex – will be difficult to replicate.

Source: ACIAR Workshop March 2007.

The workshop went on to discuss policy and institutional issues that may underlie these barriers. They broadly fell into the following categories.

Security of property rights and tenure

Participants argued that lack of security of property rights with respect to natural resources impacts in at least two key areas:

- customary fishing rights may be well delineated at the local level, but lack of formal definition may complicate transfer to external investors and attempts to undertake aquaculture projects or to adopt broader reaching approaches to managing marine resources
- land tenure and its impact on mobilising land for investment and on ability of landowners/users to use land as security for loans[4].

Government funding and approach to agriculture, research and extension

Participants pointed to:

- a low priority given to agricultural research and extension activities, and inappropriate targeting of sectoral budgets
- dependence on donor funding means that governments do not fund other or ongoing R&D and technical support
- low priority on spending on agriculture
- inherent weaknesses in extension services – status, training, funding of operational expenditures, linkages to research activities[5].

Agriculture ministries were seen to be hamstrung by lack of professional technical expertise to undertake research work because many of the key staff have migrated to Australia and New Zealand or gone to work for regional organisations[6].

Low levels of trust and the inadequacy and inappropriateness of formal methods of contract creation and enforcement.

Low levels of trust between different communities in PICs, and the limited reach of formal mechanisms to underpin commercial contracting were seen to:

- erode development of forward and backward linkages in supply chains
- disable growth of contract growing, and scope for formal enterprises in distribution/marketing as well as input supply to provide credit and technology
- make it difficult for exporters to enforce contracts made with growers because the village-sector farmers have no assets and there is no point in taking them to court.

Weaknesses of national sanitary and phytosanitary systems

Exporting agricultural produce and seafood to most developed country markets requires meeting stringent standards. The weakness of local agencies responsible for sanitary and

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[4] *The Solomon Islands Agriculture and Rural Development Strategy (SIARDS), prepared by the Government and a consortium of donors led by the World Bank, highlighted the role of land tenure issues in the demise of the Russell Islands coconut plantation (Ministry of Development Planning and Aid Coordination, 2007)*

[5] *The SIARDS report described the effective collapse of agriculture and fisheries extension services as part of a broader decline of rural services in Solomon Islands associated with the long period of fiscal stress experienced by the country since the early 1990s.*

[6] *The SIARDS report described the effective collapse of agriculture and fisheries extension services as part of a broader decline of rural services in Solomon Islands associated with the long period of fiscal stress experienced by the country since the early 1990s.*

phytosanitary matters makes it hard to meet these standards[7]. It also leaves local producers vulnerable to pest and disease incursion.

Input costs and availability of inputs – especially fertiliser and pesticides

Cost and availability of inputs associated with new technologies were frequently seen to be a major deterrent to adoption. Participants recognised that there is a need to identify the underlying cause of perceptions of 'high' cost. For example:

- Is it that high costs of internal and international transport affect input and farm-gate prices? If so is this a function of taxes, regulatory monopolies or inadequate infrastructure?
- Is it that the economics of new technologies are fundamentally unfavourable and grower returns are too low or uncertain for farmers to risk outlaying cash on inputs when there are other priorities?
- Or is it a cultural issue relating to the knowledge and values of subsistence farmers? Inputs actually reduce risks but subsistence farmers may not understand this, and expect fertilizers and chemicals to work miracles when they neglect other good crop husbandry practices such as proper land cultivation, weeding and seed selection. One participant's experience as a farmer was that new technologies that ease the work burden will be adopted more quickly than others.

Institutional capacity to absorb and use policy analysis

Weaknesses in key government agencies dealing with agriculture, forestry and fishing were seen as a significant problem. Participants commented on:

- the inability to make best use of analytical tools in policy making
- the political environment in some South Pacific countries can make it extremely difficult for civil servants to give an independent professional opinion if it goes against the Minister's views.

Limited capacity and willingness to enforce legislation

Participants described occurrences of legislation that is largely ignored, pointing to the need to understand if this is an issue of legislative efforts failing to take account of compliance and enforcement costs or whether agencies are under-skilled or under-funded. It was also proposed that in some situations there may be limited acceptance of the value of complying with the law. The workshop also discussed the fact that enforcing some legislation may have negative social consequences — for example, it was suggested that if the Land Conservation Act (1954) was strictly enforced in Fiji most of the farmers producing ginger would not be farming. Inconsistency in the application of by-laws also creates problems.

Corruption and poor governance

Corruption and limited transparency and accountability in government processes were seen to influence the targeting of beneficiaries and the consistency of application of regulations and taxation.

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[7] *This issue was highlighted at a paper delivered to a later workshop on Economics Research on Pacific Agriculture held at Lae, Papua New Guinea in July 2007. The paper identified quarantine agencies as the weak link in the Pacific island country horticultural export marketing chain (McGregor, 2007)*

Impact of government marketing agencies:

Participants argued that government participation in agricultural marketing erodes incentives for or prohibit development of private activities — particularly when government agencies monopolize the marketing of certain commodities. It was suggested that government marketing agencies are usually the market of last resort for growers. It was also suggested that the greatest beneficiaries of these agencies are often overseas importers who are able to make favourable deals with the agencies.

The deteriorating law and order situation

Participants said that law and order problems remain a serious constraint on market oriented production in some PICs. While margins for certain crops — for example water melons, taro and kava — are good, the risks of the crop being stolen are very high. One participant reported that gross margin analyses of selected crops by the Ministry of Agriculture in Fiji now take into account 10 to 20 per cent loss through thefts. It was reported that farmers in isolated areas have been violently robbed and a few have been murdered in recent years, and that farmers' produce may also be stolen when they bring it to the market.

Limited access to credit

Participants observed that banks are not providing credit to the agriculture sector because of weak security and poor performances of existing/past clients. As a result exporters are financing growers to some extent but have a recovery problem because the 'contracted growers' do not always sell the produce back to the same exporter, to avoid repaying the debt.

Weak industry councils

Participants argued that many industry councils are not functioning well. Industry Councils came into being in the 1990s when private/public partnerships became fashionable. Donor agencies may believe these industry councils represent a broad sector of stake holders when they may be in fact a one person show.

Lack of good farm managers

The development of commercial farming was seen to be constrained by the lack of farm management skills. Farming enterprises remain semi-subsistence or can only operate as a family unit. Rural labour is also hard to get on a consistent basis although there is surplus labour available. Examples were discussed of coffee plantation being abandoned due to insufficient pickers. It is possible the bigger farms will cease operations once key personnel retire.

Environmental degradation

Participants observed that a number of factors weaken incentives to avoid environmental degradation, suggesting, for example, that soil erosion is prevalent because the hardest working farmers see themselves as the last generation on the land. In a number of areas, government land allocation and rental practices encourage poor management.

6.3 Identifying impediments and their causes — workshop feedback

Workshop participants assessed the impacts of the key impediments identified for each case study. The findings are listed in tables 6.3 to 6.8. A significant number of the impediments were assessed to have a high impact on project outcomes. Possible areas for (any) future policy linkage studies were also identified where relevant.

It is important to keep in mind that while some impediments undoubtedly have significant impacts on the environment in which ACIAR projects are conducted, it may be beyond

ACIAR's scope to consider directly addressing the issue. Such an example is the customary land ownership issue. Here the challenge is not to suggest there could realistically be a short term change in such traditions but rather how can these ownership patterns be improved to meet the needs of research adoption and productivity enhancement/commercialisation at the producer level.

6.3.1 The Fiji case study — management of the taro beetle pest

As noted in chapter 2, agricultural GDP in Fiji is around 15 per cent of total GDP, while nearly 50 per cent of the population is involved in agricultural activities. The taro industry currently ranks seventh in terms of value of production in the FAO's list of major food and agricultural commodities in Fiji (FAO 2007). It ranks behind industries such as sugar cane, cattle and chicken meat, and coconuts. Taro production represents nearly 3 per cent of the value of production of the top 20 commodities. However it is the third ranked food/agricultural export, behind raw sugar and (spring) water. It currently makes up nearly 6 per cent of the value of major food/agricultural exports. (Raw sugar remains the major export – at 52 per cent of the total value.)

In the ACIAR taro case study, workshop participants reported a range of underlying policy and institutional impediments that are limiting the adoption of ACIAR research into control of the taro beetle pest (see table 6.3). Key themes are poor quality extension services, market barriers such as monopolies and tariffs increasing input costs; cultural issues; and poor governance (legislation not enforced). These impediments were all assessed to be of high impact.

Table 6.3. Assessing the impacts — Taro beetle management in PNG and Fiji

Impediment	Underlying cause	Likely impact	Ranking of impact[a]	Benefit if impediment can be addressed	Possible future ACIAR 'policy linkage study'
Cost of chemicals – pesticide too expensive due to local monopoly brand	Tariffs Monopoly suppliers of pesticide	Farmers will not use	1	increased quality, productivity, food security and sustainability of Taro growing Increased health More income for farmers	Analysis of policy and institutional impacts on supply chain for agricultural chemicals
Method of application not user friendly needs extension training	Extension role has low profile in ministries of agriculture	Farmers not getting informatio n they need	1		Assess extension resources in agriculture ministries
Cultural aspects – need education about pesticide use	80 per cent of commercial growers are Chinese and extension is not targeted to them	Majority of commerci al farmers do not benefit	1	Increased quality, productivity, and quantity of taro Increased grower return	Evaluation of scope and framework for greater involvement of private sector in ACIAR projects
Risk relating to the natural environment and security of the crop (up to 10% stolen)	Not addressed				

Environmental degradation (cultural education needed for safe use of the pesticide)	Government does not enforce legislation. Lack of work done by agriculture ministries and extension services to increase awareness	Long term social, health and soil fertility issues	1	Sustainability of whole system over time Improved health outcomes	na

[a] Ranked from 1 (high) to 7 (low). Source: ACIAR Workshop.

The issue of input costs is quite complex. It may be that the policy environment increases costs, but it may also be that even with access to world prices, farmers would think the input price is too high. The problem may be that the technology is inherently uneconomic — the expected returns are too low. This may be for a whole range of reasons affecting expected farm gate prices and costs. It may reflect the fact that the opportunity cost of cash needed to purchase fertiliser is high – some farmers use cash received to pay their children's' school fees. Alternatively, the technology may require scarce complementary female labour as an input, or more sophisticated management skills.

Participants suggested ACIAR consider future policy linkage studies addressing:

- policy and institutional factors impacting on pesticide/chemical inputs
- approaches to funding and delivery of extension services.

They also suggested that some thought needed to be given to find ways of better engaging the private sector in ACIAR research projects.

6.3.2 The Vanuatu case study — diagnosis and correction of nutritional disorders of yams

In Vanuatu, agricultural GDP is around 15 per cent of total GDP, while 77 per cent of the population is involved in agricultural activities. Yams are grown by around 80 per cent of households in Vanuatu, usually on small semi-subsistence holdings. Yams are not separately listed by the FAO in the top 20 food and agricultural commodities. However, the 'roots and tubers' category is currently ranked third in terms of value of production (10 per cent of total value), and 10th in the export rankings.

In the Vanuatu case study, workshop participants reported a range of underlying policy and institutional impediments that are limiting the adoption of ACIAR research into diagnosis and correction of nutritional disorders in Yams (see table 6.4). Key themes (overlapping to some extent with the Taro project) are market barriers such as tariffs and monopoly suppliers of inputs, the poor resources and profile of Ministry of Agriculture extension services; poor project design, and perverse impacts of donor influence on project direction. These impediments were all assessed to be of high impact.

Participants suggested ACIAR consider future policy linkage studies addressing:

- policy and institutional factors impacting on fertiliser use and the cost of chemical inputs
- possible impediments to other vehicles of fertiliser supply – such as exporters, traders and suppliers of agricultural inputs
- approaches to funding and delivery of extension services, and assessing the impacts of donor funding of extension on adoption of research outcomes.

Table 6.4.Assessing the impacts — diagnosis and correction of nutritional disorders of yams in Vanuatu

Impediment	Underlying cause	Likely impact	Ranking of impact[a]	Benefit if impediment can be addressed	Possible future ACIAR 'policy linkage study'
Resistance to fertiliser use (need for education) (seen as similar to the Taro issue)	Tariffs Monopoly suppliers of pesticide	Farmers will not use	1	Increased quality, productivity, food security and sustainability of yam production Increased health More income for farmers	Analysis of policy and institutional impacts on supply chain for fertilisers and agricultural chemicals
Quality of extension service (poor) linked to poor resources in departments of agriculture	Extension role has low profile in MAFFs	Farmers not getting information they need	1		Assess extension resources in agriculture ministries
Lack of continuity in work on issues once the ACIAR project ends	Projects not well designed Inadequate own-source funding of government research and extension agencies, over-reliance on donor funding	Research outcomes not sustainable	1	More sustainable research outcomes	Evaluation of scope and framework for greater involvement of private sector in ACIAR projects Assess impacts of donor funding of extension on adoption of research outcomes

[a] Ranked from 1 (high) to 7 (low). Source: ACIAR Workshop.

6.3.3 Samoa case study — integrated pest management in a sustainable production system for Brassica crops in Fiji and Samoa

In Samoa, agricultural accounts for around 13 per cent of total GDP, while 78 per cent of the population is involved in agricultural activities. The Brassica (or cabbage) industry is not yet large enough to be listed in the FAO's top 20 agricultural commodities. However, production of Brassica crops has recently increased dramatically in Samoa (and Fiji) and it is expected that Chinese cabbage will soon become the major source of green leaf vegetable in these countries. Currently Samoans are importing a large amount of cabbage that, if not for impact of the diamondback moth pest, could be locally produced.

In the Samoa case study, workshop participants reported a range of underlying policy and institutional impediments that are limiting the adoption of ACIAR research into integrated pest management for Brassica crops (see table 6.5). Key themes included: the cost of the new pesticide is too high compared with existing alternatives; lack of farmer education re the benefits of the new pesticide; poor resources and quality of extension services; and lack of an institutional environment to enforce pesticide legislation. These impediments were all assessed to be of high impact — farmers who fail to adopt the new pesticide risk total crop loss.

Table 6.5.Assessing the impacts — integrated pest management in a sustainable production system for Brassica crops in Fiji and Samoa

Impediment	Underlying cause	Likely impact	Ranking of impact[a]	Benefit if impediment can be addressed	Possible future ACIAR 'policy linkage study'
Competitiveness of the cost of the new pesticide with existing products	Lack of farmer understanding and education	Opportunity cost – lost crops.	1	No loss of crop which can be as high as 100 per cent	Approaches to farmer education and alternatives to public extension systems
Weak linkages between players	Farmers lack confidence in extension services Fall in standards and professionalism in the civil service Lack of capacity	Poor direction of research – too scientific; and Extension officers don't identify the real problem.	1	Increase in productivity	Assessment of resource allocation in Ministries of Agriculture and priority given to research and extension, including assessment of possibility of scrapping or contracting out extension services
Lack of enforcement of the pesticides law	Lack of capacity Lack of education Lack of trust	Health impacts.	1	Increased confidence Increased consumption	Evaluation of legal framework and regulation covering use of pesticides and programs for consumers and growers
Pesticide residue and health concerns (poor regulation)	Not discussed				
Question of what happens when ACIAR project ends	Not discussed				

[a] Ranked from 1 (high) to 7 (low). Source: ACIAR Workshop.

Participants suggested ACIAR consider a future policy linkage study on alternative approaches to funding and delivery of extension services. They also suggested that projects targeting pest management might usefully include components dealing with:

- increasing awareness of consumers and growers of pesticide legislation and the benefits of compliance
- farmer education on the benefits of pesticide/chemical use plus establishing a database of chemical input costs.

6.3.4 Tonga case study — integrated disease control strategies for powdery mildew and other problems in squash

In Tonga, agricultural GDP is around 29 per cent of total GDP, while nearly 76 per cent of the population is involved in agricultural activities. The squash industry is a very important component of the agricultural economy, currently ranking second in terms of value of production in the FAO's list of major food and agricultural commodities (FAO, op cit). It is only out-ranked by coconut production. Squash production represents nearly 20 per cent of the value of production of the top 20 commodities. Further, it is the top ranked food/agricultural export — currently representing 80 per cent of the value of major food/agricultural exports.

Table 6.6.Assessing the impacts — Integrated disease control strategies for powdery mildew and other problems in squash in Tonga

Impediment	Underlying cause	Likely impact	Ranking of impact[a]	Benefit if impediment can be addressed	Possible future ACIAR 'policy linkage study'
Market price is too low	Market price too low relative to costs of production Monopsony power exerted by exporter Competitors have increased their growing season General lack of PIC export competitiveness	Not discussed	1	Industry would survive	Case study on economic viability of industry and its implications for adoption of research findings
Land tenure creates land availability problem	Not discussed				
Lack of credit facilities (interest rates and lack of security for credit)	Not discussed				

[a] Ranked from 1 (high) to 7 (low). Source: ACIAR Workshop.

In the Tongan case study, workshop participants focussed on the key factor influencing the sustainability of the industry — the overriding concern that the market price for squash is too low (see table 6.6). The underlying factors creating this situation were seen to include: too much exporter power in the market; an increase in the growing season in the key export market (Japan); high production costs due in part to the role of New Zealand middle men; and general lack of PIC export competitiveness. These impediments were assessed to be of high impact: but are not seem to be immediately a result of policy or institutional failings.

Participants suggested ACIAR might consider studies addressing:

- the economic future of the squash industry in Tonga
- alternative crops that Tonga could produce and export, given the current importance of squash production as an export industry.

6.3.5 Solomon Islands case study — nutrition of tropical hardwood species in plantations in the south-western Pacific

In the Solomon Islands, agricultural GDP is around 44 per cent of total GDP, while 83 per cent of the population is involved in agricultural activities. The forestry industry is very important in the Solomons, and is estimated to account for around 17 per cent of GDP, 65 per cent of export receipts and 10–12 per cent of formal employment.

However, as noted in section 4, the natural logging industry in the Solomon Islands is in crisis. The major accessible natural forests are likely to be logged out by 2020 (or earlier) if current unsustainable practices continue.

In the Solomon Islands case study, workshop participants reported a range of underlying policy and institutional impediments that are limiting the adoption of ACIAR research into nutrition of tropical hardwood species (see table 6.7). Key themes are: poor project design; the need for clear contractual agreements regarding utilisation of research outputs; and the high cost of chemical inputs and of nursery establishment. The cost of inputs was considered the most important of these factors.

Further insight provided from a workshop participant with personal involvement in the project indicated that other important factors in reduced adoption were:

- a lack of capacity at the commercial plantation company involved in the project to implement some of the techniques. A number of key staff trained by the project have since move on to work elsewhere — where they have been offered more attractive employment conditions
- The plantation company has not carried out the extension services to small holders since the project completion that it used to undertake in the past
- the extension officers of the South Pacific governments involved in the project have not communicated the project outputs, partly due to the high turnover or promotion of these trained staff within the ministries responsible for forestry
- new donor projects do not always take account of outcomes of previous research done in the area.

Participants suggested ACIAR consider a future policy linkage study addressing policy and institutional impediments to establishing competitive fertiliser and chemical input supplies.

Table 6.7. Assessing the impacts — nutrition of tropical hardwood species in plantations in the South-western Pacific

Impediment	Underlying cause	Likely impact	Ranking of impact[a]	Benefit if impediment can be addressed	Possible future ACIAR 'policy linkage study'
Interaction between the private company (KFPL), forestry department and others Ministry extension officers not passing on technology	Poor project design – lack of clarity regarding target beneficiary — private sector or small holders	Small holders did not benefit from project.	5	Better outcomes for small holders and villagers	None — but ACIAR might consider new approaches to project design
Shift in plantation company priorities over the life of the project	Poor project design Absence of a clear contract re responsibility for outcomes – including clarification of who would take the role of information dissemination to small holders	Small holders did not benefit from project.	5	Better outcomes for small holders and villagers	None — but ACIAR might consider new approaches to project design
Technology restricted to the private company (not available to small holder farmers)	Poor project design – did not clearly target small holders MAFF staff trained by project have not translated knowledge into extension services – some staff moved on	Small holders did not benefit from project	5	Better outcomes for small holders and villagers	None — but ACIAR might consider new approaches to project design

Cost of fertiliser and of setting up the nursery	High cost of chemical inputs in South Pacific (tariffs, monopolies	Some nurseries not continued.	2	Better adoption rate of technology	Study on policy & institutional impediments to competitive fertiliser, chemical

[a] Ranked from 1 (high) to 7 (low). Source: ACIAR Workshop.

6.3.6 Kiribati case study— Pearl oyster resource development in the Western Pacific

In Kiribati, fisheries GDP is around 12 per cent of total GDP, while 53 per cent of the population is involved in agricultural/fishing activities. Nearly 17 per cent of total exports are fishery-based. However, the pearl industry is yet to be commercially established in Kiribati. The ACIAR project is intended to assist with the establishment of a cultured black pearl oyster industry, with the aim of raising the quality of life of the island population, where there are few other potential sources of income or employment.

In the case study, workshop participants reported a range of underlying policy and institutional impediments that are limiting the adoption of ACIAR research into pearl oyster resource development (see table 6.8). Key themes were: the lack of market survey prior to project implementation; political interference in site selection due to concerns re urban drift; and poor security of tenure impacting on investment levels. The lack of understanding regarding the potential for a pearl market in Kiribati was seen as the key factor impacting on what was reported as the virtual failure of the project. Poor security of tenure was also seen as a major issue.

Participants suggested ACIAR consider a diagnostic study of the main factors behind the lack of success of this project.

Table 6.8. Assessing the impacts — Pearl oyster resource development in the Western Pacific (Kiribati)

Impediment	Underlying cause	Likely impact	Ranking of impact[a]	Benefit if impediment can be addressed	Possible future ACIAR 'policy linkage study'
Poor links to economic / marketing information - commercialisation of the trials will be difficult	Absence of survey of the market prior to commencement	local production not possible no scale of production for farming lack of the right site no pearls being produced in Kiribati	1	May have been no project in the first place	Case study of the project to identify the importance of market research and risk analysis before embarking on research
Inappropriate site selection	Political interference by government concerned to address urban drift	Reduced production in chosen sites	5	Higher probability of success	Case study of the project to identify the importance of market research and risk analysis before embarking on research
Barriers to investment – need security in property tenure and more secure rights for entrepreneurs	Lack of investment related to security of tenure	Higher costs of production	2-3	Increased security Community involvement	Land Tenure issues for Aquaculture

Unrealistically high expectations at outset of project	Absence of survey of the market prior to commencement	Risk of relationship damage between investors and owners of fishing rights	3	Reduction in risk	Case study of the project to identify the importance of market research and risk analysis before embarking on research

[a] Ranked from 1 (high) to 7 (low). Source: ACIAR Workshop.

6.3.7 The regional case study

The Regional case study was also discussed in the context of policy and institutional factors impacting on its success. However, it was agreed that this project did not face similar issues to the other projects, being more technical and model-based. However, as already indicated by the ACIAR project leader, adoption of the outcomes of this project will face barriers due to an expected lack of cooperation between regional stakeholders. This is an ongoing high level institutional impediment in the region that, while very important, is beyond ACIAR's resources to influence acting alone.

6.4 Other issues raised at the workshop

A number of other important issues were raised during the group discussions. In particular, a strong suggestion from the workshop was that ACIAR needs to take greater account of the social and economic circumstances of potential beneficiaries of its research. Participants suggested that ACIAR needs to build a stronger understanding of the incentives facing smallholder farmers of adoption of new technologies. They also suggested that ACIAR could explore the potential for research that enables farmers to address resource conservation while pursuing their economic survival. Further, it was suggested that research project development needed to take greater account of the fact that raising finance is a key issue for small farmers. Since banks will not lend to them because the risks are perceived as too high and they offer insufficient security, new technologies that require additional cash outlays may not be adopted.

Has almost every major agricultural project failed?

An important view expressed at the workshop was that lessons must be drawn from the claim made by a number of participants that 'almost every major agricultural project in the South Pacific in the last 40 years has ended as a commercial disaster'[8].

The performance of government and aid funded projects was contrasted with the success of some agricultural activities that did not receive much government or foreign assistance. These successes included taro, ginger, kava and the small village gardens that supply a large variety of local fresh food to the urban markets. These crops are based on semi-subsistence or small farms operating on family labour.

The perception that government and aid funded agricultural projects in the South Pacific have been largely unsuccessful suggests that ACIAR could consider a more detailed diagnostic study of the factors impacting on the success of failure of projects in its own portfolio.

[8] *This claim is supported by observations made in reports prepared by the Asian Development Bank. One of these observed that 'It is, in fact, difficult to find a single agricultural project by any funding agency that has fully met its objectives' (Holden et al 2004). This poor performance may not be limited to agricultural projects, however. The World Bank, in its evaluation of its country assistance to the Pacific in the decade 1992-2002 observed that its assistance, which was largely targeted at the social sectors had moderately unsuccessful outcomes, negligible institutional development impact and had low probability of sustainability. (World Bank, 2005)*

Importance of the subsistence sector

Participants suggested that one implication of the high failure rate of major agricultural projects is that ACIAR should increase its focus on enhancing the subsistence sector. Ways of enhancing the subsistence sector include selection of superior food plant varieties, improvement on the design of basic farming tools and adding storage life and value to traditional crops.

Participants argued that many farmers in the South Pacific place a higher value on reducing back breaking work than achieving financial gains from improving yields which involves more work. One participant commented:

> …my requests to the Ministry of Agriculture for research on reducing my work load have never (been considered) a good research proposal. Researchers want to make their name by improving crop yields even if it breaks the farmers' backs and in the Pacific Islands people do not want to work long and hard.

Participants suggested that a strong subsistence sector would form a base for supporting cash cropping and the commercial agricultural sector. They suggested that modern agricultural sciences such as soil science, genetics, plant pathology and post harvest handling can be put to good use in improving the quality of life of subsistence growers and in protecting the food security of Pacific Island countries. They argued that this has not been done to date, as mainstream research has always favoured global traded commodities. An example was given in Fiji where there had been more crop trials on maize for chicken feed than on ota — an edible wild fern that grows in wet places — even though this has always been sold in the urban markets, and is eaten by all communities in Fiji.

In summary, the workshop recommended that ACIAR should have an increased focus on enhancing the subsistence sector. This would include projects that assist in the selection of superior food plant varieties, improve the design of basic farming tools and add storage life and value to traditional crops.

Importance of project partnerships

A key suggestion from the workshop concerned the importance of partnerships for ACIAR projects in the future – in particular, partnerships which include the private sector. It was argued that private sector input is needed not just to ensure the commercial, market success of a project but also increasingly to contribute funds.

A workshop participant noted the positive impact of early involvement of the private sector in the current ACIAR ginger project in Fiji (Hort/2004/049). Private sector involvement has resulted in a focus on a new, larger Australian variety of ginger which Fiji can use to target niche international markets, where size attracts a premium price.

Better understanding of failure to adopt chemical/technological inputs

Workshop participants argued that there is a need to have a better understanding of the policy and institutional factors underlying the failure to uptake new technology – for example, pesticides developed by ACIAR research (refer the Taro beetle project). It is necessary to understand the points in the supply chain that are contributing to the failure of adoption.

ACIAR project design phase

Participants also suggested that ACIAR may need to place a greater emphasis on investigating the social and economic environment for technology adoption in its project design and selection process. There was a concern that projects might fail to have a significant impact because the resultant technologies were inherently uneconomic due to factors such as the high costs of accessing input and output markets. Further, it was argued that `ACIAR may need to more explicitly consider the implications of institutional

weaknesses in public sector agencies involved in agriculture (particularly extension services) and to recognise the incentives faced by potential beneficiaries to adopt new technologies, particularly by smallholders with limited access to markets'.

7 Dealing with impediments

The consultations undertaken for this study have confirmed that the socioeconomic factors that are linked to poor economic performance in the Pacific have a direct influence on the probability of adoption of the results from ACIAR funded research. Project leaders and stakeholders have described a range of factors that limit the ability and willingness of the households that dominate primary production in the Pacific to invest time, effort and money in adopting new technologies.

A key question for ACIAR is what it can do to deal with these constraints. Are they susceptible to policy reforms or institutional development, and can ACIAR use its program of policy linkage studies to help policy makers and stakeholders in PICs to develop strategies for reducing some of the existing impediments to the adoption of ACIAR research? If the constraints are unlikely to be relaxed in the short to medium term, how should ACIAR structure its portfolio to increase the likely impact of its research in the Pacific — how can it successfully operate within the constraints imposed by this environment?

Project leaders and workshop participants suggested a number of strategies for ACIAR to work within the prevailing policy and institutional framework. By and large they did not advocate that ACIAR should only work on projects where the constraints are not so acute (for example, where commercial operators are driving the industry, or where a biological control agent can be developed and allowed to operate without need for a supporting policy/institutional environment). Rather, they suggested extending ACIAR projects to address adoption and technology transfer, and/or to embed projects in broader initiatives that are tackling key constraints. There was a fairly strong message from the workshop that ACIAR may have to consider more comprehensive project scoping and identification activities and adding components to technical projects that deal with some of the socio-economic dimensions of technology uptake in the Pacific. There were also suggestions for policy linkage and scoping studies that could help inform development of ACIAR's portfolio in the Pacific and that could provide input into attempts to improve the policy and institutional environment for rural investment in new technology.

7.1 Strategies for improving impact of ACIAR research projects

Project leaders suggested some possible approaches to overcoming impediments to adoption of research findings. These include the following.

- Place stronger emphasis on those elements of ACIAR's project design processes that focus on:
  - broad consultation with stakeholders outside of the research community
  - recognising the incentives and context in which quasi-subsistence smallholders operate in the Pacific and the limited capacity of government agencies dealing with agriculture, forestry and fisheries (this may require, for example, explicitly building market research into project development activities, and testing ex ante the incentives that small-holders may face when considering adoption of research outputs)
  - explicitly considering adoption pathways
  - building in components dealing with information transmission and technology transfer.
- Work more closely with regional organisations — such as the Forum Fisheries Agency, Secretariat of the Pacific Community, and the Pacific Island Forum Secretariat — and with relevant ministries in each PIC

- Use industry co-ordinating committees that have appropriate private sector and government membership, and perhaps work on preparing industry development plans
  - this may require helping to strengthen the industry councils.
- Ensure that ACIAR projects are partnerships between the government and the private sector (particularly to assist with implementation and adoption) — this would require:
  - taking pains to identify the right partners
  - using transparent processes with clear guidelines.
- Consider integrating research projects with long term government and NGO rural development programs that might be addressing policy and institutional problems and supporting processes for transmitting information to producers:
  - this would involve collaborating with other donors, and may involve stronger efforts to build capacity in and strengthen relevant government agencies.
- Explore the potential for collaboration with other Australian agencies (particularly AusAID) which may assist with project implementation and providing ongoing financing to sustain institutional capacity building.

It was suggested that the concept of integrating projects with long term development programs and extending the reach of ACIAR projects to deal with technology transfer and adoption would only be meaningful if household and community level impacts are built into monitoring and evaluation processes. There was a concern that 'too often rural development has been measured by the process of aid work, projects undertaken and committees formed rather than how more comfortable or secure the people have become'.

7.2 Suggested policy-linkage studies

The consultations with ACIAR project leaders and workshop participants provided considerable support to the idea that ACIAR should commission scoping studies to further explore the nature and impact of policy and institutional impediments in the Pacific. This could help inform the development of strategies for ACIAR, and also generate inputs that may help motivate PIC efforts to address these impediments. Three possible studies are outlined below.

7.2.1 Rapid impact assessment of ACIAR's Pacific projects

Very few of ACIAR's Pacific research projects have been subject to assessment under the Centre's impact assessment program[9]. This may be because few projects have been regarded as very successful. It would be useful to subject a selection of the portfolio of completed projects in the Pacific to a rapid assessment (using the new Desktop Impact Assessment methodology being developed for ACIAR see box 7.1) to:

- characterise the impact of ACIAR's portfolio of completed and ongoing projects in the South Pacific using the Desktop Impact Assessment methodology
- assess the effect of the economic, policy and institutional environment for adoption and impact of projects, and suggest strategies for future identification and development of project opportunities in the region that take account of the incentive for adoption of research findings.

[9] *One exception is the series of projects on management of fruit flies in the Pacific: Projects CS2/1989/020, CS2/1994/003, CS2/1994/115 and CS2/1996/225, which were the subject of an impact assessment in 2005 — see R. McLeod,* Management of Fruit Flies in the Pacific*, Impact Assessment Series Report No. 37, November 2005, ACIAR, Canberra.*

7.3 ACIAR's Desktop Impact Assessment Framework

Undertaking full benefit–cost analysis (BCA) across the whole portfolio would be resource intensive and time consuming. Instead, a larger range of the portfolio should be put through the Desktop Impact Assessment/Project Impact Assessment Survey approaches (Gordon and Davis op cit). These are subjective, qualitative tools — but not full BCAs — that can be applied to gain a broad qualitative sense of outcomes, adoption, benefits and costs. These tools will provide some insight on the effectiveness of projects by focusing on the key issues relating to the project inputs, outputs and outcomes:

- **Rationale**: What was the motivation for the project — how did it come about? What problem was it designed to address?
- **Outputs**: What were the major outputs of the project (intended and unintended) and what improvements were made in research skills and infrastructure?
- **Changes**: What are the most significant changes as a result of the project?
- **Pathways**: Given the output, is there a clear pathway to next and final users?
- **Users**: Given the changes in policy, products or processes required of the next and final users to adopt the outputs, who are and how big are the final user populations?
- **Distribution**: What is the distribution of impacts among the user populations?
- **Adoption**: How likely and how rapid is adoption of the R&D outputs by the final users in each applicable population, given the benefits and the costs of adoption? What factors affect adoption?
- **Economic, institutional and social factors**: How does the broader environment impact on the ability of the project to deliver significant community benefits?
- **Overall impacts**: Considering the impacts to date and potential impacts, and the probability of adoption occurring as described, what is the overall impact of the project?
- **Lessons**: Are there any lessons that will help to improve future ACIAR investments?

The intention of this approach is to assess, at a qualitative level, the impacts on the target beneficiaries.

The study could develop a basic qualitative database on key characteristics of ACIAR's South Pacific projects, and select a sample of projects for a deeper assessment of factors shaping project impact. The objective would be to examine the incentives for adoption and what policy, institutional and environmental factors shape these incentives. The methodology could involve examining and quantifying value chains (as far as possible) for the key commodities targeted by the research and/or characterising the resource allocation decisions that smallholders make under uncertainty. The aim would be to provide a means of explaining the responses that a final user may make to information about new technologies, and to assess the financial capacity for adopting technologies and the effect of policies and institutions (as well as country characteristics such as geography) on this capacity. This would also require an assessment of the institutional and commercial factors that influence transmission of information and how well projects took account of these factors.

The study would then select a sample of projects for deeper analysis, designed to shed light on factors affecting incentives for adoption and the extent to which project design and development took account of and/or addressed these factors. This could be done by identifying value chains for activities targeted by the projects, assessing the financial capacity for adopting technologies and assessing the effect of policies and institutions (as well as country characteristics such as geography) on this viability. (At least three of the projects discussed in this report might be candidates for such a study —CP/2000/044

Taro beetle management in PNG and Fiji, HORT/2003/046 Integrated disease control strategies for powdery mildew and other problems in squash in Tonga; and FIS/1997/031 Pearl oyster resource development in the Western Pacific.)

7.3.1 Funding of delivery of services to the primary sector

Project outline

The consultations for this report suggested that inadequate priority is being given to resourcing government services relating to agriculture, forestry and fisheries in the South Pacific: questions were raised about aggregate funding and how resources are allocated across competing activities. In particular, concern was expressed about the resourcing of extension and regulatory functions which could impact on transmission of information about the results of research. At the same time, there was concern that the scope for private sector delivery of these services (through contractual arrangements) has not been well explored, and that commercial provision is impeded by the policy environment. And where donor support has been provided, it has not always led to sustained improvements in service delivery.

While these questions relate to broader issues of public expenditure, it could be useful for ACIAR to summarise some of the diagnostic work that has been done by other agencies on the role and funding of agricultural services, and look more closely at the impact of policy on non-government provision of these services, especially extension and support for technology transfer. The study could examine issues such as:

- what services are government agencies charged with providing, and how well are they perceived to be performing by key stakeholders and informants?
- what role are the private and NGO sectors playing in service delivery, and what stands in the way of increasing that role?
- what has been the impact of donor funding on the direction and sustainability of service delivery?
- are there inherent weaknesses in extension services — such as in the status, training, funding of operational expenditures, and linkages to research activities?
- does ACIAR help by providing professional skilled people for a limited time?
- how could ACIAR build better relationships with agencies and enterprises that might transmit research results?

7.3.2 The environment for contract farming in the South Pacific

A number of workshop participants highlighted problems facing the development of contract farming and linkages between exporters and smallholder farmers in PICs. Given some of the constraints on expansion of direct bank lending to smallholders (including land tenure issues), and the poor performance of government extension services, these linkages may be a key way for transmission of new technologies to farmers, for providing financing for the investment required to take them up, and a way of sharing the risks of adopting new technologies. A range of issues concerning low levels of trust, a lack or limited reach of formal methods of contract creation and enforcement, excessive government regulation and crowding out by government marketing bodies were said to play a role in constraining the growth of contract production.

A policy linkage study on the environment for contract production (it need not necessarily be limited to agriculture, since similar problems may arise with respect to forestry and fisheries) could provide useful analysis of the problems, and suggest ways of addressing them.

The study could:

- carry out some case studies of existing contract production arrangements, detailing the value chains that are involved, investigating their experiences in technology transfer and canvassing some of the issues confronted by parties to the contracts
- summarise work on the impact of land tenure and customary ownership of marine resources on credit mobilisation and investment in contract production arrangements
- assess the applicability of alternative approaches developed to provide securitization for working capital (for example, corporatisation by communities of individual livestock assets or the warehousing of produce to provide security for credit) — these may require investigating aspects of the legal arrangements surrounding contracts and their enforcement.

8 References

Koczberski, G., Curry, G. and Gibson, K. 2001, *Improving Productivity of the Smallholder Oil Palm Sector in Papua New Guinea: A socio-economic study of the Hoskins and Popondetta Schemes*, Australian National University, Canberra.

Asian Development Bank (ADB) 2006 Key Indicators, http://www.adb.org/Documents/Books/Key_Indicators/2006/pdf/FIJ.pdf.

—— 2003*, Vanuatu – A Private Sector Assessment*, report prepared by The Enterprise Research Institute under RETA 6037: Private Sector Development Strategy for the Pacific, http://www.adb.org/PrivateSector/Development/documents/Vanuatu-PSA.pdf, accessed 25 July 2007.

—— 2000, *Vanuatu: Agriculture and Fisheries Sector Review 2000*, http://www.adb.org/Documents/Reports/Vanuatu_Agri_Fisheries/agri_fish.pdf , accessed 25 July 2007.

AusAID *2006a, Pacific 2020 — Challenges and Opportunities for Growth*, May 2006.

AusAID *2006b, Pacific 2020 — Background Paper: Fisheries* January 2006.

AusAID *2006c*, *Pacific 2020 — Background Paper: Agriculture*, January 2006.

AusAID *2006d, Pacific 2020 – Background Paper: Forestry*, January 2006.

Duncan R. and Nakagawa H. 2007, *Obstacles to Economic Growth in Six Pacific Island Countries*, draft report prepared for World Bank

FAO 2007, Country Profiles, - http://www.fao.org/countryprofiles /index.asp?iso3=VUT&lang=en, accessed April 2007.

FAO, Farming Systems Training for Sustainable Development Asia and the Pacific Region, (1998), http://www.fao.org/docrep/field/383967.htm, accessed February 2007.

Hausmann Ricardo, Dani Rodrik and Andres Velasco, 2005. *Growth Diagnostics*, http://ksghome.harvard.edu/~drodrik/barcelonafinalmarch2005.pdf, Accessed 1 May 2005

Holden, P., Bale, M. and Holden, S. (2004), *Swimming Against the Tide? An Assessment of the Private Sector in the Pacific*, Pacific Studies Series, Asian Development Bank, Manila.

Lightfoot, C. 2005, 'Does customary land ownership make economic sense?', in *Privatising Land in the Pacific: A defence of customary practices*, Fingleton (ed), Discussion Paper Number 60, The Australia Institute.

McGregor A. 2007, The export of horticultural and high value agricultural products from the Pacific Islands, Pacific Economic Bulletin, Vol 22, No 3, Asia Pacific Press.

Ministry of Development Planning and Aid Coordination, 2007, Solomon Islands Agriculture and Rural Development Strategy, http://siteresources.worldbank.org/INTPACIFICISLANDS/Resources/442114-1180930407961/ARDS_Full_Report.pdf, accessed 20 August 2007

Pearce, D. 2005, *Review of ACIAR's research on agricultural policy*, Impact Assessment Series Report No 31, February 2005.

Quirke, D., Harding M. and Warner B. 2007, *Papua New Guinea coffee and cocoa policy linkages*, Final report of Project PLIA/2005/148, ACIAR, Canberra.

Warner B., McGregor A., Wore I. and Pelomo M 2006, *Rural growth in Solomon Islands*, report prepared for the Agricultural and Rural Development Strategy, Solomon Islands Government, Ministry of Planning and Aid Coordination, Honiara.

Wikipedia (encyclopedia), http://en.wikipedia.org/wiki/Institution, accessed January 2007.

World Bank, http://web.worldbank.org/WBSITE/EXTERNAL/WBIEXTWBIGOVANTCOR/0,,contentMDK:20678937~pagePK:64168445~piPK:64168309!~theSitePK:1740530,00.html, accessed January 2007.

—— 2006a, *World-Wide Governance Indicators*, http://info.worldbank.org/governance/kkz2005/tables.asp, accessed October 2006.

——2006b, *The Pacific Infrastructure Challenge: A review of obstacles and opportunities for improving performance in the Pacific*, http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/EASTASIAPACIFICEXT/PACIFICISLANDSEXTN/0,,contentMDK:20892589~menuPK:441914~pagePK:1497618~piPK:217854~theSitePK:441883,00.html, accessed July 30 2007.

——2005*, Evaluation of World Bank Assistance to Pacific Member Countries*, 1992-2002, Report No 31940

9 Appendices

Note:The project information contained in Appendixes 9.2 to 9.8 is drawn from information provided to CIE by ACIAR and also from the ACIAR website (www.aciar.gov.au)

9.1 Glossary

ACIAR	Australian Centre for International Agricultural Research
EEZs	Exclusive Economic Zones
DWFNs	Distant Water Fleet Nations
FFA	Forum Fisheries Agency
PICs	Pacific Island Countries
SPC	Secretariat of the Pacific Community
WCPO	Western and Central Pacific Ocean

9.2 ACIAR regional project

Case Study — Maximising the economic benefits to Pacific Island Countries from management of migratory tuna stocks

A brief overview of this project is provided in table 9.1.

Table 9.1. Project Details — Regional

Project	Collaborating Countries	Collaborating Institutions	Project Leader and Commissioned Organisation	Budget and Duration
SFS/2001/036: Maximising the economic benefits to Pacific Island Countries from management of migratory tuna stocks	Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Palau, Papua New Guinea, Samoa, Solomon Islands, Tuvalu, Vanuatu	University of Queensland, Australia Secretariat of the Pacific Community, New Caledonia Forum Fisheries Agency, Solomon Islands	Commissioned Organisation: La Trobe University, Australia Project Leader: Dr John Kennedy Phone : 03 94792313 Fax : 03 94791654 Email : j.kennedy@latrobe.edu.au	Project Budget: $577,585.00 Project Duration: 01/01/2002 - 31/12/2005 Project Extension: 01/01/2006 - 31/12/2006

Source: http://www.aciar.gov.au/web.nsf/country/Solomon%20Islands?opendocument&section=currentprojects

Project overview

Shoals of tuna migrate through the exclusive economic zones (EEZs) of island nations in the Western and Central Pacific Ocean (WCPO). This migratory characteristic means that no nation has control over the tuna stocks. Stocks in each EEZ depend on harvesting levels in each respective EEZ and on the high seas as well, thus each nation has special problems in managing harvesting effort within its EEZ. The member nations of the Forum Fisheries Agency (FFA) stand to gain the greatest total benefit if they unite to regulate fishing effort or catches by their domestic fleets or by distant water fishing nations. Also, the United Nations Fish Stocks Agreement seeks to set up Regional Fisheries Management Organisations for the conservation and efficient management of migratory stocks.

This project is identifying and promoting strategies for Pacific Island Countries (PICs) to maximise the economic benefits from their migratory tuna stocks. Researchers are gathering fishery data and undertaking economic analysis, bioeconomic modelling and policy development. They are updating biological and economic parameters of a model in order to use it for optimal year-by-year changes in access charges and fleet capacities.

They aim to establish the economic negotiating positions of PICs with rights to migratory tuna stocks, and of the Distant Water Fleet Nations (DWFNs) such as Japan, USA, South Korea, Taiwan and China interested in paying for access to the stocks.

Background— the problem

Over the last decade the proportion of Pacific tuna caught by island nations has risen substantially. At the same time, the level of purse seining by DWFNs has also risen significantly. A bioeconomic model (developed in an earlier ACIAR project) of the Pacific tuna fishery has been used by the FFA and the Secretariat of the Pacific Community (SPC), to identify and analyse various concerns associated with increased purse seine catching. One of the negative impacts identified is that increased purse seining reduces catch of larger (older) and higher priced tuna caught by longliners and sold fresh. A second concern identified with the model is that the traditional method of charging the purse seine fleets of DWFNs for access to the EEZs of the WCPO is not maximising the flow of annual rents from tuna harvesting to island nations. A third issue is that excess

vessel capacity has built up in the fleets that harvest the tuna, which has led to economic inefficiencies in harvesting.

The project will update, where necessary, biological and economic parameters in the model, and extend the model with game theory approaches so that it can be used to determine optimal year-by-year changes in access charges and fleet capacities. The model will be used to address optimal annual harvesting of stock over time, dependent on issues of: El Nino events, new harvesting technologies, the balance between harvesting by DWFNs purse seiners and fresh tuna longliners, optimal systems for charging DWFNs for access to EEZs of the FFA, and optimal fleet capacity.

Pacific Island Countries which rely on income from tuna in their EEZs are members of the FFA with headquarters in Honiara. There are total of 16 member nations. The purpose of the agency is to maintain a data bank on fisheries in the region and their harvesting, and to provide evaluation and analysis of the data for dissemination to member nations.

Stock assessments of the tuna are conducted by the Oceanic Fisheries Programme (OFP) of the SPC in Noumea in collaboration with other scientists. OFP scientists have adopted a methodology known as MULTIFAN-CL which is a length-based, spatially-explicit, age-structured model that is fitted to total catch, length-frequency and tagging data using a likelihood-based approach.

The research component of the project is scheduled for completion within two years. An additional two years of modest funding is included to ‘institutionalise’ the work and to translate the results into practical policy implementation.

The project entails joint research work between personnel at the FFA (fishery data and economic analysis), the SPC (bioeconomic modelling), the Department of Economics at the University of Queensland (economic analysis and policy) and the Department of Economics and Finance at the La Trobe University (economic analysis, game theory and modelling). A consultant with policy experience in the South Pacific tuna industry and a working knowledge of the model will help with applying the model results to practical decision making, either through the FFA, or directly with the countries involved.

Key issues

Many PICs are highly dependent on the income generated from charging distant water fishing nation's access fees for fishing in their EEZs. Based on the existing WPCOBTM model, it has been pointed out that PICs could potentially significantly raise income by altering both the level and structure of the fees. Fees as a percentage of catch value could be raised for all fleets, and a fee structure that recognizes the different revenue and cost structures of different fleets could be introduced. The project will explore strategic measures for increasing this income, and extend the WPCOBTM model in a game-theoretic way accordingly, recognising that a Commission to be set up for managing stock levels will have to balance the interests of the PICs and the DWFNs.

It remains to be seen what increases in rents would be predicted to accrue for all nations harvesting WCPO tuna stocks, and for FFA nations alone, from taking this approach. Under alternative assumptions used in their model, which did not allow for strategic interaction between harvesting parties, annual rents for all nations could be increased by US$150–215 million, and for FFA nations by US$8–12 million (1996 base).

In recent years there has been a significant growth in the catches taken by vessels flagged by FFA member countries. For example, the proportion of the total catches landed by vessels flagged by FFA member countries doubled from 7 per cent in 1995 to 14 per cent in 1998. This share exceeded the 11 per cent share of the Japanese fleet in 1998. Growth in PICs harvesting will have helped to reduce the high level of under-employed labour and to increase national income. Results from the ACIAR project ADP/1994/005 show that reductions in purse seining would raise rents from tuna fishing overall, with part of the increase in rents coming from the domestically based fresh tuna longline fleets.

If PICs cooperate more closely with regard to access fees, this, in turn, may lead to greater empowerment and a stronger negotiating position at the WCPO commission when it is established.

The objective of the draft Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific is to ensure, through effective management, the long-term conservation and sustainable use of highly migratory fish stocks in the western and central Pacific Ocean.

In line with this objective, constraints will be included in the model to ensure that the various management options are consistent with maintenance of projected stocks of each species of tuna. SPC, who are partners in the project, have a monitoring role in relation to tuna fish populations, so compatibility between that role and the model outputs is assured in this way.

Project impacts

Results will feed directly into policy via the overseas partners of FFA and SPC who provide front line advice to policy makers. Results will also be disseminated through published papers and reports. Follow up visits to selected countries (and FFA) will be undertaken during the two years of 'institutionalisation' activities, scheduled to follow the initial two years which have primarily a research focus. The model will be documented and made available to interested users at no cost.

Access regimes will be identified for adoption by the FFA to increase the rents earned from FFA tuna stocks in a sustainable manner. Previous ACIAR funded research strongly suggests this is possible, leading to increased living standards and employment opportunities for the communities of the South Pacific.

9.3 ACIAR Fiji project

Overview of Fiji

Fiji has a good natural resource base for agriculture, forestry and fisheries. Its poverty level is comparatively low, though rural-urban income inequality is an increasing problem.

ACIAR has had a crop protection focus in Fiji since the 1990s. There has also been strong ongoing cooperation in fisheries. Agricultural economics research cooperation has recently become much more important. Fiji also hosts the main campus of the University of the South Pacific (offering potential for collaboration in economics, development, geography and marine science and for involvement of students), and the bases of the Secretariat of the Pacific Community (SPC) Land Resources Division, the Pacific Forum Secretariat, and several relevant NGOs.

Sugar production is decreasing, and the development of alternative land uses for agriculture within a sustainable land management framework is a national imperative. Development of promising horticultural crops such as papaya, spice and nut crops and accompanying post harvest technologies and marketing options are being explored, as are new fruit varieties with longer production seasons.

Research opportunities in fisheries may include continued genetic selection of freshwater finfish and giant prawns; aquatic health including quarantine and import risk assessment, restocking as a tool to rehabilitate sea cucumber fisheries; and improved feed formulations for finfish and shrimp. More research may be needed on marketing of fisheries products, including seaweed.

Options for forestry cooperation include timber utilisation, value-adding to mahogany and native species, plantation management and health, and increasing the potential of indigenous forestry species.

Case study — Taro beetle management in PNG and Fiji

Project overview

The aim of this project is to develop and transfer to farmers environmentally sustainable Taro beetle control practices that, when integrated into sustainable cropping systems, reduce Taro beetle damage. The project is developing biological controls, including investigating the combined action of pesticide control and bio-control. It will implement these methods for taro beetle management in environmentally sustainable cropping systems in Papua New Guinea (PNG) and Fiji.

These practices will reduce taro beetle damage in farmers' fields, restore the supplies of taro as a major staple and revive the trade in quality taro in infested countries. This project relies upon bio-control methods that were identified during a previous project: the fungus Metarhizium anisopliae (Ma), and the virus Baculovirus oryctes (OrV).

Table 9.2. Project details — Fiji

Project	Collaborating Countries	Collaborating Institutions	Project Leader and Commissioned Organisation	Budget and Duration
CP/2000/044: Taro beetle management in PNG and Fiji	Fiji, Papua New Guinea	CSIRO Entomology, Australia Ministry of Agriculture, Sugar and Land Resettlement, Fiji National Agricultural Research Institute, Papua New Guinea	Commissioned Organisation: Secretariat of the Pacific Community, Fiji Project Leader: Mr Aleki Sisifa Phone : 679 3379214 or 679 3370733 ext. 214 Fax : 679 3370021 Email : Alekis@spc.int	Project budget: $711309.00 Project duration: 01/01/2002 - 31/12/2005 Project extension: 01/01/2006 - 31/12/2007 ACIAR Research Program Manager: Dr T K Lim

Source: http://www.aciar.gov.au/web.nsf/country/Fiji?opendocument&section=currentprojects

The project builds on work supported over a number of years by the European Union through the SPC. The four-year Taro Beetle Management program commenced on 1 January 2002, as a component of the SPC Pest Management in the Pacific (PMP) program. PMP is one of the two major projects of SPC-Plant Protection Service funded jointly by Australia (AusAID and ACIAR) and New Zealand (NZAID).

Project scientists are completing several research aspects from the earlier project, in preparation for implementation of practical control of taro beetle in two South Pacific countries (PNG and Fiji). They are developing ways to increase the effectiveness of controlling taro beetle grubs through the use of both fungal and viral pathogens. They are also developing sustainable methods for taro beetle control with minimal use of chemical pesticides. Further studies are developing protocols for synergistic combination of chemical pesticides and use of biological control agents to achieve optimum control. Results are to be provided to taro growers in the partner countries through participatory implementation approaches in association with SPC extension services.

Background — the problem

Taro is the preferred staple in Pacific communities and is a major energy source. One of the main pests of taro is the taro beetle, which damages the corm (an underground stem resembling a bulb) of the plant and creates entry points for secondary pests. The taro beetle causes about 30 per cent yield loss. Taro production is a labour-intensive crop which is grown on a small-scale in farming communities. The spread of the taro beetle in the Pacific is a threat to taro exporters and their revenue, and it also has an environmental impact because infested Taro gardens are abandoned and established forests are then cleared to create new gardens.

Taro beetle is thus a threat to food security, health and well being of Pacific communities particularly in the most heavily populated Melanesian countries. Taro also has cultural value as a customary food gift of choice and is held in some esteem in the Pacific island countries.

There are also concerns about revenue losses caused by prohibition of taro exports. Infested countries or islands may not export infested taro. There are also significant quarantine concerns about the threat taro beetle poses to uninfested countries and the attendant concerns about the environmental impact of taro beetle. Movement of taro between islands is also prohibited, but very costly for countries to police. More recently non-taro beetle infested countries have increased taro exports substantially. Thus the spread of taro beetle in the Pacific is a threat to taro exporters and trade revenue.

In 2000, PNG produced an estimated 332,000 tons of taro. Fiji produced 25 000 tons on 3000 ha in 2000 (www.apps.fao.org). Taro beetles cause an estimated 30 per cent yield

loss in PNG, the equivalent of about A$45.9 million annually. In Fiji the average loss in experimental control plots was 33 per cent.

The envisaged solution to the problem is to sustainably reduce taro beetle populations to sub-economic levels by adjusting farming practices to systems that shift the balance in taro gardens in favour of biological control agents. Taro production is largely a labour intensive, family function within a community farming system on small areas which makes it amenable to introduce farming practices to manage taro beetle populations.

Key issues

Traditional cropping practices

It is expected that integrated management options and the extension practices for the transfer of taro beetle management practices to rural communities may need to take several forms to account for customs and traditional cropping practices in different countries and regions. The introduction of biocontrol systems to rural communities may require adjustment to customs and rituals of taro cultivation which could have an unknown impact on rural community customs and traditions associated with taro cultivation. However, it is likely these impacts will be less marked than being deprived of an adequate access to taro.

Need for private sector involvement

Private sector involvement and support in the project is needed, so that so that the supply of materials to retails outlets is not a limiting factor and to stimulate interest in the commercial production of the fungus

9.4 ACIAR Kiribati project

Overview — Kiribati

Kiribati is one of the poorest Pacific countries, having few land-based natural resources, but has jurisdiction over one of the largest exclusive economic zones (EEZ) in the world. The small land area has lead to high population density on some of its atolls and an accompanying risk of environmental damage from agriculture and other human activities.

The large marine area in the country makes fisheries important for export and subsistence. Issues such as tuna resource rents are critical for Kiribati, as is the identification of new village-level mariculture opportunities. There are only limited opportunities in other agricultural sectors.

ACIAR's program in Kiribati has had a strong fisheries emphasis, in particular the long-standing, ongoing effort directed at the development of a sustainable profitable pearl culture industry. Other key areas of ACIAR research include:

- availability and quality of water for agriculture and domestic purposes
- research to reduce the dependence on imported food crops and on the conservation and use of traditional food crops
- applied research on crop pests and diseases, including taro beetle, breadfruit fungal rot and biocontrol of spiralling white fly of pawpaw
- improved local feeds for pigs and chickens —an important issue for food security.

Case study — Pearl oyster resource development in the Western Pacific

Project overview

The small island nations of the Pacific have limited opportunities for export trade. Only non-perishable or high value products are feasible due to their remoteness. The productions of black pearl and cultured mother-of-pearl shells have become important industries in some Pacific Island Countries (PICs). The black pearl oyster (Pinctada margaritifera) flourishes in atoll lagoons and is a major export earner for French Polynesia and the Cook Islands. In French Polynesia the black pearl industry is now their major export earner.

Table 9.3. Project details — Kiribati

Project	Collaborating Countries	Collaborating Institutions	Project Leader and Commissioned Organisation	Budget and Duration
FIS/1997/031: Pearl oyster resource development in the Western Pacific	Fiji, Kiribati, Solomon Islands	Ministry of Environment and Natural Resources Development, Kiribati WorldFish Center, Malaysia Ministry of Agriculture, Fisheries and Forestry, Fiji	Commissioned Organisation: James Cook University, Australia Project Leader: Dr Paul Southgate Phone : (07) 47815 737 Fax : (07) 47251 570 Email : paul.southgate@jcu.edu.au	Project budget: $728961.00 Project duration: 01/01/1998-31/12/2000 Project extension: 01/01/2001 - 31/12/2006 ACIAR Research Program Manager: Mr Barney Smith

Source: http://www.aciar.gov.au/web.nsf/country/Kiribati?opendocument&section=currentprojects

This project follows directly from a previous ACIAR project that focused on the pearl oyster resources of Kiribati (1993 to 1996). That project:

- assessed the natural stock of pearl oysters in Kiribati and Fiji

- developed low technology methods for hatchery and nursery culture to allow replenishment of natural oyster stocks
- investigated practices to improve gem quality of pearls.

This project involves Kiribati and Tonga, as well as linked pilot pearl farm activity with the WorldFish Centre (ICLARM) in the Solomon Islands. It aims to further develop and refine grow-out and pearl culture techniques. Culturing black pearl oysters to establish an industry is expected to raise the quality of life of people living in the Pacific atoll islands where there are few potential sources of income or employment.

In Kiribati, the focus is on investigations into nursery, juvenile and adult culture methods suitable for atoll and open reef systems, the development of a Pearl Industry Development Plan, and pilot community-level pearl production trials. In Tonga, where the earlier spat collection study proved disappointing, the focus is on hatchery production of spat, nursery and early grow-out experiments. The project also involves production of a simplified manual on mariculture methods.

Background — the problem

The project is primarily aimed at raising the quality of life of the ordinary island people living in those areas of the Pacific where there are few other potential sources of income or employment. The techniques developed will deliberately be kept simple to enable them to be mastered by island people without advanced technical training. However, the ultimate nature of the development of cultured pearl industries in each Pacific Island country will depend on decisions made by the individual governments.

Project achievements

The project has achieved the following outcomes to date:

- A Pearl Oyster Coordinating Committee (POCC) has been established bringing together representatives of relevant Kiribati Ministries and other agencies. The POCC has been approved by the Kiribati Cabinet and will provide advice to the Minister on the development of a cultured pearl industry in Kiribati.
- Project activities, particularly training and establishment of remote farm sites, have built considerable capacity in pearl oyster culture in Kiribati both within Ministry of Fisheries and Marine Resources Development and at a local level through community participation.
- The projects' draft Development Plan will provide a framework for developing a cultured pearl industry in Kiribati and address both technical and political issues.
- The project has established a Demonstration Pearl Farm at Abaiang as a focal point for project research, for training and for hosting potential investors.
- There have been major benefits to cultured pearl industries in Australia and other PICs as a result of the information generated during this project.
- An up to date culture manual for P. margaritifera has been completed.
- A workshop focused on 'Pearl Oyster Economics' was held in Kiribati in September 2004 with support from Secretariat of the Pacific Community (SPC). It provided input from experts from SPC, Cook Islands and Federated States of Micronesia as well as expertise from project personnel. The workshop analysed various scenarios for transition towards industry development using the SPC spreadsheet-based pearl culture economic model. The modelling indicated:
  - larger farms approaching 100,000 oysters will be more profitable focusing on round pearls rather than maybe (half pearls), or production of oysters for seeding by a third party

- community farms may accept lower levels of profit, recognising the overall benefit to the community (employment, family structures, etc.). Community level farms may also have lower costs of production, due to low labour costs, but are likely to be less efficient than a private farm.

Key issues

The project is concerned with enhancing depleted natural stocks and enhancing the sustainability of cultured pearl oyster industries. Project activities are likely to produce positive environmental impacts by increasing the rate of recruitment of wild (P. margaritifera) spat/juveniles in the lagoon of Abaiang atoll where surveys have shown that wild stocks are very low. However, increased pearl oyster density may have some adverse environmental effects from the production of faeces, etc. Nevertheless, in contrast to the closed atolls of the Cook Islands, the atolls of Kiribati are more open allowing for greater flushing. Research at Abaiang atoll is being conducted at a number of sites to assess the best areas for grow-out. This should reduce the possibility of adverse environmental effects.

The project relies on equipment from overseas (for example nets, ropes and cleaning equipment). There have been delays for badly needed equipment. This is particularly the case if the Australian supplier has to order the equipment from manufacturers in Asia. This problem could be addressed by appropriate planning and maintenance of a good stock of commonly used equipment in Kiribati.

The management of pearl oyster farms is very much a family enterprise with everyone actively engaged in daily operations. Family members work their own farms but may engage in reciprocal exchanges of labour with other farm-families for large tasks. The family-farm seems a good basis for cultured pearl farming in PICs. It is appropriate to the social structure of the island communities and should ensure that most profits go to the farmers rather than to distant shareholders in companies. Thus, the sociological effects of the project are potentially quite positive — reversing the trend of emigration to larger centres and overseas, providing an industry that is compatible with the family/kinship system of the island communities.

9.5 ACIAR Samoa project

Overview— Samoa

Samoa has recently had comparatively strong economic growth across a range of sectors, including agriculture. The main export base comes from fish, automotive parts and tourism. Agriculture was an important part of exports until recently when the Taro market collapsed. Samoa faces many ongoing development challenges such as remoteness, and frequency of natural disasters.

ACIAR's main focus in Samoa has been on insect pest management, virus indexing of Taro as well as biological control of pests and weeds. Key areas of research include:

- post harvest research to improve shelf life of root crops and fruit
- research to assist improvements in niche marketing of commodities, potentially organic produce
- policy incentives for the establishment of wood lots
- nursery management techniques
- forest weeds, pests and diseases
- better utilisation of wastage.

Case study — Integrated pest management in a sustainable production system for Brassica crops in Fiji and Samoa

The project is about the integrated control of the diamondback moth and other pests affecting the production of cabbage plants in Fiji and Samoa.

Table 9.4. Project details — Samoa

Project	Collaborating Countries	Collaborating Institutions	Project Leader and Commissioned Organisation	Budget and Duration
HORT/2004/063: Integrated pest management in a sustainable production system for Brassica crops in Fiji and Samoa	Fiji Samoa	Secretariat of the Pacific Community, Fiji Ministry of Agriculture, Sugar and Land Resettlement, Fiji Ministry of Agriculture and Fisheries, Samoa Queensland Department of Primary Industries and Fisheries, Australia	Commissioned Organisation: University of Queensland, Australia Project Leader: Dr Michael Furlong Phone : 07 3365 4822 Fax : 07 3365 1655 Email : m.furlong@uq.edu.au	Project budget: $595,804.00 Project duration: 01/07/2005 - 30/06/2010 Project extension: not applicable ACIAR Research Program Manager: Mr Les Baxter

Source: http://www.aciar.gov.au/web.nsf/country/Samoa?opendocument&section=currentprojects

Project overview

Brassica crops, especially 'English' and Chinese cabbages, are important commodities for both large and small farmers in Pacific Island Countries. The production of these crops has increased dramatically in Fiji and Samoa and Chinese cabbage will soon become the major source of green leaf vegetable in both sectors. However, with production increasing in recent years opportunities for the diamondback moth (DBM) to spread have expanded. This has led to problems for many farmers trying to combat the moth.

Current control measures for the moth rely exclusively on prophylactic insecticide application, there is significant environmental contamination and crops frequently fail. Significant efforts to establish biological control of DBM, by a variety of agencies, have been thwarted by inadequate extension programs. This failure will be addressed through

the development of farmer field schools to replace the traditional top down extension approach.

The aim of the project will be to adopt a collaborative participatory approach to research and extension to facilitate the adoption and uptake of effective integrated pest management strategies and develop sustainable agricultural management systems for Brassica crops in Fiji and Samoa. Appropriate training and establishment of farmer field schools will provide a feedback mechanism which will identify the constraints to the adoption of project outputs ensuring the relevance of research and extension activities. The farmer field school approach will be particularly effective in this regard; it will represent the major adoption pathway for the adoption and uptake of project outputs and lead to increased farmer empowerment.

Background— the problem

Commercial Brassica crops — especially 'head' or ''English' cabbage (Brassica oleracea) and Chinese cabbage (Brassica campestris) — are extremely important to the rural economies in Fiji and Samoa. Increasingly as traditional vegetables such as bele, taro and fern leaves become less available in local markets, Brassicas are becoming the most important leaf vegetable crops. Bele and taro leaf production has declined due to the constraints of leaf blight and production of taro leaf production has fallen further due to the predominance of varieties selected for corm production. The booming tourist trade has created further demand for high quality Brassica vegetables but, due to the constraints on the local industries, much of this is currently supplied by imports.

In 2004, the combined market value of Brassica crops in Samoa was Tala 130 000 and the value of Brassica imports was Tala 422 000. Local production is severely constrained by the insect pest complex and improved pest management would lead to increased local production and significant import substitution. Currently almost all Brassica production occurs in Upolu Island (1286 holdings in 2002) as the insect pest severely restricts cultivation on Savai'I Island (9298 holdings in 2002). Although English cabbage can sell for Tala 6 a head, the produce of more than 30 per cent of Brassica farms is utilised exclusively in local community trading. Insect pests attacks also severely restricts Brassica production in the period January-May (the off-season) in both countries; during this period small heads of cabbage sell for A$2–5. Farmers able to successfully produce good quality crops in this period stand to make substantial economic gains.

Brassica crops are attacked by a complex of insect pests including DBM, cabbage cluster caterpillar, cabbage centre grub and various aphid species. Management of these insect pets is a major constraint to the industry, crop damage is severe, yield losses are high and crops frequently fail completely. Control currently relies exclusively on the prophylactic application of insecticides and reports of twelve or more applications per ten week cycle are common; there is no control over the levels of pesticide residues present in crops that make it to market. Insecticide costs also commonly represent 40 per cent of total crop inputs but many farmers in the small holder sector are unable to afford any insecticidal intervention.

Key issues

The primary beneficiaries of this project are the farmers through maintenance of profitability and growth of the cabbage industry. At present, Samoa is importing large amounts of cabbage which could be produced at home. The main reason is the large number of crop failures as a result of insect pests, particularly the diamondback moth. The main outputs of this project are threefold:

- local understanding and acceptance of concepts ad benefits of Integrated pest management
- local extension officers appropriately trained, farmer field schools to lead to improved and sustainable Brassica production

- natural enemy status established; biological control prospects identified; suitability of potentially effective natural enemies confirmed
- sustainable locally relevant IPM strategies.

A key element of this project will be the development of the farmer field schools.

9.6 ACIAR Solomon Islands project

Overview – Solomon Islands

In the Solomon Islands, subsistence agriculture and fishing sustain over 80 per cent of the livelihoods of people. The ongoing civil conflict has caused stagnation or collapse in the production and export of many commodities. Fish, timber, copra, palm oil and cocoa were previously substantial exports, along with minerals such as gold. Most Solomon Islanders live in isolated rural communities dependent on subsistence agriculture and intermittent crop and small livestock sales.

ACIAR has a significant number of completed projects in the Solomon Islands, covering culture of a range of fish species, marine protected areas, stock assessment and fisheries management policy; farming systems economics; production and diseases of root crops; insect pests; biological control of pests; and forest tree nutrition. ACIAR's Solomon Islands program has a strong fisheries emphasis, including economic and technical research to support the development of sustainable livelihood opportunities based on the culture of coral reef animals. ACIAR effort has been strongly focused on activities that will quickly contribute to enhanced smallholder income generation.

Case study — Nutrition of tropical hardwood species in plantations in the south-western Pacific (completed)

Table 9.5. Project details — Solomon Islands

Project	Collaborating countries	Collaborating institutions	Project leader and commissioned organisation	Budget and duration
FST/1996/085: Nutrition of tropical hardwood species in plantations in the south-western Pacific	Fiji, Samoa, Solomon Islands	Ministry of Agriculture, Sugar and Land Resettlement, Fiji Kolombangara Forest Products Ltd, Solomon Islands Ministry of Agriculture, Forests, Fisheries and Meteorology, Samoa	Commissioned Organisation: CSIRO Land and Water, Australia Project Leader: Dr Paul Reddell Phone : +61 7 4089 7777 Email : paul.reddell@ecobiotics.com.au	Project budget: $771,726.00 Project duration: 01/01/1998 - 31/12/2000 Project extension: 01/01/2001 - 30/06/2002 ACIAR Research Program Manager: Mrs Heather Crompton

Source: http://www.aciar.gov.au/web.nsf/country/Solomon%20Islands?opendocument&section=concludedprojects

Project overview

It is estimated that more than 95 per cent of world production of sawlogs, veneer logs and cabinet timbers originates from logging of natural rainforests. However, this resource is dwindling rapidly, due to unsustainable logging practices and/or the encroachment of shifting and permanent agriculture. Harvesting of these products from plantations on previously degraded lands in the humid tropics is a viable, long-term option for ensuring their continued supply. Such an industry would also provide long-term employment opportunities, export earnings and environmental advantages for many countries in the Asia-Pacific region.

Maintenance of adequate plantation nutrition is one factor critical for successful, long-term timber production from degraded soils in the tropics. Previous research supported by ACIAR demonstrated that widespread, severe nutritional deficiencies were limiting establishment and productivity of high-value timber species in many of the soil types available for plantation forestry in northeast Australia and the southwest Pacific. This project built on those results and sought to increase understanding of aspects of the nutrition of broadleaf tropical trees pertinent to their sustainable production in plantations.

Project objectives were: to undertake a comprehensive study of nutritional deficiencies in important broadleaf species; to develop environmentally-sound and economically feasible nursery and field fertiliser strategies for forest plantings in the humid tropics; to estimate the amount of nutrient capital lost through removal of logs during harvesting operations; to develop fertiliser strategies for plantations in Fiji and the Solomon Islands; to provide relevant training to project staff in partner countries.

The project studied five species important to the region: Swietenia macrophylla (mahogany), Flindersia brayleyana (Queensland maple), Tectona grandis (teak), Gmelina arborea (white teak/white beech) and Eucalyptus deglupta. The scientists compared nutrient requirements and developed fertilisation strategies to maintain forest nutrition, focusing on the nutrients nitrogen, phosphorus, potassium, calcium and zinc (identified previously as limiting in the major soil types on which these species are grown in the south-western Pacific).

Project outcomes

Key project outcomes follow:

- The finding that applications of high levels of slow-release fertilisers in the potting mix, which remain with the seedling at out-planting, resulted in more effective fertiliser uptake than with the normal broadcast application. The largest commercial plantation forestry company in Solomon Islands, Kolombangara Forestry Products Ltd, now uses the technique routinely for Tectona grandis and Eucalyptus deglupta. Other potential applications are for new Swietenia plantations in Fiji, and for other plantations in Samoa and north Queensland.
- A simple, robust framework for identifying the likelihood and severity of occurrence of specific nutrient deficiencies was developed. This framework is applicable to new sites on similar soil types/parent materials through the Asia-Pacific region.
- Nutrient site budgets were established that track the amount of nutrient taken off site by logging and the inputs made during growth, to ensure that over time there is no net nutrient depletion from repeated harvesting of the timber. This process has satisfied forest stewardship authorities sufficiently to enable ‘Green label’ certification of the timber. This attracts a premium price on European markets.
- On Kolombangara Island the researchers developed a potting medium for plantation species, using decomposed coconut shells. This medium was superior to forest soil, and seedlings grew much faster. Producing the medium has created a small industry for village women, who grate up the composted coconuts through a metal screen to produce the final product. The women are also paid to plant up the seedlings in the composted mixture and transplant them to the plantations.

The successful completion of the project is expected to lead to:

- increased productivity of forest plantations of the target species on degraded lands in Australia and the south western Pacific;
- conversion of additional areas of degraded and unproductive land to forest plantings that will produce commercial returns;
- more effective forest management strategies that minimise environmental impacts of plantation operations and underlie the long-term sustainability of plantation timber production;
- increased employment opportunities and incomes to rural communities involved in reforestation activities;
- increased export incomes to Governments from the sustainable production of sawlogs and other high value wood products; and
- reduced long-term pressure for exploitation of natural forests in the region.

9.7 ACIAR Tonga project

Overview –Tonga

The Tongan economy is heavily reliant on the agricultural sector which provides the major sources of employment, foreign exchange earnings and food security. Tonga has developed a successful export trade in pumpkin squashes in recent years however development of markets is an ongoing challenge. Environmentally appropriate pest and disease management to maintain this industry remains a priority. Tuna is the main fishery export from Tonga, and together with snapper and aquarium fish, is also a major export income source.

Tonga faces a number of factors affecting agricultural development — including geographical isolation, fluctuations in its export markets, a limited natural resources base and governance structures. Tonga has high natural disaster susceptibility and there are limited income generation opportunities for outer islanders.

ACIAR's current focus in Tonga is on farming systems and it has an ongoing interest in crop-related research in the area of marketing and post harvest quality improvement. Key areas of research include:

- productivity of root crops and vegetables
- development of new crops such as coffee and spices
- crop protection including fruit fly management
- better soil and water management
- development of agroforestry-based farming systems, including tree legumes and fruit trees (plantation resources are modest).

Case study — Control of pests and diseases in squash

The project is about the integrated control of powdery mildew and other disease, weed and insect problems in squash in Tonga and Australia.

Table 9.6. Project details —Tonga

Project	Collaborating countries	Collaborating institutions	Project leader and commissioned organisation	Budget and duration
HORT/2003/046: Integrated control of powdery mildew and other disease, weed and insect problems in squash in Tonga and Australia	Fiji Tonga	Ministry of Agriculture, Forestry and Food, Tonga Secretariat of the Pacific Community, Fiji	Commissioned Organisation: University of Sydney, Australia Project leader:: Dr Robyn McConchie Phone : 02 9351 4332 Fax : 02 9351 4172 Email : r.mcconchie@usyd.edu.au	Project budget: $399 959.00 Project duration: 01/01/2005 - 30/06/2008 Project extension: not applicable ACIAR Research Program Manager: Mr Les Baxter

Source: http://www.aciar.gov.au/web.nsf/country/Tonga?opendocument&section=currentprojects

Project overview

The squash industry is a key component of the Tongan economy. Production of squash contributes 55 per cent of gross domestic product and represents more than 95 per cent of exports. However, price competition and agronomic (crop production and soil management) factors are threatening the viability and sustainability of the industry, necessitating improved production methods.

Poor management of powdery mildew and viral diseases have resulted in total losses of some crops. Weeds act as hosts for some viral diseases and also hamper crop

establishment and growth. The silver leaf whitefly has also emerged as a serious pest. Research will concentrate on delivering improved management options for all these problems.

The aim of the project is to improve field-based crop protection and market quality of squash within a systems framework addressing powdery mildew, silver leaf whitefly, virus management, weed management and grower uptake and market implications. Technology adoption will be promoted through a 'farmer participatory systems' approach that integrates control options for each pest. The focus is on optimizing uptake and increasing awareness of market implications through use of on-farm trials and stakeholder workshops.

Background — the problem

Tongan agricultural exports are now dominated by squash (plus some vanilla and kava) following the collapse of the coconut industry and declining exports of watermelon and bananas to New Zealand as a result of pest and disease problems. The development of the squash industry in Tonga is hailed as a model example of agricultural export from the South Pacific to developed countries, demonstrating that growers will respond to niche economic opportunities when the returns are profitable.

However, in recent years, pest and disease control in the squash industry has become a serious issue due to the development of pesticide resistance. Powdery mildew, silver leaf white fly, viruses and weeds can all cause losses of 30 to 60 per cent, with the latter two becoming more serious when powdery mildew defoliates the crop.

The squash industry in Tonga

Kabocha is the major squash variety grown and is exported to Japan. The crop is highly attractive to farmers as:

- it is the only short term (3 month) crop produced in Tonga with potentially high returns
- the crop has a simple marketing structure with most of the product going to Japan.

The Tonga Squash Exporters Association (comprising approximately 15 exporters) provides the seed, fertilizer, pesticides and land preparation on credit to the farmers. On receipt of a bank letter of credit from the Japanese buyers, the farmers are paid the balance by exporters. The success of the Tongan squash export industry to Japan is based on providing an excellent quality product, predominantly during the niche window of about 3 weeks in October, from the end of the Japanese squash season to the beginning of supply from countries such as New Zealand and Mexico. New Zealand, California, Texas and Mexico are the other major exporters of squash into Japan.

Production has been steadily increasing over the last 10 years and squash exports increased from 18 162 metric tonnes in 2002 to 22 657 metric tonnes in 2003. Average exportable yields range between 8-9 tons per ha over the 3 planting stages. There is a trend to increased farm size and operation with the ratio of small: large farms moving from 420:180 in 2000 to 280:270 in 2003 with the total number of farms currently around 550.

However, because of overproduction and the extension of the exporting season by market competitors, the average price declined from $600/mt in 2002 to $200/mt in 2003. To ensure survival of the industry, Tongan squash production must become more efficient and be based on provision of a superior quality product to enable it to successfully compete against other exporting countries to Japan.

Key issues

The primary beneficiaries of this project are the farmers though maintenance of profitability of their squash industry. However the whole Tongan economy has become reliant on the export squash industry, economically and socially. At present the industry is at risk, due to the severe pest problems as well as the instability of financial returns. In

addition, the labour force, consisting of substantial numbers of women and children, is dependent on the survival of the squash industry.

The main output of the project will be recommendations for reducing losses and improving productivity in the squash farming system. A key element in implementation of crop protection recommendations will be liaison with the Exporters' Association. As suppliers of inputs to farmers, their acceptance of revised recommendations and supply of new chemicals for pest, disease and weed management will be crucial.

A high rate of technology uptake is anticipated via extension strategies given the desire and need for change expressed by farmers in previous workshops and the sharing of common goals in this current project. The project communication activities will also aim to build understanding amongst farmers, exporters and Tongan Ministry of Agriculture Forestry and Fisheries of cost/benefit implications of industry improvements and of changes in trading partner opportunities and quality/supply projections.

Squash production is very labour intensive, and has had a significant impact on the availability of labour particularly during June to October. As a consequence the cost of labour has increased 3-fold over the last decade. The shortage of labour has drawn in the participation of women and children and now, the industry has become heavily reliant on the contribution of this section of the labour force, especially during the planting, harvesting and post harvest handling and packing.

The large areas of land clearing that has taken place to make way for the squash industry has had some negative environmental impacts. The island of Tonagtapu in particular has very little native vegetation remaining, unlike the island of Eua where significant numbers of pockets of native vegetation exist. The lack of vegetation diversity on Tongatapu is thought to have contributed to the increase in pest problem in squash.

Further, Tonga is particularly vulnerable to contamination of the water supply by agrichemicals. Consequently, an overarching requirement of any crop protection program is compliance with the clean groundwater objectives of the CROPPRO project *Development of integrated farming approaches for sustainable crop production in environmentally-constrained system in the Pacific region* funded by the European Union and NZAID.

Project outcomes

The expected outcomes of this project will enable farmers to improve quality of the product as well as decrease input costs, contributing to the overall profitability of the industry. Specifically the economic impact will translate into:

- financial sustainability of the Tongan squash industry
- a more competitive, higher quality product for consumers
- more certainty of income from better production and pest control technologies.

It is hoped this project will significantly contribute to the overall economic and agronomic sustainability of the squash industry and consequently the social stability of the Tongan community

9.8 ACIAR Vanuatu project

Overview – Vanuatu

Vanuatu's agriculture and tourism sectors are the mainstays of the country's economy. Key agricultural activities relate to coconut, cattle, cocoa, timber production, and traditional food production for subsistence and local markets. Smallholders also cultivate peanuts, potatoes, vanilla and peppers. Although Vanuatu is an agricultural exporter, the majority of the population is in the subsistence or informal sector.

ACIAR's current focus in Vanuatu is on:

- the identification of niche horticultural markets
- crop protection and post harvest technology research to underpin development of horticultural export markets
- ensuring earlier ACIAR support for research on root crops in the region such as taro, yam and sweet potato is extended, through production of field guides and other extension material
- targeted research to underpin village-level fisheries (including aquaculture) as well as commercial fisheries
- livestock research
- policy and technical interventions for sustainable management of plantations and development of new species of commercial value for both plantations and smallholders (forest covers almost 40 per cent of the total land area of Vanuatu).

Case study — Diagnosis and correction of nutritional disorders of yams

Project overview

Yams are an important staple food in the Pacific as well as being important to cultural heritage. Yams demand high soil fertility — more so than other tropical root crops — and this has contributed to a decline in production as pressure on land and labour has increased. Nevertheless, a healthy yam crop can generate good economic returns.

Table 9.7. Project details —Vanuatu

Project	Collaborating Countries	Collaborating Institutions	Project Leader and Commissioned Organisation	Budget and Duration
SMCN/1998/028 : Diagnosis and correction of nutritional disorders of yams	Vanuatu Papua New Guinea Tonga	Ministry of Agriculture and Forestry, Tonga Department of Agriculture Livestock and Horticulture, Vanuatu National Agricultural Research Institute, Papua New Guinea	Commissioned Organisation: University of Queensland, Australia Project Leader: Dr Jane O'Sullivan Phone : 07 33654811 Fax : 07 33651188 Email : j.osullivan@mailbox.uq.edu.au	Project Budget: $855,308.00 Project Duration: 01/07/1999 - 30/06/2003 Project Extension: 01/08/2005 - 31/12/2006 ACIAR Research Program Manager: Dr Christian Roth

Source: http://www.aciar.gov.au/web.nsf/country/Vanuatu?opendocument&section=currentprojects

The aim of this project is to determine the extent to which South Pacific yam yields are limited by nutritional stresses, and whether yields can be economically increased using appropriate soil fertility management. Information to help increase quantity and quality of yam crops will be made available to farmers in PNG, Tonga and Vanuatu. A major component of the project is the production of a colour-illustrated field guide on the

diagnosis of nutritional disorders in yams — a companion volume to those produced on the other three main root crops — cassava, sweet potato and taro.

Background — the problem

Yams are the most esteemed and perhaps oldest of staple foods in the Pacific, and in 1998 ranked third among root crops (sweet potato, taro, yams and cassava) in the region. Yams provide income for semi-subsistence farmers, and export revenue for some countries. In 1995 the Pacific crop was around 288 000 tonnes, or around 42kg per capita, making it the Pacific's third most important food crop. However, their importance has been diminishing due to a lack of effort to incorporate them into the intensified farming systems that have evolved due to population and commercial pressures on land resources.

The favoured species in the Pacific are the 'greater yam,' and the 'lesser or sweet yam'. The 'greater yam' has a long history of production in the region and is the most important in terms of cultural and ceremonial significance. However, the sweet yam is gaining popularity as a productive food crop.

Most farms in the South Pacific are semi-subsistence, growing traditional food crops partly for family consumption and partly for sale. Yams are grown by up to 80 per cent of households in Vanuatu, Solomon Islands, and Tonga. Yams are the only tropical root crop that can be stored satisfactorily for extended periods after harvest, and hence is an important crop for the region which often experiences seasonal drought.

In Vanuatu, yam is typically grown on a small scale in mixed crop gardens, although in the vicinity of Port Vila, quite large areas of single cropped yam are grown for market - highlighting the potential for expansion within the country if market access is improved. The Vanuatu government also has a policy of improving nutrition in schools by increasing the consumption of yam relative to rice and flour — this will assist access to a more widely dispersed market.

Crop yields in the region are at a fraction of potential, and there is evidence that poor crop nutrition is a major factor. The low yields have translated into a poor return on the labour invested, thus discouraging production much beyond family requirements. This has meant market prices have been high due to supply constraints, thus encouraging consumers to favour cheaper (less nutritious) imported cereal products such as white rice and flour. This in turn has lead to serious health problems.

The main obstacle to expansion of the commercial yam industry has been the relatively high labour requirement compared with other root crops. Farmers are discouraged from growing more than their own needs because they consider the prices are too low for such a labour-intensive crop.

Project outputs

It is hoped that information provided by this project will lead to higher, more profitable yam yields. This should result from better recognition of nutritional disorders, and better information on the likely impacts of improved nutrient management strategies under specific environmental and sociological conditions, enabling sound recommendations to growers. Secondary benefits will include improved diets of local communities and improved trade balance (including an increase in yam exports).

Key issues

South Pacific farmers are expected to be quite receptive to improved technologies for yam production — due to its high prestige and relatively high market value. However, the speed of adoption is expected to vary throughout the region, depending on exposure of farmers to markets, their past experience with non-traditional farming techniques and the capacity of local extension services.

Beneficiaries

The main beneficiaries are likely to be smallholder farmers, benefiting from higher more reliable crop yields. This will increase productivity of limited cropping land and provide greater food security and more likelihood of marketable surpluses. Urban populations are also likely to benefit from lower yam prices, increased yam consumption and reduced dependence on nutritionally inferior imported rice and flour.

In the South Pacific, cultivation of food crops is most frequently the job of women. However, yams are often an exception to this rule, with men taking an interest and pride in yam cultivation, with a competitive attitude to producing large well-formed yams as gifts or contributions to festivals. Thus the economic benefits of improved yam production may fall on men to a greater extent than for other root crops. However, as cash cropping is becoming an increasing focus of farming families, it is likely that commercial production of yams will involve both men and women. This means that both women and children are expected to benefit from increased food security and improved capacity for household income generation.

9.9 World Bank governance indicators

The World Bank has been collecting world wide governance indicators on 213 countries since 1996 and on an annual basis since 2002.[10] The Bank defines governance as the 'set of traditions and institutions by which authority in a country is exercised'. This includes:

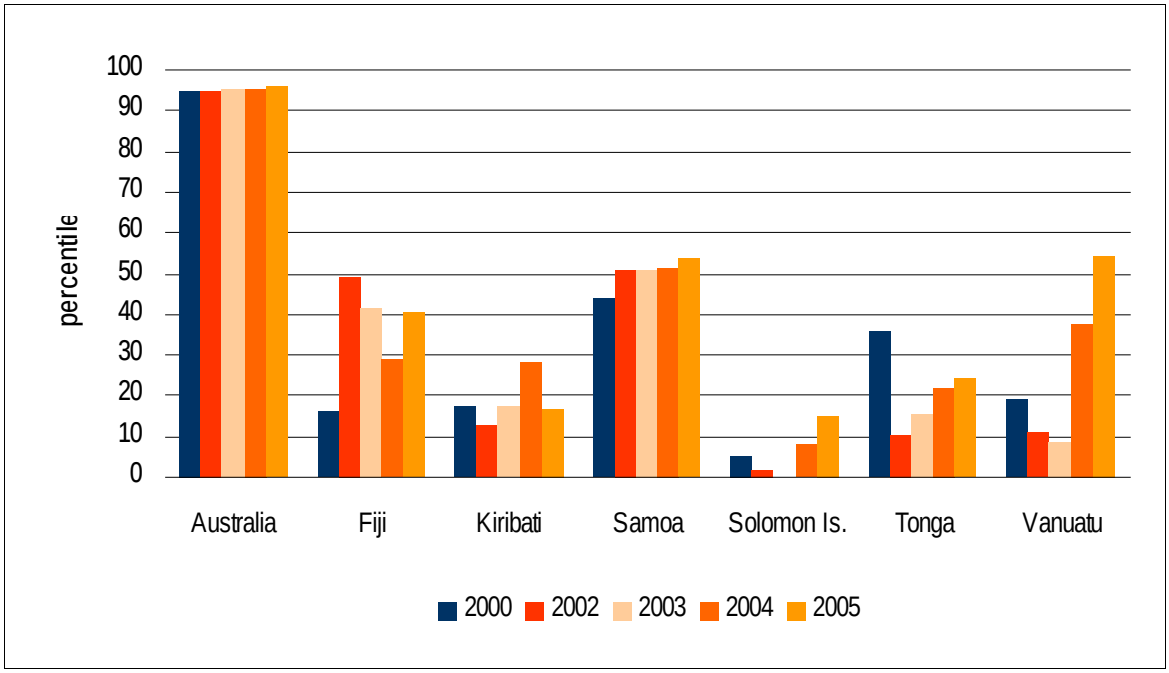
- the process by which governments are selected, monitored and replaced
- the capacity of government to effectively formulate and implement sound policies
- the respect of citizens and the state for the institutions that govern economic and social interactions among them.

The World Bank's governance rankings for Pacific Island Countries (PICs) are illustrated in the charts below, and compared with Australia as a benchmark. The data indicates that generally the PICs rank below the 60th percentile, compared with Australia, which is consistently above the 90th percentile. Samoa is the best performing PIC on these indicators, while the Solomon Islands are the poorest performer.

Regulatory quality

The World Bank's regulatory quality indicator focuses on government policies, including measures of the incidence of market-unfriendly policies such as price controls or inadequate bank supervision, as well as perceptions of the burdens imposed by excessive regulation in areas such as foreign trade and business development.

Figure 9.8. World Bank Ranking – regulatory quality



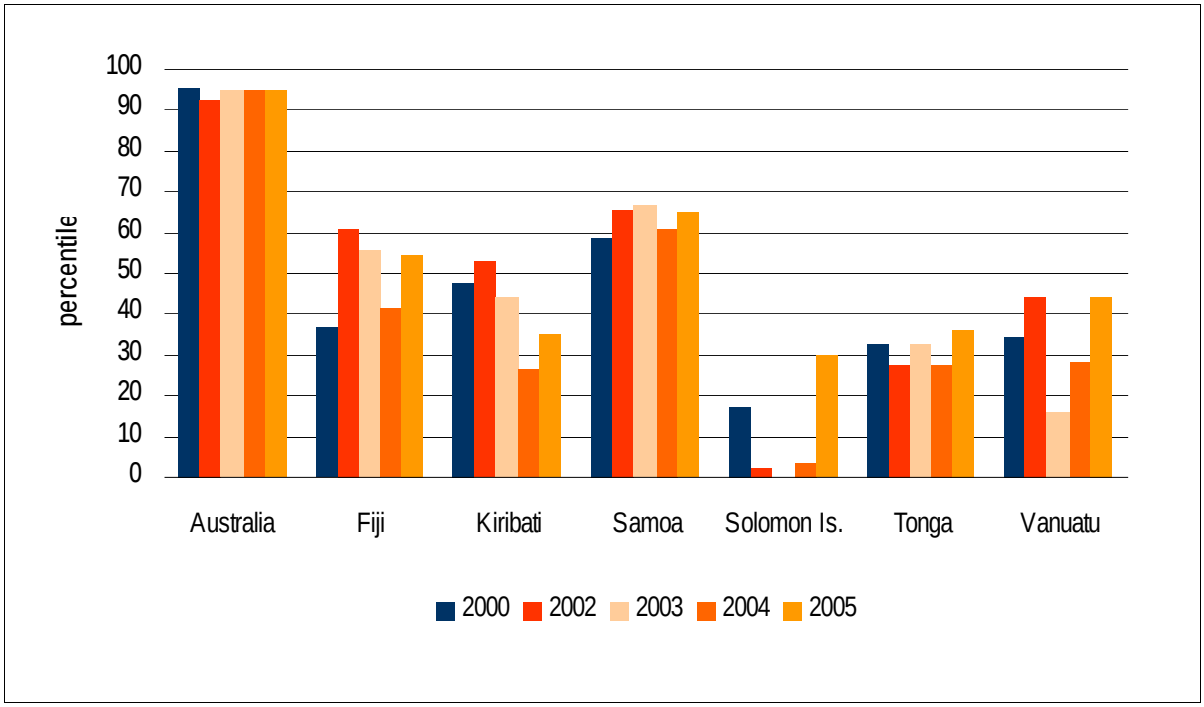
Data source: World Bank 2006.

Government effectiveness

Government effectiveness combines responses on the quality of public service provision, the quality of the bureaucracy, the competence of civil servants, the independence of the civil service from political pressures, and the credibility of the government's commitment to policies.

[10] *World Bank, 2006, World-Wide Governance Indicators, http://info.worldbank.org/governance/kkz2005/tables.asp, accessed October 2006.*

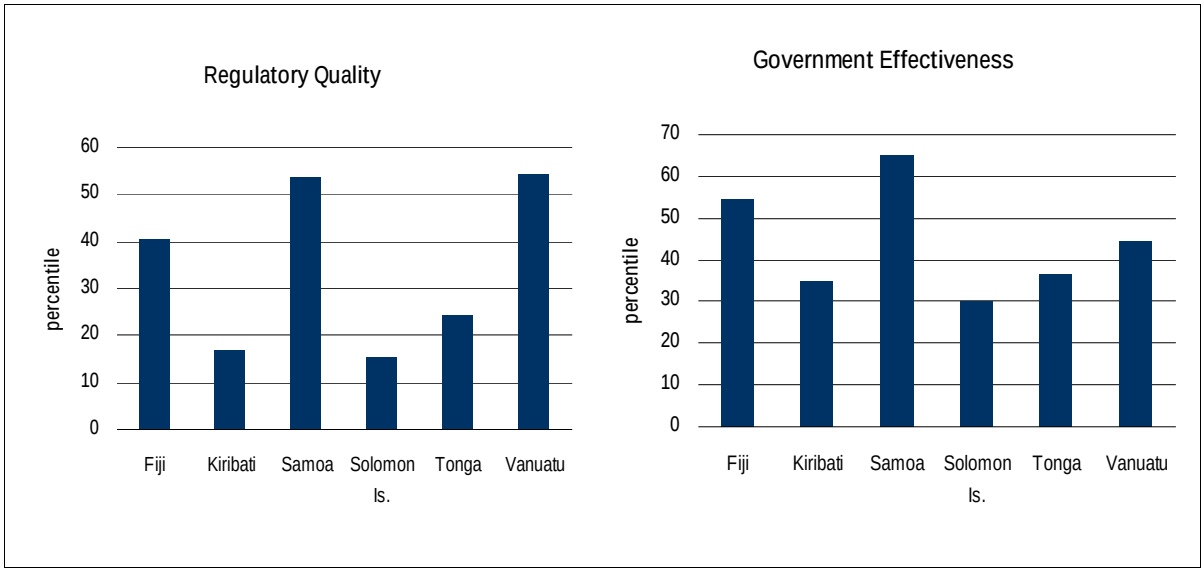
Figure 9.9. World Bank Ranking – government effectiveness



Data source: World Bank 2006.

Control of Corruption is a measure of the extent of corruption, conventionally defined as the exercise of public power for private gain. It is based on scores of variables from polls of experts and surveys.

Figure 9.10. Regulatory quality and government effectiveness (2005)

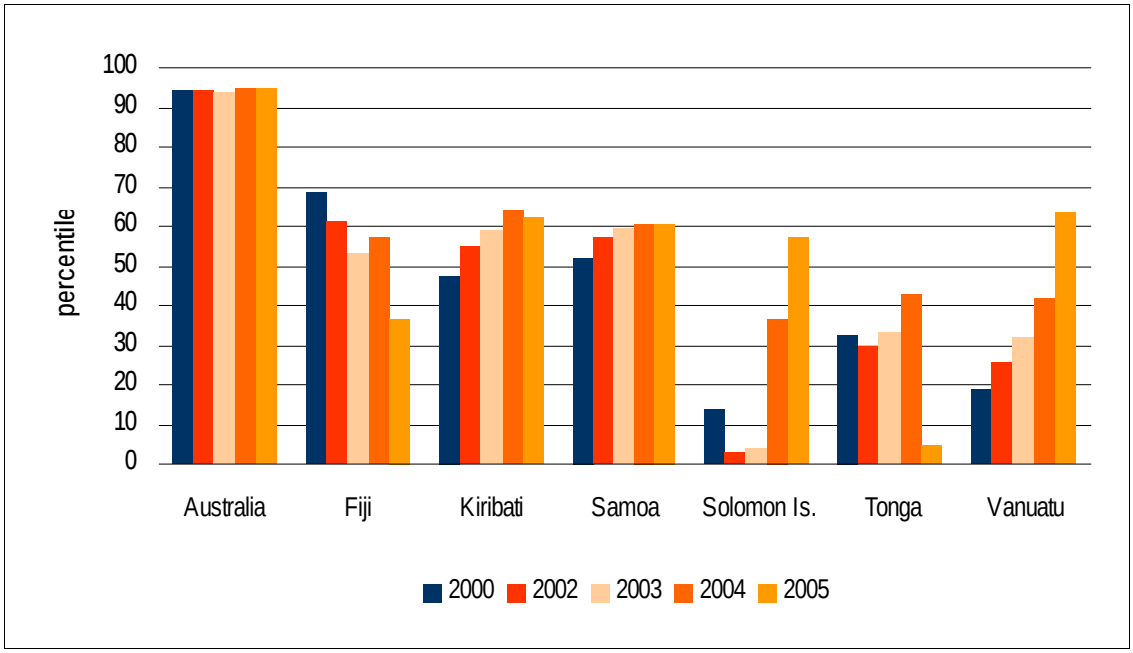


Data source: World Bank 2006

Rule of law

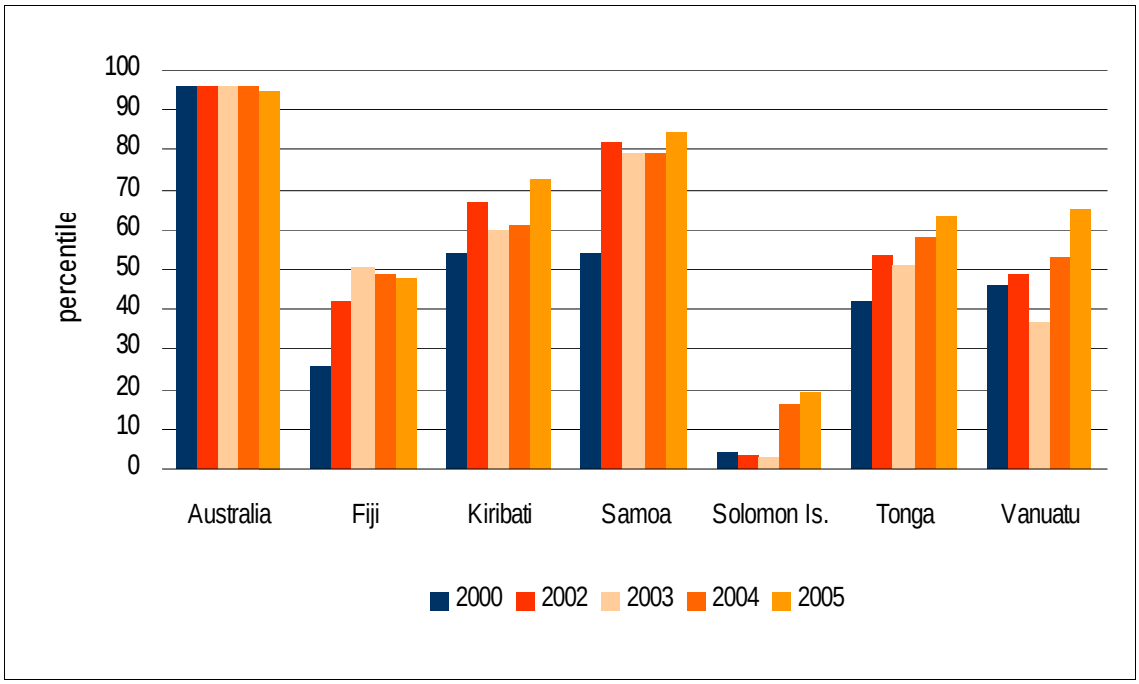
Rule of Law includes several indicators that measure the extent to which agents have confidence in and abide by the rules of society. These include perceptions of the incidence of crime, the effectiveness and predictability of the judiciary, and the enforceability of contracts.

Figure 9.11. World Bank Ranking – control of corruption



Data source: World Bank, 2006.

Figure 9.12. World Bank Ranking – rule of law



Data source: World Bank 2006.

9.10 Land tenure issues

Land tenure is a difficult and sensitive issue in Pacific Island Countries (PICs). Customary ownership of land is deeply embedded in the culture and has historically provided a safety net from poverty. Table 9.13 summarises the land tenure arrangements in the six PICs.

The PIC governments recognise the need to reach some form of compromise between traditional and modern tenure systems in order to meet the need of both the indigenous people and potential investors. Land tenure issues impact not only on economic issues, but also on social, security and political arenas.

Table 9.13. PIC Land tenure arrangements

Country	Land Tenure			
	Registered (%)	Customary (%)	State (%)	Free (%)
Fiji	most	83	8	9
Solomon Islands	12	95	-	-
Vanuatu	very little	97	-	-
Samoa	na	81	16	3
Tonga	most	-	-	-
Kiribati	most	-	66	-

Source: Pacific Island Forum Secretariat in AusAID 2006, p 81.

Security of land tenure is an important foundation to economic activity as it increases access to credit markets. Clearly specified property rights are also an important equity issue for poor and disadvantaged groups.[11] The World Bank made the following observations in relation to improving security of land tenure in developing economies:

- Individual title is not necessarily the most appropriate and cost effective method of increasing security and transferability of land. Recognising customary tenure and finding means to facilitate land exchange through long-term leases can be just as effective.
- Improving security of tenure also requires the existence or creation of institutions to enforce legal rights.
- Property rights need not be static, and can respond to the changing demands for tenure security as countries develop.

A key lesson already learnt in the Pacific is that land tenure reforms must not be too ambitious. Reform should be incremental because it is complex and affects people's lives at fundamental social, cultural and economic levels and needs to balance diverse, competing interests. Further, PIC governments do not have the financial and administrative resources to implement wide-ranging reforms.

A functioning land tenure system will require:

- clear decisions over what rights in land can be transferred
- policies for recording land rights
- rules for determining who is entitled to enter into land deals
- arrangements for settling land disputes and strong land administrations.

[11] *AusAID 2006, Pacific 2020 — Challenges and Opportunities for Growth, May 2006.*

There is some agreement that the way forward for PICs in this area is a blending of ownership at the group level with long-term leases setting out the rights of individual developers to use the land.[12]

[12] *AusAID, 2006, Pacific 2020 — Challenges and Opportunities for Growth, May 2006.*

9.11 Workshop attendees and people consulted for Issues Paper

Table 9.14. Workshop Attendees – 6-7 March 2007

	Participant	Country of project (or organisation)
1	Mr. Graeme Stephen Thorpe, Managing Director, Balthan (Western) Ltd – exporter of taro, Fiji. (gst@is.com.fj)	Fiji - Taro
2	Mr. James Ernest, NARI Laloki Research Station National Agriculture Research Institute Dry-lowland Program-Laloki P.O.Box 1828, Port Moresby, Papua New Guinea Ph: (675) 3235511; Fax: (675) 3234733 james.ernest@nari.org.pg	Vanuatu - Yams
3	Dr. Siosiua Halavatau, Participatory Extension Officer Development of Sustainable Agriculture in the Pacific (DSAP) Project Secretariat of the Pacific Community (SPC) Private Mail Bag, Suva, FIJI Phone: (679) 337 0733 Fax: (679) 337 0021 Email SiosiuaH@spc.int	Vanuatu - Yams
4	Sada N. Lal, Entomologist, Plant Health Land Resources Division Secretariat of the Pacific Community, Suva, Fiji. Private Mail Bag, Suva, Fiji. Phone: (679) 337 0733 Fax: (679) 338 6326/337 0021 E-mail: SadaNL@spc.int	Samoa – Brassica PM
5	Barry Ale, Principal Research Officer, Crops Division, Nuu Ministry of Agriculture and Fisheries, Samoa Postal address: PO Box 1874, Apia, Samoa Phone: +685 20 605 Fax: +685 23 996 Email: barry@lesamoa.net	Samoa – Brassica PM
6	Viliami T. Manu, Ph D, Research & Extension Div. Ministry of Agriculture & Food, Nuku'alofa, Kingdom of TONGA Ph: (676) 37474 or 37475 or 17936 Fax: (676) 37476 Email: mafsoils@kalianet.to	Tonga - Squash
7	Mr Tevita TOAFA, General Manager, Friendly Island Marketing Co-operative Nuku'alofa, TONGA (Squash Exporters Council) Ph: (676) 21988 mob - (676) 21988 Fax: (676) 23928 Email: fimco@kalianet.to	Tonga - Squash
8	Mr Justin Hunter, J Hunter Pearls, Fiji Address: PO Box 34, Savusavu, Fiji Islands Ph: (679) 885 0821 Fax: (679) 885 0742 Email: info@pearlsfiji.com Website: www.pearlsfiji.co	Kiribati - pearls
9	Mr Ben Ponia, Aquaculture Technical Adviser, SPC. BP D5 9884 Noumea Cedex - New Caledonia Tel: +687 262000, direct 260166; Facsimile: +687 263818 Web: http://www.spc.int Email Benp@spc.int	Kiribati – pearls
10	Dr Richard L. Pauku, Principal, Maraghoto Consultancy Services P.O Box 1322, Honiara, Solomon Islands Tel: (677) 23190 (O) Tel: (677) 73246 (M)	Solomon Islands – forestry and general
11	Dr Chris Reid, Market Advisor Forum Fisheries Agency, PO Box 629, Honiara, Solomon Islands Email: chris.reid@ffa.int Tel: (677) 21124 Fax: (677) 23995	Regional (Fisheries)

12	Mr Wah Sing e-mail address - yeewahsing@grapevine.com.au Phone: (679) 327 5036 - Agricultural processor and exporter - owns Garden City, Suva	Fiji (general issues)
13	Mr Sam Foy Chung – exporter and chairman root crop council in Fiji. (waisuli@connect.com.fj, phone 679 3300 892 – contact per Mr Aleki Sisifa, Director Land Resource Division, Secretariat of the Pacific Community	Fiji (general agricultural export)
14	Mr Sidney Suma, Biosecurity and Trade Facilitation Adviser, Secretariat of the Pacific Community)	Fiji - Biosecurity
15	Jeff Davis Jacqui Wright	ACIAR
16	Bob Warner Libby Stephens	CIE
17	Professor Ron Duncan Ms Bibi Hamidan	USP

Table 9.15. ACIAR project leaders – consulted for Issues Paper

Project	Project Leader
CP/2000/044 Taro beetle management in PNG and Fiji (PNG, Fiji)	Mr Aleki Sisifa Director Land Resource Division Secretariat of the Pacific Community Private mailbag Suva, FIJI Email: Alekis@spc.int
FST/1996/085: Nutrition of tropical hardwood species in plantations in the south-western Pacific	Dr Paul Reddell Ecobiotics PO Box 148, Yungaburra QLD 4884 Email: paul.reddell@ecobiotics.com.au
SMCN/1998/028 Diagnosis and correction of nutritional disorders of yams (Tonga, Vanuatu)	Dr Jane O'Sullivan School of Land & Food Sciences University of Queensland Brisbane QLD 4072 Email j.osullivan@mailbox.uq.edu.au
HORT/2004/063: Integrated pest management in a sustainable production system for Brassica crops in Fiji and Samoa	Dr Michael Furlong School of Integrative Biology University of Queensland St Lucia Qld 4072 Email: m.furlong@uq.edu.au
PHT/2003/046 Integrated disease control strategies for powdery mildew and other problems in squash in Tonga (Tonga)	Dr Robyn McConchie Department of Crop Sciences Faculty of Agriculture Food and Natural Resources University of Sydney Woolley Building A20, Sydney NSW 2006 Email: r.mcconchie@usyd.edu.au
FIS/1997/031 Pearl oyster resource development in the Western Pacific (Fiji, Kiribati, Solomon Islands)	Dr Paul Southgate Department of Marine Biology and Aquaculture James Cook University Townsville Qld 4811 Email: paul.southgate@jcu.edu.au
SFS/2001/036 Maximising the economic benefits to Pacific Island Countries from management of migratory tuna stocks (Fiji, Kiribati, PNG, Samoa, Solomon Islands, Vanuatu)	Dr John Kennedy School of Economics La Trobe University Bundoora Vic 3083 Email: j.kennedy@latrobe.edu.au