



Papua New Guinea and the Pacific

Financial year	Regional expenditure	Total bilateral expenditure	Board target as percentage of expenditure
2003-04	\$5,067,418	19.8	10-20%
2002-03	\$4,754,635	17.9	10-20%
2001-02	\$3,126,071	12.8	10-20%

The outlays for Papua New Guinea and the Pacific rose by 1.9 per cent in 2003-04. In the longer term the trend is for expenditure in the region to rise to around 20 per cent, the upper end of the Board target. This is consistent with the trend in the broader Australian aid program, reflecting the importance to Australia of development and stability in the region.

ACIAR regional team leaders:
Top: Dr Ken Menz (PNG) and bottom:
Mr Barney Smith (Pacific).

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Papua New Guinea

Active projects in 2003–04	32
AOP budgeted expenditure in 2003–04	\$2,981,991
Actual bilateral country expenditure in 2003–04	\$3,346,297
Bilateral country expenditure in 2002–03	\$3,171,113
Bilateral country expenditure in 2001–02	\$2,550,738



Coffee beans from Papua New Guinea

Key performance indicators	Performance 2003–04
<ul style="list-style-type: none"> Industry directly involved as a partner in at least five projects. 	Direct industry involvement in projects on: oil palm income distribution, poultry feeds, peanut production, sugar diseases, vegetable marketing, prawn catch assessment and cocoa diseases (under development).
<ul style="list-style-type: none"> At least five active PNG John Allwright Fellowships. 	Eleven active John Allwright fellowships at 30 June 2004.
<ul style="list-style-type: none"> Revised Barramundi Fishery Management Plan formally approved by National Fisheries Authority Board and an effective process for implementation and ongoing stakeholder consultation established. 	Revised PNG Barramundi Fishery Management Plan approved by the NFA Board and gazetted into legislation. The process of community consultation, initiated through this project, is an ongoing activity for NFA.
<ul style="list-style-type: none"> 15 undergraduates, scientists and/or journalists to graduate from new scientific communication course, and 15 more to enrol. 	Forty graduates in March 2004 graduation and more than 60 new students enrolled in the following year's course.

Position

Papua New Guinea (PNG) is one of ACIAR's most important partners. ACIAR's program in PNG increased significantly over the last two years. In addition to projects funded from ACIAR's appropriation, since 1998 ACIAR and AusAID have worked together to develop and fund a small set of projects of mutual interest to tackle some of the formidable challenges to agricultural development. PNG is a net food importer with high population growth rates. Village-based agriculture supports 70–80 per cent of the population and domestically traded food is very important. ACIAR projects aim to enhance cash income for smallholders, with an emphasis on export tree crops and root crops.

PNG's limited capacity to undertake research and development (R&D) activities and to deliver extension services remain constraints. In its project design ACIAR includes a training component, utilising both short- and long-term training, and where possible to package the results of earlier research in a suitable form for uptake by farmers. To enhance the adoption of research results, ACIAR involves the private sector in applicable projects wherever possible.

Achievements

Zoonotic diseases (diseases of animals that can be transmitted to humans) are an increasing problem in Papua New Guinea and some Pacific Island countries. Diagnostic (ELISA) **tests for the detection of two zoonotic diseases have been developed and validated.** A test for *Leptospira* (the



Margaret Newman is our Manager for Papua New Guinea and Solomon Islands



causative agent of leptospirosis), standardised for use in cattle and pigs, has revealed its presence in PNG's cattle herd.

The smallholder broiler chicken industry produces around 6 million birds a year, using feedstuffs derived from imported grains. A research project aims to replace these with home-mixed feeds from locally available materials. The project team has established **an inventory of available local feeds**, and tests are now under way to determine their suitability as substitutes for the imported product.

The mobile card scheme, a non-cash payment system for plantation labourers in the oil palm sector, is soon to be tested more widely. Case studies of the card's use in the oil palm sector revealed **increased production, a more equitable flow of benefits and less conflict** arising from disputes over labour division and payments. The project will focus beyond the original trials and try to replicate this success more widely in the oil palm industry and in the cocoa and coconut industries, working with extension groups in all sectors.

Mapping of the supply chain for fresh produce in the PNG highlands has been undertaken. It is clear that the problems with the supply chain have as much to do with a lack of human infrastructure (communication and coordination) as they do with physical infrastructure. A concept

Mama Lus Frut Scheme

The Mobile Card scheme – helping improve livelihoods

Palm oil is the leading agricultural export industry in PNG, accounting for five per cent of the country's total export value in 2002. Despite its importance labour constraints in the smallholder sector mean that under-harvesting is a problem. Jenny, the widowed owner of an oil palm block in the Hoskins scheme, West New Britain, was unable to harvest much fruit after her adult sons moved away. Weeding and pruning, essential to maintaining productivity, fell away, as did the block's harvest potential. Jenny and her daughters came to rely on market gardening for their income.

ACIAR has supported research into the application of the 'Mama Lus Frut' scheme, first introduced by the Oil Palm Industry Corporation (OPIC) in 1997. When her sons resided on the block they harvested fresh fruit bunches. Jenny and her daughters supplemented their income by collecting the loose fruit dislodged from the main bunches during harvesting for which, as cardholders, they received payment. After her sons moved away harvesting ceased and 'lus frut' income dried up. The women were forced into greater dependence on food production for household consumption and income. Seeing the potential of her

block to generate further income and help pay off debts, Jenny has, since late 2002, used a new payment initiative developed by ACIAR in collaboration with OPIC and the Oil Palm Research Association.

The 'Mobile Card' initiative is a logical extension of the 'mama lus frut' scheme. It guarantees payment of labour to cardholders by the oil palm process of an agreed proportion of the value of the crop harvested. Steven, a previously under-employed resident of a highly populated block, was contracted as the Mobile Card worker for Jenny's block. He receives 50 per cent of harvest payments in return for maintaining the block and harvesting fresh fruit bunches, with the other half paid to Jenny. By August 2003 outstanding debts had been repaid, and new investments to ensure the long-term viability of the block had been arranged. For Jenny the increased production and associated returns have allowed her to do something she has never done before, save money for the future. The use of the card system allows problems associated with payments of contracted labour, such as those driven by culture and poverty, to be circumvented, and both user and suppliers of labour to fulfil their obligations.

paper has been produced that contains the **vision and strategies for developing the Highland-based fresh produce marketing system**, which has been endorsed by all the industry stakeholders. The Secretary of Agriculture has endorsed the ideas developed in the concept paper and has recommended that they be adopted as a basis for the future development of the fresh produce industry.

Decreases in **coconut productivity** are caused by a variety of factors, including ageing trees and diseases. A project now under way seeks to **improve methods to increase seedling growth, development and establishment**, using zygotic embryos. Improvements to the viability of the peanut industry continue, with surveys revealing that more than 40 per cent of growers regard peanuts as their most important cash crop. Also farmer ignorance of aflatoxin, potentially dangerous to humans, revealed a need for pre- and postharvest management information. Research capacity to test for aflatoxin has also been boosted as a result of these findings, helped by the Agricultural Production Systems sIMulator (APSIM) peanut model that enabled researchers to examine various crop management factors for their impact on yields and aflatoxin risk levels. Varietal trials of **new peanut germplasm have out-yielded local varieties two- to threefold** at all locations, sparking significant farmer interest in their use.

The distribution of pests and diseases of sugarcane has been mapped for PNG, Indonesia and Australia. This completes the first coordinated survey of sugarcane threats in the region, **creating a vital resource for quarantine managers** in all three countries. A resistance screening test for the sugarcane borer *Sesamia griseocens* is also being developed. The little-known *Oribius* weevil, a pest of several horticultural crops, is being studied to determine possible controls. To date scientists have established trials to determine the weevil's impact on key crops and what conditions contribute to larval growth. Classification of several *Oribius* species is also under way. A similar project on the red-banded mango caterpillar has commenced, again focusing on gaining more knowledge of the pest's life cycle.

New infestations of the weed *Chromolaena* have been recorded throughout parts of Papua New Guinea, prompting the release of biocontrol agents. Thirty-eight previously unreported infestations were recorded; most of these emerged as the result of efforts to raise public awareness about *Chromolaena* infestations. At 28 sites a gall fly has been released as a biocontrol agent, with fly field populations increasing at another 26 sites in eight provinces. The fly's appetite for the weed results in plants becoming sickly, and reports of its spread up to 10 kilometres from the point of release **give hope of wider weed control**.

Agricultural research scientists in PNG now have access to a graduate training course to learn procedures and technologies for writing and publishing results. A Graduate Certificate in Scientific and Technological Communication has been accredited by the University of Technology,



Oil palm seedlings





with 59 students graduating to date. Course graduates are now running workshops at five different Universities, with more than 100 participants now enrolled.

Fisheries remain important sources of income for PNG. A new project is examining the economics of the Gulf of Papua prawn fishery, second only to the PNG tuna fishery in value. A study will help determine appropriate management arrangements to ensure sustainability and profitability. A second and closely linked fisheries project is supporting these activities through an **assessment of stock status and fishing impacts on the prawn fishery**. An essential aspect of this new project is enabling National Fisheries Authority staff to gain skills in fisheries stock assessment and sustainable management.

The collapse of the barramundi fishery in Western and Gulf Provinces of PNG in 1985 led to a loss of both food and income for coastal and inland communities. An ACIAR project led to the **development of a revised Barramundi Fishery Management Plan** that provides the legislative architecture to underpin the continued recovery and future sustainability of this important fishery. In 2003 this Plan was formally gazetted into law under the PNG Fisheries Management Act.

Two tree species with economic potential as producers of essential oils have been identified, and mapping of their distribution is under way. Techniques for harvesting oils are being developed, helped by improvements in distillation. A second project is training scientists from the National Forestry Service to undertake domestication of indigenous species. Conservation strategies for indigenous germplasm are being developed, supported by seed collection. In a third project **capacity in sustainable forest management** is being developed. The project team has developed recommendations to improve planning, inventory and mapping and presented these to the PNG Forest Authority.

Project work to improve cocoa fermentation, drying and quality has led to recommendations for revisions of the PNG Cocoa Inspectors and Assessors Manual and of Export Regulations. Revisions for the design and maintenance of dryers have also been developed and **training in their use is soon to begin**. A survey of microbial contaminants associated with sago has revealed how contamination could occur during village processing. This will be the focus of interactions at the village level, concentrating on identifying potential *critical control point* interventions that can reduce contamination in production and storage.

Oil palm crops planted in volcanic ash soils suffer from magnesium (Mg) deficiency. Modelling of **water and soil profiles has yielded useful information** to assist field trials examining alternatives to standard Mg fertilisers. Responses of oil palms to these alternatives and to Mg fertilisers are also being measured, to determine Mg uptake and to define areas where deficiency is most likely to occur.

Pacific Island countries



Coconut palms in Fiji

Active projects in 2003–04	18
AOP budgeted expenditure in 2003–04	\$1,871,100
Actual bilateral country expenditure in 2003–04	\$1,721,121
Bilateral country expenditure in 2002–03	\$1,583,522
Bilateral country expenditure in 2001–02	\$575,333

Key performance indicators	Performance 2003–04
<ul style="list-style-type: none"> • Priorities consultation successfully delineates both regional and country-specific research priorities for ACIAR in key partners. 	Consensus achieved on regional priorities as well as specific priorities for the six main partner countries at December 2003 consultation.
<ul style="list-style-type: none"> • Growth in proportion of budget for Pacific islands compared with 2002–03. 	Expenditure in Pacific Islands grew from 6.0 per cent to 6.7 per cent.
<ul style="list-style-type: none"> • Impacts of zoonotic diseases (transferable from animals to humans) on livestock production documented in two countries. 	In Fiji, leptosporosis has been diagnosed in cattle and dogs and to a lesser extent in pigs, but Trichinella has not been found.
<ul style="list-style-type: none"> • Forest pest status documented in two countries and initial training in pest identification completed. 	Initial training in survey methodology and pest identification completed and surveys conducted in four countries.
<ul style="list-style-type: none"> • Flexible multi-agency regional program of applied research support to aquaculture development in the Pacific islands initiated. 	A Fisheries project utilises mini-projects to address specific constraints to aquaculture development in Pacific Island countries.
<ul style="list-style-type: none"> • Initial trials on trochus broodstock replenishment completed with two communities in each of Samoa and Vanuatu. 	Three restocking sites were selected but the small number of broodstock available limited stocking to one initial trial site.

Position

ACIAR's program in the Pacific Islands region has grown over the past three years. This reflects the importance of a stable and economically viable Pacific and official Australian development assistance priorities for the region. There are many factors constraining socioeconomic development of Pacific Island countries. The region's small renewable resource subsectors are dominated by subsistence agriculture. Commodity exports are an important income source, as is income gained from fishing resources rents and overseas remittances.

Many Pacific Island countries, due to their small size, have limited capacity to participate effectively in ACIAR's normal mode of bilateral collaborative research partnerships. Their participation in regional or multi-country programs and projects addressing common problems partly helps overcome these constraints. Projects are designed to address this, creating linkages with key groups such as the Secretariat of the Pacific Community (SPC) and supporting collaborations by Pacific Island countries with two CGIAR centres, the WorldFish Center and the International Plant Genetic Resources Institute (IPGRI).

Achievements

Fiji's sugar industry is being examined to improve efficiencies at the farming and milling levels, through a comprehensive econometric analysis. Key areas for efficiency gains have been **identified and results presented to the Fijian Government**. Development of a model on food choice in Fiji was completed. Information gathered has revealed that changes to diets and shifts in lifestyle patterns from increasing urbanisation are factors in rising obesity levels. This is being factored into a Government education campaign on nutrition principles. A new project in Fiji is examining the role of trade liberalisation and associated policies on agriculture and land use. Of specific interest is the role of liberalisation policies relating to sustainable land use and their impacts.

Activities, capacity and collaboration in plant genetic resources conservation and use continue to grow in the Pacific, helped by an ACIAR-funded International Plant Genetic Resources Institute specialist assigned to the SPC. An **information paper on policy issues has been published** and widely disseminated, along with public awareness materials, and a regional directory of gene-banks has been prepared for publication. Ex situ conservation of breadfruit has begun in Vanuatu—until recently little germplasm had been collected. Gene-banks have also been established in Pohnpei, and genetic resources of local crops are being documented in Kiribati and Marshall Islands.

All virus diseases of taro in the Pacific have been characterised, leading to development of **a diagnostic test for each virus**. This will substantially boost the capability of quarantine services to test for taro diseases, enabling varieties resistant to taro blight or having other desirable agronomic traits, to be transported between countries. The project has supported the AusAID TaroGen project and has resulted in follow-up work to examine other crop diseases. A promising control for taro beetle grubs, using a fungal control agent, has been developed. Trials at the field level now under way in Fiji and PNG will help determine appropriate dosage levels for application in both countries.

The first mini-harvest of cultured pearls from a Ministry of Fisheries and Marine Resources demonstration pearl farm, established as part of an ACIAR-supported project in Kiribati, has been achieved. The poor results from an investigation of wild spat availability in Tonga accelerated efforts to transfer blacklip pearl oyster hatchery technology to Tonga. **Good progress on hatching and growing pearl oyster spat** has been reported. A manual on hatchery and grow-out technologies for blacklip pearl oysters is in production. A new project will draw on the results from successful ACIAR and WorldFish projects, to assist Pacific Island countries to establish or solve problems constraining the development of viable income-generating mariculture industries.

Migratory tuna stocks fished in the Exclusive Economic Zones of Pacific Island countries **produce significant income for these nations**, which



Pacific islands clam cleaning

charge access rights to more distant fishing nations. An economic model is being adapted for use in determining optimal access levels and fees based on sustainable catch levels. The model will also be used to inform regional decision makers on the management of migratory fish stocks by nations of the Pacific. The recent establishment of the Western and Central Pacific Fisheries Commission now provides a conduit to translate information emanating from the project into practical policy initiatives.

Restocking of the sea cucumber 'sandfish' (*Holothuria scabra*) using hatchery produced juvenile stocks is being assessed to determine suitable transport and release strategies. **Promising methods of release** to ensure acceptable levels of survival after restocking have now been developed. A low-cost hatchery has been established by WorldFish, with sea cucumber larvae being successfully produced, and effective nursery and juvenile grow-out systems developed. Carefully designed pilot release experiments are now underway to further refine release strategies that will optimise survival in the wild. Sites for trochus broodstock replenishment were chosen in Samoa and Vanuatu in consultation with local communities. Surveys of trochus numbers were conducted prior to restocking of one Samoan and all Vanuatu sites.

More sustainable approaches to the collection of reef species valued by the aquarium industry using crest nets, were demonstrated in the Solomon Islands. The research, which is also applicable to PNG, established the need to culture fish following capture, **to increase size and marketability**. Suitable feeds and feeding strategies have also been developed based on locally available foodstuffs.

The results of an analysis of **future trends in the fish sector** and their effects on the poor and the environment have been included in a book by the International Food Policy Research Institute. ACIAR supported this work, which revealed developing countries will shape nearly all developments in the fish industry in the next two decades. Policies and new technologies and their role in reducing pressure and improving the sustainable management of wild fisheries, as well as raising productivity in aquaculture, have been described.

Horticulture can significantly contribute to community health and nutrition and boost incomes in market-remote regions. However, development initiatives for horticulture often fail to deliver expected benefits, due to choice of unsuitable enterprises or poor extension and back-up technical support. **A new project in Samoa** will help to design strategies that harmonise with the way people in such regions currently access and use information. Project researchers will identify then involve horticulture industry stakeholders in two remote communities, one in Samoa and the other on Cape York Peninsula, Australia. They will undertake rapid rural appraisals to assess community models for change and then construct an information delivery system for key commodity interests, tailored to the participants' needs.



Tuna fishing



Forest pest

Forest health surveillance allows early detection of pests and diseases, providing **opportunities for early interventions** to maintain the health of resources that generate valuable income. Fijian, Samoan, Tongan and Vanuatu forest stakeholders have received training in forestry surveillance methods, to help them recognise pest and disease infestations on trees. A forest health form, compatible with the existing Secretariat of the Pacific Community Pest List database, has been developed and is now in use. On-the-ground training in insect taxonomies and specimen collection and handling has been provided during surveys of forests.

A project to improve the utilisation and management of animal waste is targeting Pacific farming systems. An economic model to demonstrate alternative uses and their benefits is in production. The cultural aspects of waste management are also being examined, as these are often a constraint to improvements in the system. The **economic benefits will be incorporated as part of strategies** to overcome these constraints.

Equitable use of groundwater resources in Kiribati is an increasingly divisive issue. Coral atolls and **small islands have limited water resources**, with groundwater being in demand for a number of uses. An integrated approach to encapsulating social and biophysical interactions, based on stakeholder views and inputs, is being developed for Kiribati and will then be trialled in Tonga. This will in part involve simulations of water use and impacts on groundwater levels.

Helping the Solomon Islands

Two new projects are being developed to boost food security and livelihoods in the Solomon Islands. Following the restoration of law and order by the Australian-led Regional Assistance Mission to Solomon Islands, ACIAR began investigating agricultural research needs. Issues with longer-term ramifications that are to be addressed are the role of village poultry in food security and the exploitation of sea cucumber as an income source for poor farmers.

The first project in development will examine the feeds used in village poultry production systems. This will focus on identifying improved feeds to raise the quality of chicken meat and eggs in human diets. Better feeds will also result in more productive chickens, meaning more eggs, more chickens and more potential income. The recent unrest significantly reduced income earning potential, making any sources of potential income important.

Unrest also resulted in high-value resources such as sea cucumber becoming even more attractive. Sea cucumber is relatively easy to fish, and this coupled with their value have seen them subjected to increasing

and in many cases excessive fishing pressures. This short-term gain will result in long-term hardship if exploitation continues and these fisheries collapse, an event from which individual stocks may take decades to recover. A community-based management strategy to ensure sustainability and profitability, successfully trialled elsewhere in the Pacific, will be adapted to Solomon Island communities.



Sea cucumbers