

Papua New Guinea and Pacific island countries

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Pacific island countries

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ACIAR Regional Coordinators



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Graham Teakle taking plant samples in Solomon Islands - with the help of a group of local children

Papua New Guinea

Key statistics	
GDP per capita (US\$) ^a	953
Population (millions) ^a	6.5
Funding	
Bilateral actual 2007–08	\$4.53m
Bilateral allocation 2008–09	\$4.52m
Bilateral budget 2009–10	\$4.51m
Bilateral + multilateral budget 2009–10	\$4.87m

^aSource for current and following chapters: United Nations Statistics Division Online 2009, selected data from 2007 and 2008, <<http://unstats.un.org/unsd/demographic/products/socind/>>

Country manager
Dr Tony McDonald, ACIAR Country manager,
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Coffee growers meeting

Key program managers

Dr Chris Barlow, Fisheries

Dr Russell Haines, Forestry

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Dr Richard Markham, Pacific Crops

Medium-term strategy

The Australian Centre for International Agricultural Research (ACIAR) program supports the Papua New Guinea (PNG) Government's Medium Term Development Strategy (MTDS) 2005–10, in particular the priorities to promote economic growth in the primary sector, comprising agriculture, forestry and fisheries and to empower smallholders to mobilise their own resources for higher incomes. To achieve these goals, ACIAR facilitates and supports (R&D) activities for efficient use of sustainable resources to enable more productive and sustainable agricultural systems. Emphasis is placed on the social and economic contexts of the research, particularly with respect to involvement of women farmers. There are emphases on plantation crops, root and other horticultural crops, forestry and fisheries. These include exported and domestically traded commodities that generate smallholder income and underpin improved food security and economic development. PNG has several significant competitive advantages in relation to the production of timber. The opportunity exists to develop a timber growing and processing industry many times larger than the current log export industry from primary forests.

The ACIAR program includes tightly linked clusters of projects addressing problems faced by smallholders in major commodities such as sweetpotato, coffee, oil palm and cocoa.

Program design also encourages private sector, industry and non-government organisation (NGO) linkages in design and delivery of activities. Through addressing issues of biosecurity and sustainable management of land, forest and fisheries resources, sustainability of renewable resources is encouraged. The program has a strong emphasis on capacity building, with high priority given to both training within projects and postgraduate training. In addition to the project expenditures shown above, about \$1 million is invested by ACIAR annually on training in PNG.

AusAID and ACIAR work closely together in PNG. AusAID co-invests ACIAR-managed project activities, while ACIAR contributes to relevant AusAID programs, particularly the Agricultural Research and Development Support Facility (ARDSF).

Key performance indicators (2009–10)

- technologies developed to enhance smallholder livelihoods from sweetpotato through increased crop yields, appropriate management of soil and nutrients, and by improved post-harvest handling and marketing
- technology innovation for export tree crops that enhance crop yields and improve post-harvest handling and marketing within a socio-cultural context that reduces constraints to adoption and improves smallholder livelihoods
- new coffee project scoped to assess the socio-economic constraints to technology adoption and management of the natural resource base
- initiatives commenced to secure and promote the availability of high quality teak germplasm for smallholder plantings and increased involvement in projects of agroforestry-focused NGOs

- strategic approach developed to guide the expansion of inland aquaculture in PNG and quantities and reliable availability of high quality fingerlings significantly improved
- direct linkages between at least three AusAID-funded ARDSF projects, at least three Unitech scholarship projects and ACIAR research outputs.

Position

PNG is one of Australia's most important development partners, and ACIAR's program in PNG reflects this. ACIAR's program recognises the many challenges to agricultural development in PNG, including poorly developed infrastructure, weak market signals and services, pressure on land and renewable resources as a result of population increases and new pest and disease threats, and poor product quality. Future impacts of population pressure and HIV/AIDS and other human diseases on the farming sector, including effects on labour availability and productivity, will be addressed, and gender issues will be mainstreamed into the program. Recognising the enormous potential of agriculture for sustaining the basic livelihood of the people, the Papua New Guinea Department of Agriculture and Livestock has developed a National Agriculture Development Plan as a blueprint to guide future directions in agriculture and rural development.

Village-based agriculture supports over 70% of the population, and domestic trading of fresh produce is a very important source of cash income. By far the most important crop in PNG is sweetpotato, the dominant staple for over 65% of the rural population. The main export tree commodities are timber, oil palm, coffee, cocoa and coconuts. Forestry is PNG's third largest revenue earner and a major contributor to economic and social development. PNG has

several significant competitive advantages in relation to the production of timber; available land, good soils and climate, and a long history of successful incorporation of trees into agroforestry systems. The PNG fisheries zone of 2.4 million km² is the largest in the South Pacific. The fisheries zone includes an extended reef system, numerous islands and an extensive coastline. These create huge opportunity but also present an enormous challenge for monitoring and control. The total market value of the PNG catch is estimated at \$A140–160 million. Pigs and poultry are important village animals and there are some live exports of cattle from PNG. ACIAR will assist in the development of capacity to detect and manage infectious disease in the wider context of biosecurity arrangements and in collaboration with other Australian agencies. Where relevant, close linkages will be formed between ACIAR-funded programs in PNG and the Pacific island countries, for example in root and tree crops, fisheries and forestry.

Key principles in designing and executing the program include the importance of:

- engagement with the private sector, industry bodies and NGOs along with government in both research and implementation of research results
- research that assists the engagement of smallholders in the cash economy
- understanding the social and economic issues affecting farmer decision-making and factors influencing adoption of new technologies.

Research is urgently needed into more effective ways of increasing the adoption of R&D results from pilot level involvement of communities to enable broader implementation. ACIAR will work with its counterparts to assist in communication and extension of the results of research. As well as making a greater commitment to implementation of the results of research, the need for on-going development of agricultural technologies remains strong.

There is particular need to develop the informal sector (including those involved in village-level production and marketing of root and horticultural crops and small livestock), improve the productivity of major tree crops (by increasing production and exports and lowering production costs), and support R&D that assists in diversification of the agricultural export product base.

There are requirements for capacity building at both the individual and institutional levels in all areas, but particularly to support analysis of social and economic constraints and opportunities, marketing and value-addition of agricultural products and in agricultural education. PNG's relative lack of human resources is a constraint in R&D activities and delivery of extension services. It is therefore crucial during design and implementation of projects to involve farmers and extension workers, and to include training and packaging of research results in a form useful to farmers, members of industry and policymakers.

Box 1. Relationship to the AusAID PNG strategy

AusAID's strategy is to encourage PNG to reduce poverty and promote sustainable development through support for the PNG Government's efforts to implement its Medium Term Development Strategy and Medium Term Fiscal Strategy, with a specific focus on four core areas:

1. improved governance and nation building
2. sustainable broad-based economic growth and increased productivity
3. improved service delivery and stability
4. a strengthened, coordinated and effective response to the HIV/AIDS epidemic.

Australia's support to the agriculture sector in PNG contributes directly to the second strategy and is in alignment with the ACIAR program. The main goal of the ACIAR program, including the ACIAR—AusAID Partnership in PNG is to ensure 'sustainable and secure improvements in food supply and rural incomes for smallholders through increased productivity and enhanced access to markets and services (agriculture, forestry, agroforestry, fisheries and aquaculture) and sustainable and secure improvements in food supply and rural incomes'.

Research priorities

ACIAR has a formal program of consultations with PNG to establish priorities in research collaboration, as well as annual smaller consultations and industry workshops to finetune these priorities. A record of the most recent set of formal consultations, held in May 2008, is provided at <www.aciar.gov.au> under Partner country priorities/Papua New Guinea. The ACIAR PNG portfolio emphasises the disciplines of agricultural systems (including postharvest activities); production and protection of root, horticultural and tree crops; and fisheries and forestry. Training priorities are mainly addressed through targeted activities within projects, although support for postgraduate degrees in Australia and an in-country scholarship scheme at the University of Technology, Lae, are the main contributors to capacity development. The priorities are grouped under the following thematic programs.

Subprogram 1: Addressing social, cultural and policy constraints to the adoption of agricultural technologies

- Interventions to overcome cross-cutting social and cultural constraints to smallholder household profitability/productivity based on analysis of:
 - land mobilisation issues (tenure, registration, titles, communal)
 - applicability of new labour mobilisation models beyond the cocoa and oil palm industries
 - impact of smallholder involvement in participatory action research activities and other group learning processes on adoption of technical innovations

- effects of cultural factors on ability to replicate successful entrepreneurship in agriculture
- analysis of income utilisation, savings incentives and microfinance access in smallholder families, particularly with respect to establishing criteria for successful engagement of women

- Analysis of how current production and marketing systems impact on women in terms of efficiency and equity, and the role and effectiveness of women's groups in rural industries
- Assessment of the role of cottage industries in contributing to livelihoods and household cash flow and complementing engagement in formal markets and the national economy
- Economic assessment of the rice trade and rice-based farming systems, including national demand (role of production and imports) and potential returns from investing in technical improvements
- Improved crop water management under climate variability and change, including:
 - management of water availability to meet market demand and food security
 - identification of drought-vulnerable areas for PNG and potential policy and technical interventions.

Subprogram 2: Enhancement of smallholder incomes from horticulture and root crops

- Matching supply to demand and marketing of highland root and horticultural crops, including:
 - understanding the sector to clarify demand of different product categories in major markets.



Dr Gamini Keerthisinghe on a project visit in the PNG Highlands with a local boy carrying utensils to prepare and cook lunch with his father who is working in the fields

- understanding relative effectiveness of different collaborative arrangements for mobilising smallholders from social and cultural perspectives
- economics of storage depots, and the role of private sector versus government intervention
- establishment of criteria for productive relationships between smallholders, middlemen and private sector buyers and sellers
- Application of traditional staple crop varieties (sweetpotato, taro and banana) and identification of suitable crop varieties for processed products
- Identification of quarantine barriers to potential export of root crops and flowers to other countries
- Use of legumes and fallow crops for soil fertility improvement and longer term nutrient supply in vegetable production systems
- Analysis and interventions in market chains for temperate vegetables, including collation of market information and strategies to improve post-harvest operations
- Assessment of simple technologies and mechanisation systems for family and community production, post-harvest handling and storage of horticultural crops
- Improvement of seed multiplication, distribution and marketing systems, including assessment of strategies for enhancing availability of quality seed
- Improved productivity and profitability of sweetpotato-based farming systems, including:
 - development of breeding and selection strategies for important traits in sweetpotato for different regions in relation to yield, stress tolerance and consumer preferences
 - development of integrated pest, disease, weed and nutrient management strategies
 - evaluation of industrial opportunities for processed sweetpotato products
- Identification of promising root crop—legume—tree—livestock systems that provide better use of crop residues for nutrient cycling and local sources of animal feed.
- Development and smallholder implementation of biocontrol systems for major oil palm pests (*sexava*, *eurycantha*) and diseases (*ganoderma*)
- Assessment of natural resource sustainability indicators for tree crop industries
- Management systems for processing wastes from coffee and other tree crops to underpin development of environmentally sustainable production practices required for certain export markets

Subprogram 4: New livelihoods from smallholder fisheries, aquaculture and forestry

- Use of GIS-based tools that integrate aquaculture into existing land-use systems and socio-economic contexts
- Small-scale inland aquaculture, including cost-effective feeds and feeding strategies and increased availability of quality fingerlings
- Evaluation of livelihood opportunities in recreational fishing resources such as black bass
- Development of agroforestry systems, addressing:
 - integration of high-value tree crops into agricultural systems
 - germplasm development, delivery and agroforestry demonstration sites
 - social, cultural and economic motivations for landowners planting trees
- Social and economic approaches to improve smallholder involvement in forestry and agroforestry, addressing land tenure and user rights issues and participatory processes to foster community engagement
- Improving economic returns from timber processing, including economic analysis of sawmilling strategies, improving sawn log recovery and use of small-diameter logs from secondary forests.

Subprogram 5: Agricultural biosecurity and sustainable management of forestry and fisheries resources

Subprogram 3: Improving smallholder returns from export tree crop production and marketing

- Social and economic analysis of incentives for uptake of intensified management systems in cocoa, coffee and oil palm
- Development and application of geographic information system (GIS) databases for coffee, cocoa and oil palm with a focus on management of pest and disease outbreaks
- Assessment of the impact of cocoa pod borer infestation and potential coffee berry borer infestation on smallholders and implementation of pre-border–post-border spread, incursion management, and surveillance
- Optimising economic, social and environmental returns from planted and native forests, particularly addressing landowner land-use options, product diversification and income earning opportunities for women
- Climate change and sustainable forest management, including research on transparent instruments to foster landowner involvement in carbon trading (through ACIAR collaboration with whole-of-government programs)
- Reforestation strategies for rehabilitation of degraded areas, including secondary (cutover) forests, mine sites and grasslands

- Management of shark fisheries, including target (shark longline) and non-target (tuna, purse seine and longline) fisheries
- Responding to overfished inshore fisheries through community-based fisheries management, restocking (especially of sea cucumber) and identification of aquaculture-based livelihoods
- Assessment of future risks, control and potential utilisation strategies for invasive or exotic fisheries species
- Strengthening of surveillance systems to monitor and respond to livestock diseases.

Current project portfolio

(Possible new projects commencing in 2009–10 shown as 'proposed')

Subprogram 1: Addressing social, cultural and policy constraints to the adoption of agricultural technologies

ASEM/2005/094	Improving the profitability of village broiler production in PNG
ASEM/2006/023	Re-commercialisation of the PNG pyrethrum industry and improving harvested yields in Australia
ASEM/2006/127	Private sector/smallholder partnerships for improving incomes in oil palm and cocoa sectors in Papua New Guinea
ASEM/2007/096	Review of technology adoption for all ACIAR projects in PNG and case studies of policy and economic factors constraining impacts
ASEM/2008/042	Postgraduate scholarship scheme at the University of Technology Lae, Papua New Guinea



Seedling distribution to pyrethrum growing families in PNG

Subprogram 2: Enhancement of smallholder incomes from horticulture and root crops

Root crops are traditional staple foods in PNG, and their vital contribution to food security is well recognised. However, the production of root crops, in particular sweetpotato, is declining as a consequence of competing land pressure, shortening fallow periods, soil degradation and other factors such as pests and diseases. The project cluster on root crops is designed with these constraints in mind. Its main focus is on identification and development of more productive and sustainable production systems based on root crops. Activities include efficient use of plant genetic resources; identification of promising nutrient, water, pest and disease management practices; and development of improved postharvest handling techniques. Capacity building and dissemination of promising technologies to farmers are critical and integral components of the program. During 2009–10 a new program of activities on horticultural crops will be implemented.

ASEM/2006/035	Improving marketing efficiency and postharvest handling of sweetpotatoes in PNG
FST/2006/048	Processing of <i>Canarium indicum</i> nuts: adapting and refining techniques to benefit farmers in the South Pacific
PC/2003/029	Management of potato late blight in PNG
PC/2005/134 (multilateral)	The use of pathogen-tested planting materials to improve sustainable sweetpotato production in Solomon Islands and PNG (CIP)
PC/2006/106	Screening and field trials of high-carotenoid sweetpotatoes for improving the vitamin A status of residents of Solomon Islands and Papua New Guinea
SMCN/2004/067	Management of soil fertility in sweetpotato-based cropping systems of the PNG highlands
SMCN/2004/071	Reducing pest and disease impact on yield in selected PNG sweetpotato production systems

Subprogram 3: Improving smallholder returns from export tree crop production and marketing

Cocoa and oil palm

The scope for smallholder productivity and income improvements within the export tree sector is large in PNG. There are approximately 150,000 families producing cocoa at very low levels of productivity, and over 18,000 smallholder growers producing oil palm at less than 50% of plantation capacity. If productivity were to rise by even a small margin, the income gains would be significant for smallholders, their families and their communities. This can only be achieved through improvements in smallholder crop husbandry skills, application of fertiliser and management of soil fertility. The main aim of this cluster of projects is to raise smallholder productivity and incomes in the oil palm and cocoa sectors while sustaining the natural resource base. This will be achieved through identification of promising management practices to increase crop productivity, development of measurable and quantifiable environmental indicators of sustainability and promotion



Smallholder vegetable markets are an important source of income for smallholder farmers

of effective strategies for commercial sector partnerships with smallholders.

ASEM/2006/127	Private sector/ smallholder partnerships for improving incomes in oil palm and cocoa sectors in PNG
SMCN/2009/013 (proposed)	Assessment of natural resource sustainability indicators for oil palm in PNG

Coffee

The PNG coffee industry supports over 350,000 families and earns K300 million (A\$120 million) annually, but the consistency and reliability of coffee supply and quality has declined with the move to low-input management of the smallholder industry. Despite this general decline, premium PNG coffee retains a good reputation among customers and there is good scope to increase demand by improving marketing and quality. ACIAR's coffee program cluster aims to increase the profitability of coffee production for smallholders through optimising the cost and adequacy of production inputs, improving reliability of supply and quality, processing for quality and exploring a range of alternative marketing approaches.

ASEM/2008/035	Scoping study to examine the state of coffee resources and socio-economics in Papua New Guinea
ASEM/2008/036 (proposed)	Coffee socio-economic/resource management program in Papua New Guinea

Fisheries and aquaculture

Inland fish farming is expanding rapidly in PNG, with an estimated 11,000 smallholder farmers contributing an annual production valued at A\$2.5 million. Key constraints include poor fingerling supply compounded by inefficient distribution channels (which limit the availability of seed to farmers), the high cost and limited availability of suitable feeds, and a general lack of aquaculture husbandry skills and

knowledge. The projects are interlinked and collectively aim to improve the productivity of fish farmers in inland PNG through increasing the supply of fingerlings to farmers; improving available feeding options, including on-farm feed production and the development and distribution of simple formulated feeds based on locally available materials; conducting dedicated training programs and strategies to increase farmer skills in pond husbandry; and investigating alternative culture species, with an emphasis on promising indigenous fish and crustaceans.

Subprogram 4: New livelihoods from smallholder fisheries, aquaculture and forestry

FIS/2004/065	Culture of promising indigenous fish species and bioremediation for barramundi aquaculture in northern Australia and PNG
FIS/2006/138	Developing aquaculture-based livelihoods in the Pacific island region and northern Australia
FIS/2008/023 (proposed)	Increased inland fish production in PNG
FIS/2008/031 (proposed)	An assessment of the extent of genetic introgression in exotic culture stocks of tilapia in the Pacific region
FIS/2008/043	Advisory Committee: barramundi feed development trial in Western province, PNG

Forestry and agroforestry

ACIAR's PNG forestry project cluster promotes the development of a smallholder- and community-based plantation industry with high-value species. This is based on significant domestic processing, involving both portable sawmills and static production facilities, together with enhanced production of non-timber forest products and services. Species addressed in this work include teak (*Tectona grandis*), galip nuts (*Canarium indicum*) and balsa (*Ochroma lagopus*).

FST/2004/050	Value-adding to PNG agroforestry systems
FST/2006/120	Increasing downstream value-adding in PNG's forest and wood products industry
FST/2004/055	Domestication and commercialisation of <i>Canarium indicum</i> in PNG
FST/2006/088	Promoting diverse fuel wood production systems in PNG
FST/2007/078	Germplasm development and delivery to underpin a PNG timber industry based on planted forests
FST/2008/050 (proposed)	Assembly of teak germplasm for provision to relevant ACIAR partner countries
FST/2009/012	Identification of researchable issues underpinning a vibrant balsa wood industry in PNG
FST/2009/016 (proposed)	Enhancing incomes from PNG's balsa industry

Subprogram 5: Agricultural biosecurity and sustainable management of forestry and fisheries resources

Many of the agricultural pests and diseases that ravage staple food crops and plantation and horticultural crops in PNG are of biosecurity concern to Australia. ACIAR has a cluster of projects that investigate better ways to manage these pests and diseases using systematic and environmentally sound methods. These include integrated pest/disease management techniques and biological control options, some of which are focused on pest/disease surveillance, quarantine risk and incursion management. The projects aim to reduce crop losses and increase quality and productivity, providing better incomes for farmers. A new initiative will investigate the problems posed by invasive fish species as well as examine opportunities to better utilise existing populations of introduced exotic species.

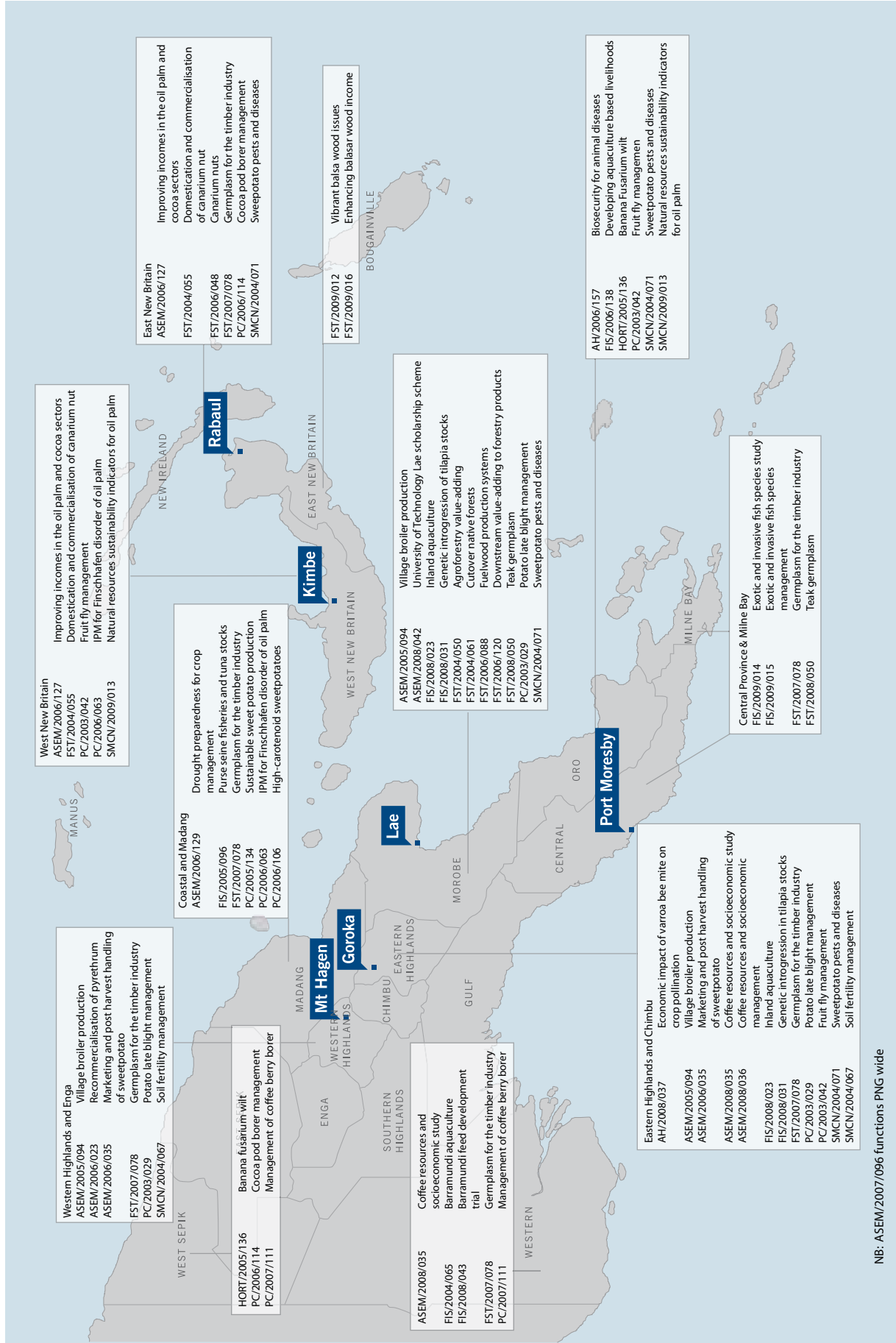
The forestry work focuses on improved management of secondary forests via ongoing sustainable production and improved environmental services. All projects have capacity-enhancement components.

AH/2006/157	Improved biosecurity for animal diseases in PNG
AH/2008/037	Potential economic impacts of the <i>Varroa</i> bee mite on the pollination of major crops in PNG
ASEM/2006/129	Early warning and drought preparedness for improved management of crop production in PNG
FIS/2005/096	Assessment of the impact of the PNG purse seine fishery on tuna stocks, with special focus on the impact of fish aggregation devices (FADs)
FIS/2009/014 (proposed)	Preliminary assessment of exotic and invasive fish species in PNG
FIS/2009/015 (proposed)	Impact, management and utilisation of invasive and exotic fish species in PNG
FST/2004/061	Assessment, management and marketing of goods and services from cutover native forests in Papua New Guinea
HORT/2005/136 (multilateral)	Mitigating the threat of banana <i>Fusarium</i> wilt: understanding the agro-ecological distribution of pathogenic forms and developing management strategies (Bioversity)
PC/2003/029	Management of potato late blight in PNG
PC/2003/042	Fruit fly management in PNG
PC/2006/063	Integrated pest management for Finschhafen disorder of oil palm in PNG
PC/2006/114 (multilateral)	Managing cocoa pod borer in PNG through improved risk incursion management capabilities, integrated pest management strategies and stakeholder participatory training (CABI)
PC/2007/111 (multilateral)	Incursion prevention and management of coffee berry borer in PNG and eastern Indonesia (CABI)



Villagers from Morobe Province, PNG inspect a taro crop with Mathew Boang, Chairman for Lands and Physical Planning in the Morobe Provincial Government

Active projects in Papua New Guinea



NB: ASEM/2007/096 functions PNG wide

Pacific island countries

Key program managers

Dr Chris Barlow, Fisheries

Dr Russell Haines, Forestry

Dr Richard Markham, Pacific Crops

Mr David Shearer, Agribusiness

Key statistics			
GDP per capita (US\$)			
Fiji	4,014	Samoa	2,750
Solomon Islands	978	Tonga	2,470
Vanuatu	1,995	Kiribati	762
Population (millions)			
Fiji	0.8	Samoa	0.2
Solomon Islands	0.5	Tonga	0.1
Vanuatu	0.2	Kiribati	0.1

Funding	
Bilateral actual 2007–08	\$2.79m
Bilateral allocation 2008–09	\$2.38m
Bilateral budget 2009–10	\$4.52m
Bilateral + multilateral budget 2009–10	\$5.15m



Flower markets in Honiara, Solomon Islands

Medium-term strategy

ACIAR's program in the Pacific island countries (PICs) concentrates on Solomon Islands, Samoa, Tonga, Vanuatu, Fiji and Kiribati, and works through regional organisations where appropriate. Our strategy recognises the importance of the agricultural, fisheries and forestry sectors within these countries. It supports R&D and capacity building to address three thrusts: improved food and nutritional security; integrated and sustainable agriculture, fisheries and forestry resources management and development; and improved biosecurity and increased trade in agriculture, fisheries and forestry products. It recognises the need to address individual PIC priorities arising from differences in climate and soils, availability of natural resources, institutional capacity, infrastructure and potential for economic growth, while at the same time recognising that many challenges are common and best addressed through regional collaboration. By working closely with Pacific partners, and adhering to the intent of the 'Pacific Partnerships for Development' approach (see Box 2), ACIAR plans to significantly increase the size of its PICs program during 2009–10 and succeeding years.

ACIAR focuses on three key stakeholder groups, smallholders, producing for commercial markets; entrepreneurs, developing value chains involving cooperative production, processing and marketing; and corporate producers and exporters, providing market linkages for outgrowers. The ACIAR strategy for the PICs identifies the participation of women in particular as a critical feature

of project success. This strategy will also have a significant impact on the household food security of smaller and subsistence growers resulting from training and capacity building for government R&D staff and extensionists and NGO staff and lead farmers, and the development of crop production systems with broad applicability. The ACIAR program provides R&D solutions and capacity building with close linkages to other extension, technology transfer and community development programs implemented by the Secretariat for the Pacific Community (SPC), Pacific island governments, NGOs and other donors.

To achieve sustainable change interventions ACIAR will offer innovative approaches that engage, empower and invest in women. ACIAR R&D activities and projects will consider how each project will specifically address gender inequity in agricultural development, for example inequity in decision-making and women's access to appropriate technology and knowledge. This will include consideration of the optimum level of women's participation to achieve maximum project impact on hunger, poverty and food security; significant increase in opportunities for women in income generating activities and decision-making; and a growing understanding of gender issues in the community in which ACIAR operates. Women particularly have a central role in household food gardening, tree crop production, and marketing of horticultural, tree crop and fisheries products. Project activities will include appropriate gender-based objectives, milestones and performance indicators.

In agriculture, the program will focus on adaptation to changes in microclimate and identification and management of constraints to productivity in both staple root and high-value crops. It will assist the identification and development of new high-value horticultural crops (fruits, vegetables and ornamentals) for domestic, regional and international markets. In fisheries, ACIAR will focus on addressing sustainable production of oceanic and inshore fisheries, the development of alternatives through aquaculture and improvements in economic returns through improved product quality and better market linkages. The forestry program will emphasise the development of emerging plantation opportunities through improved silvicultural management, enhanced genetic resources, new products, and development of disease and pest detection and management methods. There will be increased attention to the development and strengthening of agribusiness linkages with farming systems and marketing research undertaken to underpin the strategy. The program also has a strong emphasis on building R&D capacity within the region.

Key performance indicators (2009–10)

- integrated production management packages (for ginger, leafy vegetables, brassicas and papaya) being tested commercially in at least three countries
- new market-driven product opportunities (including forestry, fruits, vegetables, flowers, fishery products, nuts, herbs and spices) identified and R&D projects to address these designed and implemented in at least two countries
- promising processing technologies identified, developed and communicated for forest products and indigenous nut crops
- research strategy to strengthen agribusiness linkages for sustainable domestic and/or export market development identified for four products
- the productivity and profitability of smallholder aquaculture significantly improved in at least two countries through the introduction of new culture technologies, the identification of better performing broodstock and the development of nutritious low-cost feeds.

Position

Due to their proximity to Australia, the PICs are of strategic importance to Australia. ACIAR's program in the PICs will continue to develop in line with broader Australian development assistance priorities. There is an increasing awareness of the importance of changing economic and environmental situations, and the increased vulnerability of small developing island states if flexibility, resilience and adaptation to change are not achieved. The PICs face a range of challenges including eroding tariff preferences, population and urban growth, migration of skilled labour, resource depletion and degradation, and risks from climate change and high and fluctuating food and energy prices. As described in *Pacific 2020—challenges and opportunities*

for growth¹, ineffective policy implementation is seen as a significant impediment to development and progress.

Agriculture, forestry and fisheries sustain many households and these sectors will supply the majority of livelihoods and provide the main source of food security for PICs for the foreseeable future. In Solomon Islands, local production of food crops contributes up to 71% of household income, while in Samoa and Tonga this figure is closer to 40%. Many smallholders live in isolated rural communities dependent on household food production and intermittent crop, fish and small livestock sales. Transforming these systems into sustainable income-generating activities through improved productivity and marketing will enhance food security and self-reliance and reduce poverty. Key challenges for ACIAR and its partner agencies in working in the PICs include physical isolation of countries, poor transportation logistics, human and organisation capacity constraints, land tenure disputes and uncertainties, a lack of infrastructure, poorly developed supply chains, a lack of harmonisation between countries (e.g. in biosecurity laws) and the need to link with major domestic and international markets.

Participation in regional projects that address common problems can help overcome the limited capacity of many countries to engage in collaborative activities. ACIAR has a strong emphasis on working with Pacific regional organisations to improve effective delivery of outputs. In partnership with the University of the South Pacific, ACIAR has implemented a postgraduate training program designed to increase capacity in the region through scholarships for research associated with ACIAR projects in the Pacific.

An expanded ACIAR–Pacific island countries program

ACIAR will allocate an additional 35% to the 2009–10 Pacific R&D program projects budget from the existing recurrent appropriation budget. The additional Pacific R&D project allocation will fund two multi-year initiatives:

- research to improve the profitability of the plantation (tree) crop sector predominantly in Solomon Islands, particularly in oil palm and cocoa. Plantation tree crops are a priority due to the potential for economic growth and increases in grower incomes from these crops. For example, the estimated revenue to Solomon Islands economy from palm oil was US\$10 million in 2008. R&D and capacity building to remove production constraints could see this rising to over US\$30 million by 2014
- new initiatives on agricultural technology transfer and capacity building, including enhancement of the continuing University of the South Pacific (USP) post-graduate scholarship program. These set out to enhance adaptive agricultural R&D capacity within and between PICs and to foster co-ordination and implementation of regional agricultural technology transfer strategies. This will result in enhanced and broader impact from the outputs of previous, current and future ACIAR projects and capacity-building activities.

¹ <www.ausaid.gov.au/publications/pdf/pacific2020.pdf>

The increased allocation of funds to the Pacific R&D program from the existing ACIAR budget is additional to the support of a new ACIAR-managed program ('Exploiting opportunities for developing high-value agriculture, forestry and fisheries products in the Pacific nations'), which forms part of the whole-of-government *Food Security through Rural Development* initiative announced in the May 2009 Budget. Taken together, these initiatives will result in a 65% increase in of the ACIAR program size in the PICs from 2008–09 to 2009–10. In addition, ACIAR supports training activities (mainly postgraduate scholarships for study in Australia) and program management, totalling \$1 million annually.

Research priorities

Priorities for ACIAR–PICs cooperation are reviewed and updated in regular consultation with relevant government, community and private sector stakeholders. ACIAR also attends regional priority-setting meetings, including the Regional Conference of Heads of Agriculture and Forestry Services, and SPC Heads of Fisheries meetings. New projects will be considered under the following three thematic programs.

Subprogram 1: Improving food and nutritional security

- Identification, development and adoption of new market-driven opportunities for the improvement of horticultural and tree crops

- Development and adoption of integrated and more sustainable production management packages for food staple, fruit, vegetable and plantation crops
- Selection and adoption of staple crops with enhanced nutritional content
- Integration of existing knowledge into information packages for food staples, and fruit and vegetable crops
- Capacity building and training through postgraduate scholarships linked to ACIAR projects.

Subprogram 2: Integrated and sustainable agriculture, fisheries and forestry resource management and development

- Stock status assessment and planning for the sustainable use of vulnerable inshore fisheries, with an emphasis on increased community-level management and co-management
- New opportunities for inland aquaculture, including the domestication of promising indigenous species and integration into existing farming systems
- Valuation of resources and economic analysis of smallholder and commercial fisheries
- Domestication of multipurpose trees for forestry and agroforestry, including selection of suitable germplasm, silvicultural management and protection from pests and diseases
- Value-adding processing of forest and fisheries products

Box 2. Pacific Partnerships for Development

In 2008, the Australian Government committed to a new and elevated engagement with our Pacific island partners. 'Pacific Partnerships for Development' commits Australia and its Pacific partners to work together to meet our common challenges, raise the standard of living for people throughout the region, and in particular, to make more rapid progress towards our partners achieving the Millennium Development Goals and their own development ambitions. In this context, the 'Port Moresby Declaration' suggests measures aimed at:

- improving economic infrastructure and enhancing local employment possibilities through infrastructure and broad-based economic growth
- enhancing private sector development, including better access to microfinance
- achieving quality universal basic education
- improving health outcomes through better access to basic health services
- enhancing governance, including the role of civil society, and the role of NGOs in basic service delivery.

Pacific Partnerships for Development will be established jointly by bilateral arrangements known as Partnership Frameworks, which address mutual respect and mutual responsibility. Australia will commit to provide new and additional bilateral assistance over time in return for commitments by Pacific partners to improve governance, enhance private sector development, increase investment in economic infrastructure, and achieve better outcomes in health and education and in other areas.

ACIAR's Pacific program, through its three research emphases contributes to the objectives of a number of the partnership priorities. In fisheries, ACIAR will work in cooperation with AusAID's Pacific fisheries strategy released in November 2007. This has the dual strategic objectives of 'maximising the flow of benefits to Pacific island peoples from sustainable commercial and subsistence fisheries' and 'implementing effective ecosystem-based fisheries management for sustainability'². AusAID is currently developing the Pacific Horticultural and Agricultural Market Access (PHAMA) program for commencement in 2010. PHAMA will develop and progress market access submissions for export crop and livestock products and support implementation of biosecurity and quadrant measures required to maintain market access. ACIAR will complement this through R&D work on productivity and marketing of target products, and through capacity building.

²AusAID Pacific fisheries strategy: <<http://www.ausaid.gov.au/publications/pdf/fisheries.pdf>>

- Capacity building and training in PICs through postgraduate scholarships linked to ACIAR projects.

Subprogram 3: Improved biosecurity and increased trade in agriculture, fisheries and forestry products

- Use of marketing research to help producers and industry identify market opportunities for agricultural commodities
- Analysis of strategic supply chains and design and implementation of interventions to improve supply chain efficiencies
- Development and strengthening of agribusiness linkages, including analysis of trade policy and market-chain constraints
- Identification and analysis of processing and value adding opportunities for crops, aquaculture and forestry products and design and implementation of R&D interventions
- Identification of quarantine and pest risk issues for crop germplasm requiring exchange between countries
- Development and adoption of quarantine pest and disease control measures for crop exports.

Current project portfolio

(Possible new projects commencing in 2009–10 shown as 'proposed')

Subprogram 1: Improving food and nutritional security

This subprogram has two major emphases. First, it aims to develop and implement strategies to underpin improved and sustainable productivity and quality of food staples and high-value horticultural crops, with a particular emphasis on integrated crop management including crop pests and diseases. The second emphasis is to increase household income through market-driven diversification of production by exploitation of new market niches, genetic diversity, new products and value-adding. Several projects in the subprogram focus on the integration and adoption of results from previous ACIAR research. The particular emphasis of this subprogram is on root crops, vegetables, fruit crops and ornamentals. A third, but currently minor, focus for this subprogram is the production of root crops with improved nutritional value.

PC/2003/046	Integrated control of powdery mildew and other disease, weed and insect problems in squash in Tonga and Australia
PC/2003/047	Improved plant protection in Solomon Islands
PC/2004/030	Control of Asian honeybees in Solomon Islands
PC/2004/049	Improved farming systems for managing soil-borne pathogens of ginger in Fiji and Australia
PC/2004/063	Integrated pest management in a sustainable production system for <i>Brassica</i> crops in Fiji and Samoa

PC/2005/077 (multilateral)	Integrated crop management package for sustainable home gardens in Solomon Islands (AVRDC)
PC/2005/134 (multilateral)	The use of pathogen-tested planting materials to improve sustainable sweetpotato production in Solomon Islands and Papua New Guinea (CIP)
PC/2006/053	Evaluation of the effects of dasheen mosaic virus on taro yield (Fiji, Samoa)
PC/2006/106	Screening and field trials of high-carotenoid sweetpotatoes for improving the vitamin A status of residents of Solomon Islands and PNG
PC/2007/039	The control of basal stem rot of oil palm caused by <i>Ganoderma</i> in Solomon Islands
PC/2008/003	Development of integrated crop production management systems in red papaya in Fiji
PC/2008/011	Ornamental horticultural crop development for Fiji, PNG and northern Australia
PC/2008/046 (proposed)	Rejuvenation of cocoa plantations in Solomon Islands and Samoa for increased productivity and quality
PC/2009/003 (proposed)	Agricultural technology transfer and capacity building for the Pacific islands
HORT/2007/072	Postgraduate scholarship scheme for University of the South Pacific (Fiji, Samoa, Solomon Islands, Tonga, Vanuatu)

Subprogram 2: Integrated and sustainable agriculture, fisheries and forestry resource management and development

This subprogram aims at developing and implementing strategies to sustainably use and manage natural resources associated with forestry and fisheries production. These are often community-owned and publicly-managed resources that require broad-based and inclusive management strategies, while at the same time recognising that forestry and fisheries provide significant sources of income. The fisheries project cluster has an increased emphasis on freshwater aquaculture and mariculture of sedentary species which provide greater opportunity for income generation at the local level.

FIS/2005/096	Assessment of the impact of the PNG purse seine fishery on bigeye, yellowfin and skipjack tuna stocks, with special focus on the impact of fish aggregation devices (FADs)
FIS/2005/108	Freshwater prawn aquaculture in the Pacific: improving culture stock quality and nutrition in Fiji
FIS/2006/138	Developing aquaculture-based livelihoods in the Pacific island region and northern Australia (Fiji, Samoa, Solomon Islands, Tonga, Vanuatu)
FIS/2006/172	Pearl production from the winged pearl oyster <i>Pteria penguin</i> in Tonga
FIS/2007/116 (multilateral)	Improving resilience and adaptive capacity for fisheries-dependent communities in Solomon Islands (WorldFish)
FIS/2008/031 (proposed)	An assessment of the extent of hybrid introgression in imported culture stocks of <i>Oreochromis niloticus</i> in the Pacific region (PNG, Fiji, Vanuatu and Samoa)

HORT/2007/072	Postgraduate scholarship scheme for University of the South Pacific (Fiji, Samoa, Solomon Islands, Tonga, Vanuatu)
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The forestry project cluster underpins the development of emerging industry opportunities, in particular plantation programs with teak, sandalwood, whitewood and *Flueggea*, while identifying processing opportunities for coconut wood and non-timber forest products.

FST/2004/054	Improving value and marketability of coconut wood (Fiji, Samoa)
FST/2004/055	Domestication and commercialisation of <i>Canarium indicum</i> in PNG (and Solomon Islands)
FST/2005/089	Improved silvicultural management of <i>Endospermum medullosum</i> (whitewood) for enhanced plantation forestry outcomes in Vanuatu
FST/2006/048	Improved processing, storage and packaging of <i>Canarium</i> nuts (PNG, Solomon Islands, Vanuatu)
FST/2007/020	Improving silvicultural and economic outcomes from community teak and rosewood plantations in Solomon Islands by inter-planting with <i>Flueggea flexuosa</i> and other Pacific agroforestry species

Subprogram 3: Improved biosecurity and increased trade in agriculture, fisheries and forestry products

This subprogram aims to support the identification and development of opportunities for domestic, inter-island and international trade for agricultural, fisheries and forest products with a view to increasing the economic growth in PICs. It potentially includes a range of regional and individual country-based activities including market research, strengthening of agribusiness linkages, analysing and increasing the efficiency of value chains, and identifying and developing value-adding opportunities. There are two major emphases. Firstly, underpinning of the EU-funded Facilitating the Agricultural Trade (FACT) program and providing R&D support for the PHAMA program currently being developed by AusAID and secondly, providing capacity building in quarantine, biosecurity, market access and market development within the PICs.

AGB/2008/044	Optimising selected commodity chains in the Pacific for more profitable agro-enterprises (all countries)
FST/2004/053	Establishing forest pest detection systems in South Pacific countries and Australia (Fiji, Vanuatu)
PC/2004/064	Biological control of 'mile-a-minute' (<i>Mikania micrantha</i>) in PNG and Fiji
PC/2007/118	Alternative disinfestation treatments for fresh produce commodities from Pacific island countries (Fiji, PNG)



ACLAR funds a range of fisheries management projects in the Pacific

Country-specific issues

Although many of the challenges for agriculture, forestry and fisheries are common to most Pacific nations, it is recognised that specific priorities may differ between countries. ACIAR will support targeted and mutually agreed single-country projects on major issues of concern. Where possible, these are linked closely with regional extension and community improvement programs to foster opportunities for dissemination of the information between countries. Priority areas for each of the PICs countries with which ACIAR cooperates are provided below.

Fiji

Fiji's poverty level is comparatively low although rural-urban income inequality is an increasing problem. In recent years, ACIAR's project emphasis has shifted from crop and livestock production to horticulture, aquaculture and agribusiness. There are potential opportunities for economic and technical research aimed at developing crop and agricultural industry alternatives to sugar and, in coordination with other government and donor initiatives, underpin opportunities for regional and international export market development in crops such as papaya, root crops and ornamentals. Developments in promising horticultural crops, and accompanying postharvest technologies and marketing options could also be explored. A major constraint in Fiji's horticulture sector is capacity building in R&D and this is another potential area for engagement with ACIAR programs.

Opportunities for research to improve livelihoods in fisheries include: more productive inland farming systems, aquatic health including quarantine and import risk assessment, restocking as a tool to rehabilitate sea cucumber fisheries, and improved feed formulations for freshwater finfish and *Macrobrachium*. More research may be needed on the marketing of fisheries products. Some options for forestry cooperation include timber use, value-adding to mahogany and native species, plantation management and health, and increasing the potential of indigenous forestry species.

Solomon Islands

Opportunities exist for ACIAR to participate in activities designed to redevelop export industries such as oil palm and cocoa. Most Solomon Islanders live in isolated rural communities dependent on subsistence agriculture and intermittent crop and small livestock sales, although many also have access to more lucrative urban markets.

ACIAR's Solomon Islands program has had a strong fisheries emphasis, including holistic community-based approaches to the management of vulnerable fish resources, and economic and technical research to support the development of sustainable livelihood opportunities based on the culture of coral reef animals. Income generation initiatives, particularly in rural areas, remain important in the broader scheme of economic and social recovery in Solomon Islands, and much of this will need to occur in the area of crops, forestry and fisheries. There are opportunities for smallholders to

exploit lucrative market niches for high-value horticultural crops, value-added products and other diversified products, particularly in the developing urban markets. A particular focus has been fostering the engagement of women smallholders in the production and marketing of vegetable crops and in poultry. Widespread community interest in the planting of teak offers a development opportunity. ACIAR will continue to develop further opportunities for specific linkages with other donor programs and with AusAID's Transitional Support for Agriculture program.

Vanuatu

Vanuatu's agriculture sector, along with tourism, remains the major focus of the country's development strategy. The main activities relate to coconut, cattle, cocoa, and timber production, with traditional food production for subsistence and local markets. Smallholders also cultivate peanuts, potatoes, vanilla and pepper. Although Vanuatu is an agricultural exporter, the majority of the population is in the subsistence or informal sector.

The Vanuatu Government is currently developing a holistic agricultural plan for the country that will give direction to future ACIAR cooperation in agriculture and fisheries. For the current planning period, the focus of ACIAR activities in Vanuatu will be in forestry. Forest covers almost 40% of the total land area of the country; and hence, policy and technical interventions for sustainable management of plantations and development of new species of commercial value for both plantations and smallholders are important. In forestry, assistance is needed in relation to assessing commercial prospects for native species, including sandalwood and whitewood.



Sandalwood growers in Vanuatu

Samoa

Samoa has recently had comparatively strong economic growth across a range of sectors, including agriculture. There has been a strong emphasis in the ACIAR program on insect pest management (fruit flies, fruit piercing moth, whitefly and aphids), virus indexing of taro, and biological control of pests and weeds. Projects undertaken have studied forest nutrition and health as well as fisheries.

Samoa has expertise in germplasm selection of root crops and fruits and in techniques of tissue culture propagation. Research opportunities include those that underpin the development of exports of high-value horticultural products. This may require postharvest research on improving shelf life and transport methods to boost fruit exports, and simple processing/value-addition of fruit tree and root crops. Research to assist improvements in niche marketing of commodities, potentially including organic produce, is of importance. This may include identification of alternative extension and information transfer technologies. In forestry, research opportunities may exist in: policy incentives for establishment of woodlots; nursery management techniques; forest weeds, pests and diseases; and better use of timbers. In fisheries, opportunities may include research on community-based approaches to the management of reef fisheries and technical interventions to underpin the development of village aquaculture industries.

Tonga

Factors affecting agricultural development include geographical isolation, fluctuations in export markets for Tongan produce, a limited natural resources base and governance structures. Tonga has high natural disaster susceptibility, which limits income-generating opportunities, and relatively high youth unemployment. Opportunities exist for increased income generation

through the development of products for the local market and the exploitation of market niches.

For crop-related research, future support is likely to be in the areas of diversification, improved productivity, reduction in input costs and postharvest quality improvement. There is a current emphasis on farming systems, and development of markets (local and inter-island) is an ongoing challenge. Areas of research emphasis in Tonga include productivity of fruits, root crops and vegetables; development of new crops such as coffee and spices; and development of capacity in postharvest technology. Development of agroforestry-based farming systems (including tree legumes and fruit trees) is a priority in forestry since plantation resources are modest. Tuna is the main fishery export from Tonga and, together with snapper and aquarium fish, is a major export income source. Research will continue into the development of aquaculture systems for commercially important reef species (e.g. hatchery production of winged oyster).

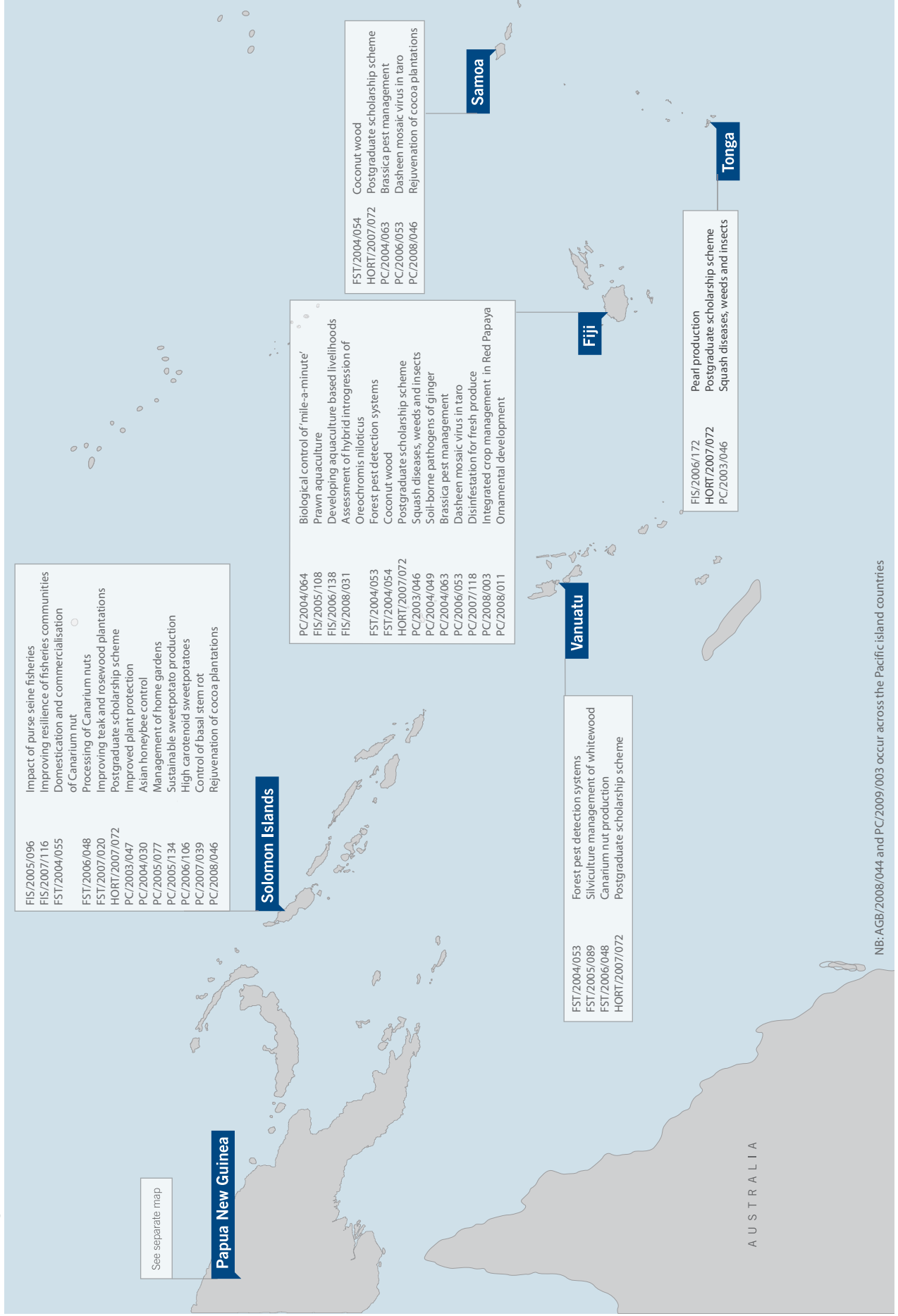
Kiribati

Kiribati is one of the poorest PICs and faces problems in maintaining food security and optimum dietary balance due to poor soils for agricultural production on the coral atolls and the adverse effects of climate change. A relative scarcity of arable land, poor soil fertility, lack of water for irrigation, soil salinisation and contamination of groundwater with salt and other pollutants are major constraints to agricultural production. To assist in addressing these issues of food security and nutrition and provide market opportunities, the SPC and the International Fund for Agricultural Development (IFAD) are establishing a centre for atoll agriculture on Kiribati. ACIAR will develop targeted projects to support the activities of this centre, particularly where Australian and CGIAR centre expertise can add value.



Harvesting pearls in Kiribati

Active projects in the Pacific island countries



NB: AGB/2008/044 and PC/2009/003 occur across the Pacific island countries