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Solomon Islands Smallholder Agriculture Study

Volume 5

Literature Review: A Brief National Assessment of the Agriculture Sector



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BR Evans

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Acronyms

ACIAR	Australian Centre for International Agricultural Research	Currency convention The currency used throughout, unless otherwise stated, is the Solomon Island Dollar (SI\$), with an exchange rate of SI\$1.00 = A\$0.20 in September 2004.
ADB	Asian Development Bank	
CEMA	Commodity Export Marketing Authority	
DAL	Department of Agriculture and Livestock (in Ministry of Agriculture and Lands)	
EU	European Union	
FAO	Food and Agriculture Organization of the United Nations	
FES	field experiment station	
GIS(s)	geographic information system(s)	
KGA	Kastom Gaden Association	
MAL	Ministry of Agriculture and Lands	
NGO(s)	nongovernment organisation(s)	
NTFP(s)	nontimber forest product(s)	
NZODA	New Zealand Official Development Assistance (now NZAID)	
ODA	Overseas Development Administration, British Government (now Department for International Development)	
PNG	Papua New Guinea	
RTC	rural training centre	
SI	Solomon Islands	
SIBAF	Solomon Islands Bibliography of Agriculture and Forestry	
SICHE	Solomon Islands College of Higher Education	
SIG	Solomon Islands Government	
SPC	Secretariat of the Pacific Community	
UN	United Nations	



Figure 1 Map of Solomon Islands, showing the main island groups

Preface

THE SOLOMON ISLANDS SMALLHOLDER AGRICULTURE STUDY IS A SERIES OF FIVE VOLUMES WHICH DOCUMENT THE DEVELOPMENT OF RECOMMENDATIONS FOR A SET OF AGRICULTURAL INTERVENTIONS SUPPORTING BOTH SUBSISTENCE AGRICULTURE AND INCOME-GENERATING ACTIVITIES FOR RURAL COMMUNITIES IN SOLOMON ISLANDS.

It presents recommendations for the implementation of the study findings, as well as some of the background research that provides the rationale for their development.

The series is based on studies in SI from September to November 2004. The 13-person study team (see Appendix 1.2 for member biographies) consisted of: Matthew Allen, Mike Bourke (co-leader), Barry Evans, Ellen Iramu, Roselyn Kabu Maemouri, Andrew McGregor, Ben Mullen, Alice Aruheeta Pollard, Morgan Wairiu, Claudine Watoto and Stav Zotalis (co-leader). AusAID staff members, Geoff Fox and Nadira Mailewa, also contributed, and Sarah Goulding guided the process. Assistance was received from many people in Solomon Islands. In particular, field staff of the AusAID-funded Community Peace and Restoration Fund (CPRF) facilitated the fieldwork in the provinces.

The studies were conducted in two phases:

- > Phase 1 involved a five-week study, which was undertaken from August to September 2004 in Brisbane, Canberra and Honiara by Barry Evans, with technical assistance from Mike Bourke and others. The report of this study has been included in this series as Volume 5, *Literature Review: A Brief National Assessment of the Agriculture Sector*.

- > Phase 2 involved a comprehensive in-country study of the agricultural sector. The study was conducted over a period of five weeks in SI from September to October 2004. The team undertook visits to seven of the nine provinces in SI, and information on the remaining two provinces was based on interviews and information gathered during previous visits by some team members. This study was complemented by the work undertaken by Andrew McGregor (a marketing specialist) on marketing issues, which was completed in November 2004 (see Volume 3).

The smallholder agriculture study complements the work undertaken under the broader Australian program of assistance to SI, which focuses on interventions in the law and justice sector, machinery of government, economic governance, health and education sectors, and the community development sector, as well as small-scale interventions focused on promoting peace building.

Volume 1, *Main Findings and Recommendations*, draws on the findings of the two-phased study to present a series of recommendations for enhancing rural livelihoods in SI, including recommendations for interventions to implement the study. Appendix 1.1 provides a cost-benefit analysis by Andrew McGregor of the proposed recommendations, which includes a detailed analysis of returns to both labour and land, as well as information on international market prices for current and potential export crops.

Volumes 2–5 contain considerable support material for the recommendations that are developed in Volume 1.

Volume 2, *Subsistence Production, Livestock and Social Analysis*, covers livestock issues (Ben Mullen), an overview of subsistence agriculture (Tony Jansen), and gender, social and cultural issues (Alice Aruheeta Pollard).

Volume 3, *Markets and Marketing Issues*, was written by Andrew McGregor and describes the detailed marketing analyses on which Volume 1 is based. In particular, Volume 3 provides justification for the recommended interventions that are detailed in Chapter 10 of Volume 1.

Volume 4, *Provincial Reports*, comprises individual reports on the constraints and opportunities for agricultural interventions in the nine provinces. They cover: Central (Matthew Allen, principal author), Choiseul (Matthew Allen and Ben Mullen), Guadalcanal (Mike Bourke), Isabel (Morgan Wairiu), Makira (Morgan Wairiu and Ben Mullen), Malaita (Mike Bourke), Rennell and Bellona (Barry Evans), Temotu (Morgan Wairiu) and Western (Barry Evans) provinces. Each provincial report was based on four to seven days of fieldwork per province, except for Choiseul and Temotu, which were based on interviews and other sources.

Volume 5, *Literature Review: a Brief National Assessment of the Agriculture Sector*, was written by Barry Evans and gives a broad overview and assessment of information on the agriculture sector in SI.

Volume 1 of this study was sent to a number of SI and Australian Government departments, several international development organisations and two academic referees for comments and review. The Solomon Island departments consulted were: Agriculture and Livestock, the Central Bank, and National Reform and Planning. The Australian Government departments were Finance, Foreign Affairs and Trade, and Treasury. Other agencies that commented on the draft document were the Asian Development Bank, European Union, New Zealand Aid and the World Bank. One academic referee was based in Australia, the other in the United Kingdom. The comments that were received have been incorporated in the final version where possible.

Introduction

THIS STUDY AIMS TO PROVIDE A VERY BRIEF AND BROAD OVERVIEW ASSESSMENT OF INFORMATION ON THE AGRICULTURE SECTOR IN SOLOMON ISLANDS (SI). IT IS NOT A REVIEW OF THE AGRICULTURE SECTOR.

For the purposes of this report, agriculture is divided into twelve subsectors, grouped into two major components: resources and services, and production (Figure 2). Background information (extent, role and importance of the subsector); past and current major initiatives and activities; and temporary and permanent constraints and opportunities are presented for each subsector. This study gives a brief **national** assessment of the agriculture sector. The AusAID mission to Solomon Islands of September 2004 has provided details of **provincial** agriculture and recommendations at a **national** level for agricultural development (see Volumes 1 to 4).

Lack of rural income-earning opportunities and subsequent urban migration have been identified as root causes of the ‘ethnic troubles’ (the ethnic tension) in Solomon Islands (Bennett 2002, SIG 2002). The need for policies and projects aimed at rural development — once basic levels of civil society (justice and peace, financial management, health, education etc) have been restored — has therefore been emphasised by all stakeholders in order to help avoid the potential repetition of the ethnic tension.

The ethnic tension from 2000 onwards saw the collapse of major export industries (tuna, copra, cocoa and palm oil) and the comparative ascendancy of round log exports, so that logs now represent 80% of total government export revenue. All stakeholders, with the possible exception of the logging industry, see this dependency as economically, environmentally and socially crippling and as the major policy challenge facing the government and people of SI. There is, therefore, an urgent short-term need to resurrect the major agricultural export earners despite their well-known structural and marketing problems. There is also a medium to long-term need to develop a broad range of alternative rural income-generating activities that will ensure food security, provide economically, socially and environmentally sustainable rural livelihood opportunities, and help lessen the long-term government dependence on less sustainable exports by providing broad-based revenue growth.

Figure 2 Agriculture subsector matrix analysis

RESOURCES AND SERVICES	PRODUCTION
> Natural resource base	> Subsistence farming and food security
> Socioeconomic resources	> Cash cropping
> Institutional support framework for agriculture	> Small-scale forestry
> Agricultural information	> Livestock
> Extension and training	> Inshore fisheries
> Research	
> Plant protection and quarantine	
> Background	
> Major initiatives/activities	
> Constraints and opportunities	

It is often stated that the Solomon Islands Government is spending less than 1% of its budget on the Ministry of Agriculture and Lands (MAL) and that the sector has been neglected. While this may be true, it is also the case that — compared with other sectors — donors have also neglected agriculture. An analysis of donor priorities and expenditure conducted in 1996 showed that donors spent less than 4% on agriculture in the Pacific (excluding Papua New Guinea) and that support had been declining over time (Roth 1996), despite donors' own reviews identifying the comparative size and importance of the sector. Even with European Union (EU) and New Zealand Overseas Development Assistance (NZODA) in the 1990s, the withdrawal of British assistance to the SI agricultural sector by the early 1990s meant that there were large gaps in support and services to the sector. Immediate post-conflict priorities for donors have understandably been focused on the provision of essential services and restoration of law and order, but the need for greater emphasis on productive agriculture in order to provide rural income and, perhaps, export revenue for the government is now seen as a high priority.

Major relevant reports, reviews and project identification missions specific to the agriculture sector of which the author is aware include:

- > 1986 — Review of Agricultural Programs, World Bank
- > 1989 — Projects Identification in the Agricultural Sector, Asian Development Bank (ADB)
- > 1991 — Agricultural Production Support Project, Food and Agriculture Organization (FAO)
- > 1993 — Second Stabex Study, European Union (EU).

1 Natural resource base

1.1 BACKGROUND

The nation of Solomon Islands (28 000 km²) is made up of a double chain of six major and 992 minor islands spread in a northwest to southeast direction, over 860 km in the southwest Pacific (5–12°S to 152–170°E) (Figure 1). The islands are relatively young, geologically, and were formed by tectonic uplifting, volcanic activity and reef creation. The geomorphology of the islands includes atolls, raised atolls, mountains and capped volcanoes. Earthquakes are common, and some remnant volcanoes are still active. Major fringe reef systems border many of the larger islands.

The climate is tropical, humid and wet, with a mean average temperature of 26°C and mean annual rainfall of 3000–5000 mm, depending on location and topography. Most areas are classed as continually wet, with no pronounced dry months, except for the North Guadalcanal plains and Ngella Islands in the same rain shadow. Cyclones are common between December and April, especially in the southeast half of the group.

High rainfall and temperature, combined with steep slopes, have produced thin, chemically weathered volcanic and coralline-based soils, except on flatter areas and alluvial plains.

The major islands are all covered in disturbed tropical rainforest, except for anthropogenic grasslands in North Guadalcanal. Smaller islands

contain a mix of rainforest and littoral forest, depending on their size. Forests cover nearly 90% of the land area, and have an estimated merchantable standing volume of 10 million cubic metres in nearly 6000 km² of 'loggable' forest (URS Corporation 2003). The flora of SI is estimated to contain more than 3000 vascular species in just over 1000 genera and 200 families (Hancock and Henderson 1988).

1.2 MAJOR INITIATIVES AND ACTIVITIES

Geological mapping of SI at 1:50 000 scale was done from 1963 to 1975 (Vedder and Coulson 1986) and later in the early 1990s, but the mapping of some areas, such as West Makira, is still to be completed.

The forests of SI were first described in detail by Walker (1962) and Whitmore (1966).

The most comprehensive survey of SI physical resources was done by the Land Resources Division of the United Kingdom's Overseas Development Administration in the early 1970s (Wall and Hansell 1974–77, Wall et al 1979). The survey produced an eight-volume series on the physical geography for each major island group, including soil, land and forest classification systems, and identification and assessment of 43 'agricultural opportunity areas' covering about 12% of total land area. However, the opportunity areas were intended to identify areas suitable for large-scale plantation agriculture

and with low population densities, so their use became limited in the postcolonial period, when priorities for development switched to smaller-scale operations. The suitability of subsistence and cash crops to land systems defined by Wall and Hansell (1974–77) is given by Chase (1981). Further work on land suitability was done by the Division of Research for Guadalcanal (Cheatle and Redfern 1988), but was not extended to other provinces.

A reassessment of forests, including biogeography and classification, was made by the AusAID-funded Solomon Islands Forestry Resources Inventory Project in the early 1990s (Schenk 1993, ACIL 1995) and later by the AusAID-funded Sustainable Forest Management Project (URS Corporation 2003). Maps and databases created by both projects are incorporated into a multifunction geographical information system (GIS) developed by the current Solomon Islands Institutional Strengthening of Land Administration Project.

The ecology, vegetation, floristics and botany of SI were further described by Hancock and Henderson (1988) and Mueller-Dombois and Fosberg (1998). Henderson and Hancock (1988) described the ethnobotany of SI, including the use of nontimber forest products (NTFPs). Recommendations for a system of protected areas are given in Lees (1991).

Responsibility for the management of (terrestrial) natural resources in SI lies mainly with the Ministry of Forestry, Environment and Conservation and the Ministry of Agriculture and Lands. Liaison and coordination between and within the two ministries (and other departments, such as the Department of Mines and Minerals) are often inadequate. Under a regional program coordinated by the South Pacific Regional Environment Programme, a process to develop and enact a National Environmental Management Strategy was begun in 1990 to address these and other problems associated with integrated resource management. This included a review of the state of knowledge of the physical environment (Leary 1991), and the development of the management strategy in 1993, but implementation and supporting legislation were delayed by poor capacity (especially within the environment and conservation departments), a lack of political will, and the prolonged impact of the ethnic tension.

1.3 CONSTRAINTS AND OPPORTUNITIES

Legislation and management of terrestrial resources in SI has frequently lagged behind development and conservation needs. Despite the logging boom and many attempts to introduce new legislation to control it, forestry is still governed by the inadequate Forestry Act (1958) and its various amendments. New legislation incorporating a code of logging practice and many other essential management requirements have finally been passed by parliament, but are yet to be gazetted. A separate Environment and Wildlife Conservation Act is in the same position. Together, these Acts should form the basis for significant improvement in natural resource management and conservation. Implementation of the new Acts is likely to be constrained, however, by poor communication and coordination between responsible agencies. This will require a major restructuring of bodies responsible for natural resource management and resources to enable them to better coordinate their efforts.

Significant information has already been generated on the natural resources of SI, but it is thinly spread across disparate organisations and much of it is not readily available to managers and stakeholders. For example, copies of Wall and Hansell (1974–77) are extremely hard to find. Information on agriculture is especially scarce after the National Agricultural Library was destroyed (see Section 4). There is a need to reconsolidate information on SI natural resources and to improve access to such information by all government and nongovernment organisation stakeholders. Such improvements should include the extended use and application of GISs, which are now mainstream technology and appropriate for integrated resource management and conservation.

NTFPs are an essential part of rural livelihoods in SI, providing building materials, foods, medicines and other products, but comparatively little is known about their ecology and abundance. Forest resource inventories tend to ignore them. Information is also needed on the impact on NTFPs of logging and land clearance for agriculture.

2 Socioeconomic resources

2.1 BACKGROUND

2.1.1 DEMOGRAPHY

The total population of SI in 1999 was 409 000 (SIG 2002; see also Appendix 5.1). The current annual growth rate is 2.8%, meaning that the population will double in 25 years. The rate of population growth is declining nationally but continues to climb in some provinces. More than 40% of the population is under 15 years old. Consequently, the age dependency ratio¹ of 81.6% is high but is improving. Population density is very uneven: 30% of the population is in Malaita Province, and another 12% is in the capital, Honiara. Despite perceptions of growing urbanisation, 84% of the population remains in rural settlements, which average fewer than 60 people in fewer than ten households.

2.1.2 INCOME

Per capita gross domestic product (GDP) in 2003 was estimated to be US\$724 (at current prices). This is less than during the 1990s but more than during the ethnic tension, when it fell to US\$644 in 2001. Less than 3% of the population (12 000) are in paid employment in the agriculture sector, and the number is declining. Two-thirds of all adults and three-quarters of all women do not do paid work.

2.1.3 EDUCATION

An average of 75% of people over 15 years old are classed as literate, but there are significant differences between sexes and provinces. Eighty-six per cent of men are classed as literate compared with 68% of women, and literacy rates in Western Province are 93% compared with 60% in Malaita and Temotu provinces. Three-quarters of SI children receive a primary education, but less than one-third go on to secondary school and only 4% receive tertiary education. Further details of agricultural education are given in Section 5.

2.1.4 HEALTH

Despite social and economic problems during the past 10 years, basic indicators of health in SI have improved. Infant mortality has fallen from 96 (per 1000 births) in 1986 to 66 in 1999, and life expectancy has risen from 55 to 61 years.

The human development index² for SI is the second lowest in the Pacific (behind PNG) and 147th in the world.

1 The age dependency ratio is defined as the number of people aged 0–14 and older than 65 per 100 people between 15 and 65 years of age.

2 The HDI is a summary measure of human wellbeing. It comprises three measurable dimensions of human development: living a long and healthy life, being educated, and having a decent standard of living. For more information, see <http://www.undp.org/hdr2003/faq.html>

2.2 MAJOR INITIATIVES AND ACTIVITIES

The Solomon Islands Government (SIG) has conducted a number of surveys focusing on socioeconomic aspects of urban and rural livelihoods in SI, including household income and expenditure surveys (MoF 1992, 1995ab) and a village resources survey (MoF 1997). The latter covered more than 4000 villages, accounting for nearly 60% of the population at the time. National censuses have been held in SI about every 10 years since 1970. The last was in 1999 during the buildup to the ethnic tension and inevitably experienced logistical problems (SIG 2002). The census includes a surprising amount of data on, and analysis of, the agricultural sector. A major review of human resources is given by Otter (2002), including a further socioeconomic analysis of the 1999 census data and background papers on rural development needs and improving livelihoods and education systems.

A UNICEF-funded national nutrition survey done in 1989 found a high prevalence of moderate malnutrition in children under four years old (MoF 1990).

2.3 CONSTRAINTS AND OPPORTUNITIES

Population growth, although slowing, will continue to put pressure on land and resources in SI and constrain real economic development. Urban drift has been temporarily halted by the ethnic tension, but is likely to remain a long-term problem. Policies that encourage appropriate and sustainable rural development, particularly in agriculture, will be needed to counteract migration to urban areas.

3 Institutional support framework for agriculture

THIS SECTION OUTLINES THE MAIN INSTITUTIONS NOT COVERED ELSEWHERE IN THE REPORT.

3.1 BACKGROUND

Institutes that provide support for agriculture in SI include the Ministry of Agriculture and Lands (MAL); the Ministry of Commerce, Industry and Employment; NGOs; the financial services sector, including government and commercial banks; donors; women's groups; churches (mostly via rural training centres — see Section 5); and regulatory and marketing agencies, such as the Commodity Export Marketing Authority (CEMA).

3.2 MAJOR INITIATIVES AND ACTIVITIES

3.2.1 MINISTRY OF AGRICULTURE AND LANDS

MAL has been continually restructured over the past 10 years. The ministry is currently split into two departments: Agriculture and Livestock (DAL), and Lands.³

According to Solomon Islands Government's (SIG) National Economic Recovery, Reform and Development Plan 2003–2006 (SIG 2003a),⁴ the main responsibilities of DAL are to:

1. pursue redevelopment of Solomon Islands Plantations Ltd
2. facilitate Russell Islands Plantation Estates Ltd to restart copra and cocoa production on its plantations on Guadalcanal

3. support smallholder and small to medium-scale production of copra and coconut oil, cocoa, other agricultural crops, such as rice and honey, and small livestock production (poultry and pigs)
4. strengthen agricultural extension services for women and facilitate access and training to enhance knowledge and skills in crop production and management
5. reform and build the capacity of the department.

Following the appointment of a new minister, DAL decided at a recent meeting to focus on the first three points, but there is no detailed strategic plan and priorities are likely to change again.

The absence of a long-term strategic plan to guide MAL or DAL activities has been noted for many years (FAO 1991). Without one, activities are inevitably project and donor-led. This problem was exacerbated throughout the 1990s by political interference and cuts to the ministry's budget, which further undermined its ability to reform. In 1999, following many years of fragmented and disjointed efforts, a major initiative aimed at structural reform of the then Ministry of Agriculture and Fisheries was started with assistance from NZODA (whose own program of assistance was being continually undermined by lack of a strategic vision in DAL). The work included development of a strategic plan for agriculture, and a corporate

³ Many government documents (and personnel) refer to the 'Ministry of-' and 'Department of-' Agriculture and Lands interchangeably.

⁴ See also <http://www.commerce.gov.sb/> for an interesting summary of previous policies, priorities and government structures.

plan for the ministry, but unfortunately the process was affected by the ethnic tension and was never completed. A draft document exists (NZODA 2000), and parts of the process have subsequently been developed by DAL but have not been implemented.

DAL is currently subdivided into four divisions: Extension and Training (see Section 5 of this report); Research (Section 6); Livestock and Veterinary Services (Section 11); and Planning and Management Services (PMS). The SI Quarantine Service (Section 7) is currently treated as a section within Livestock. Planning and Management Services includes the Land Use Planning section.

The Land Use Planning Department was established in 1972 with assistance from Britain's Overseas Development Administration to oversee the implementation of the agency's Land Resources Study (Wall and Hansell 1974-77; Section 1), and to help manage land-use proposals as a result of the survey — particularly those on alienated land and 'agricultural opportunity areas'. However, the process and methodology used were seen as too slow and costly, so a more rapid desk-based methodology was used to evaluate project proposals. Guidelines were produced for land-use development processes on customary land and alienated land, but the decline in (mainly British) donor funding for land-use planning meant that it became progressively less effective. The Land Use Planning Section within DAL is now practically inoperative, and its relationship with the Solomon Islands Institutional Strengthening of Land Administration Project (funded by AusAID) in the Department of Lands is unclear.

3.3 MINISTRY OF COMMERCE, INDUSTRY AND EMPLOYMENT

Most agriculture-related activities of the Ministry of Commerce, Industry and Employment go through the Commerce Department, which is split into three sections: Small Business and Cooperatives; Industrial Development; and Foreign Investment. The Small Business and Cooperatives section provides training and technical support for a range of agricultural activities, such as commercial vegetable and rice farming and micro oil expelling,

as well as related businesses, such as food processing and marketing. This support is essential, because most efforts to commercialise agriculture in SI fail because of poor business management, particularly financial management.

Commerce and small businesses have previously received assistance from a range of donors including the United Nations (International Labour Organization, UN Industrial Development Organisation and United Nations Development Programme) and the Japanese International Development Organisation. However, the ethnic tension in SI has meant that, like many other sectors, small businesses have missed out on the many regional initiatives in the Pacific aimed at supporting business development. There is currently little donor support; and the capacity and budget of the small business section is limited, with just three staff in Honiara and no field officers.

3.4 NONGOVERNMENT ORGANISATIONS

A number of nongovernment organisations (NGOs) have ongoing, planned activities for supporting agriculture in SI (ACFOA 2003). These include Kastom Garden Association (KGA), Planting Material Network, Save the Children Fund — Youth Outreach Program, and World Vision. KGA is most directly involved with agriculture. Activities include the Manivovo Rural Training Centre banana collection and bulking youth livelihood project in north Malaita, and taro collection and distribution in Malaita and Choiseul. Planting Material Network is a local NGO closely associated with KGA and is made up of a network membership of communities and individuals mainly involved in sharing planting materials. KGA acts as the central coordinating body for all such sharing.

NGOs that have specifically supported SI agriculture in the past include the various national and international voluntary personnel agencies (UN Volunteers, Peace Corps, Voluntary Service Overseas, the Canada-based international development organisation CUSO, Japan Volunteers, Australian Volunteers Abroad), Appropriate Technology, Community and Environment, Foundation of the Peoples of the South Pacific, and Solomon Islands Development Trust.

3.5 WOMEN'S GROUPS

Women's organisations promoting agriculture among women in SI include the Mothers' Union of the Church of Melanesia, Voice Belong Mere and Soroptimists. The Mothers' Union promotes food production, nutrition and better health among women members. Voice Belong Mere is an information network and gives out regular newsletter and radio messages to rural women through Solomon Islands Broadcasting Corporation. Sometimes they share information related to agriculture. Soroptimists assists women to establish marketing centres.

3.6 FINANCE SECTOR

3.6.1 THE DEVELOPMENT BANK OF SOLOMON ISLANDS

The Development Bank of Solomon Islands, which is wholly owned by the SIG, has a large portfolio of agricultural loans. The bank closed in early 2003 due to mounting debt caused by excessive defaults on loan repayments and poor investments. The Central Bank has stated its intention to restructure the Development Bank's debt and manage its operations.

3.6.2 COMMERCIAL BANKS

ANZ, Westpac and the National Bank of Solomon Islands all have branches in most of the provincial centres, but they have reduced their networks from their peak in the mid-1990s following poor returns and concerns over security caused by the ethnic tension. Today, the commercial banks are reluctant to give loans for agricultural projects in the provinces because of previous high default rates. None of the banks accept customary land as collateral for loans.

3.6.3 CREDIT UNIONS

With assistance and financial backing from the Development Bank of Solomon Islands, credit unions flourished during the late 1980s and early 1990s, especially in rural areas where they played an important role for providing access to credit and savings facilities. More than 200 credit unions

existed in 1997, but most collapsed during the ethnic tension, leaving just 20 currently registered.

In the early 1990s, the United Nations Development Programme and the Food and Agriculture Organization of the United Nations (FAO) funded a project to support the development of rural financial services in SI through a strengthened and financially viable credit union league. The project also strengthened the Rural Financial Services Unit in the Ministry of Finance as a means to support financial services.

3.7 DONORS

Before independence in 1978, agriculture in SI was almost completely supported by the British Government through its overseas aid program. Most senior, administrative and technical staff in MAL were seconded from the British Commonwealth Service, and assistance focused on the development of plantation cash crops, such as coconut, cocoa and spices. At independence in 1978, there was inadequate financial, human and technical capacity within the ministry (for example, there was just one SI agriculture graduate), so assistance continued mainly in the form of technical personnel in research and development (especially for diversification of agriculture, which was seen as a priority). British bilateral assistance to agriculture gradually decreased in the 1980s, and by the early 1990s it had been replaced entirely by multilateral aid via the EU.

In the 1990s, strategic program-based assistance to SI agriculture was dominated by the EU (through Stabex and its Smallholder Development Programme and Farmers Support Programme projects — see Sections 5 and 6), and to a lesser extent by the Republic of China (Taiwan) through its technical mission (research and extension station) near Honiara. In addition, other donors such as the Asian Development Bank (ADB), the Japan International Cooperation Agency, the World Bank, the FAO and AusAID (including the Australian Centre for International Agricultural Research) have provided project aid.

Details of donor-supported programs and projects in agriculture are discussed in other sections of this report.

3.8 COMMODITY EXPORT MARKETING AUTHORITY

The Commodity Export Marketing Authority (CEMA) was established by the SIG (which maintained ownership) in 1985. The purpose of CEMA was to administer EU-funded Stabex price stabilisation funds for 'prescribed' commodities (initially copra and cocoa, but then extended to some spices) and to establish a network of buying centres and points throughout the country (see Appendix 5.2) for the purchase, transport and export of agricultural commodities. After many years of loss-making and political interference, CEMA was restructured in 2002 to become a regulatory body (GFA Management 2001). Its primary roles are now restricted to quality assurance, market intelligence and issuing export licences. With the end of commodity buying and selling, CEMA's income base has been dramatically reduced. Following the ethnic tension and the restructuring, most of the buying centres and points in its network are no longer serviced and operating. To help pay off large debts, CEMA wishes to sell its eight buying centres to the provinces, but the provinces are not prepared to pay for them.

3.9 CONSTRAINTS AND OPPORTUNITIES

Previous experience has shown that any substantial, long-term donor support to the agriculture sector will inevitably be constrained by the lack of a strategic plan within MAL and DAL, even if the donor has its own strategic plan. DAL's technical expertise and provincial extension network, plus a lack of capacity in NGOs and private enterprise, effectively mean that it would prove difficult and probably counterproductive to try to bypass DAL. Developing a strategic plan for MAL and DAL will not be easy, but it should be possible to use past work and harness the current air of change in Honiara. A basic framework exists under the National Economic Recovery, Reform and Development Plan 2003–2006; working files from the 1999 NZODA-funded DAL reform program

exist (NZODA 2000); and many department and divisional plans have been drafted, so there is ample material for a consolidation exercise and development of an overall strategic plan.

A major constraint to agriculture is the low recurrent budget for DAL (SI\$1.5 million), which is centrally funded. Donor-funded projects aimed at assisting agriculture and involving DAL as a partner will inevitably encounter capacity problems within the department, caused mainly by its inadequate budget.

The collapse of CEMA's buying network has severely diminished the ability to transport commodities. Ideally, the buying points should be privately run, but in most cases this is unlikely to happen without external financial and management assistance.

The link between the Land Use Planning Section within DAL (which has just one staff member, very little funding and effectively no capacity) and the Solomon Islands Institutional Strengthening of Land Administration Project in the Department of Lands is not clear; there seems to be little or no contact or coordination between the two.

The financial capacity of institutions providing support services for agricultural businesses in SI is inadequate. Support could be improved by building on previous work within SI and using regional expertise.

With the decline in DAL, NGOs have started to become significant de facto service providers for the agriculture sector. The experience of NGOs in the design and management of long-term community based projects in other sectors (eg forestry, health) provides a good opportunity for the same principles and linkages to be applied to the agriculture sector and for governments to support NGO projects and provide technical assistance.

4 Agricultural information

4.1 BACKGROUND

Information is a key resource for all stakeholders in agriculture. Lack of timely and appropriate information is a major constraint to development. At the national level, access to information is important for the formulation and implementation of appropriate policy and plans; for agricultural research, access to the records of and results from past research is an essential part of building new knowledge; for the farmer, lack of timely access to credible and appropriate information can have a significant negative impact.

4.2 MAJOR INITIATIVES AND ACTIVITIES

In 1984, a rapid survey of the literature examining agriculture and forestry resources in SI found 1500 references (Reilly 1985). The National Agriculture Library for SI was established between 1985 and 1988 at the Dodo Creek Research Station by Peter Walton, a voluntary service overseas volunteer. The Reilly (1985) bibliography formed the basis for the development of an extended electronic database, the Solomon Islands Bibliography of Agriculture and Forestry (SIBAF), containing approximately 2000 records up to 1990. The library contained published literature, as well as a large quantity of grey literature, such as unpublished conference papers, trial reports, consultants' reports, manuscripts and extension material, dating from the early 1900s.

The other significant provider of information in the 1990s was the Agricultural Information Unit, established by the ADB-funded SI Rural Services Project. The unit was a publications production and distribution facility, although it also produced radio programs. Many of the early materials produced were inappropriate (and in some cases technically wrong), and the unit ceased to function.

During the ethnic tension in late 2000, the library and the rest of the Dodo Creek Research Station (including other key information sources, such as entomological reference collections and field experiment records) were burnt and destroyed (see Figure 3). Fortunately, a copy of the SIBAF database was found on a computer in PNG. The database is held by Peter Walton and now contains 2308 records in the ProCite catalogue software system.

With assistance from the Secretariat of the Pacific Community (SPC), DAL has now established a small inhouse Agricultural Information Unit. The SPC has electronically scanned some SI agriculture documents held in its own library for storage and use by the unit on its computer network, using the UNESCO-developed Greenstone digital library software. However, progress has been slow because SPC project funding has now finished; the unit's network is poorly maintained; there is currently no catalogue system (although the SPC plans to install ProCite); and there is no trained librarian.



Figure 3 Remains of the Solomon Islands National Agricultural Library

The library was located at the Dodo Creek Research Station outside the capital Honiara. During the ethnic tension in 2000, the library, along with the research station and more than 40 years' worth of information on Solomon Islands agriculture, was destroyed.

An assessment of the information and communication requirements of farmers in some provinces was recently conducted by the EU-funded Development of Sustainable Agriculture in the Pacific project.

The EU/ACP (African, Caribbean and Pacific) Technical Centre for Agricultural and Rural Cooperation is currently carrying out a nationwide information needs assessment.

4.3 CONSTRAINTS AND OPPORTUNITIES

Although much of the information held in the Dodo Creek Research Station and library was unique and irreplaceable, it may be possible to substitute some of the documents and information with copies from various sources in SI and overseas, and to add new information. The following sections identify potential alternative sources.

4.3.1 SOLOMON ISLANDS

- > School of Natural Resources, Solomon Islands College of Higher Education (SICHE), Honiara. SICHE included the teaching library at the National Agricultural Training Institute in Malaita.
- > Department of Forests, Honiara.
- > Forest Research Station, Munda, Western Province (established in the 1980s with assistance from the ODA). The research station contains information on horticultural and agroforestry species; however, as much as 20% of documents have been destroyed by termites. The remaining collection is in poor condition and deteriorating quickly due to maritime climate. Airconditioning needs to be installed to prevent further damage.
- > WWF Gizo, Western Province. This is a significant resource library, used mostly for conservation and environment; however, it needs cataloguing.
- > National Archives, Honiara. The archives only contains files and documents up to the 1970s. The catalogue has not been updated, and there have been very few contributions since 1980s, and the existing contents are poorly preserved.
- > National Library, Honiara. The library is currently being renovated through support from the SIG, Honiara Town Council and Japanese Aid. It contains limited material on agriculture.

- > Department of Environment and Conservation, Honiara.
- > Honiara Herbarium, which contained botanical collections relocated to the University of the South Pacific herbarium in Suva, Fiji, during the ethnic tension. The location and condition of the herbarium's botanical book collection unknown.
- > MAL/DAL. The filing system is unconsolidated and poorly indexed; it contains some files from the Dodo Creek Research Station.
- > Central Bank of Solomon Islands, Honiara, which contains mostly published international material, as well as some significant statistical information.
- > Donor offices in Honiara, especially British and New Zealand high commissions and EU Delegation.

4.3.2 INTERNATIONAL

- > SPC, Noumea and Suva.
- > Overseas Development Institute, United Kingdom, which has a significant 'grey' library.
- > British Government Department for International Development (formerly ODA).
- > NRI Library, Chatham, United Kingdom (now part of Greenwich University).
- > National Agricultural Research Institute, PNG.
- > Former development workers and technical assistants involved in agricultural research in SI.

During the course of this study, contact was made with people in many countries who had formerly been technical assistants in SI agriculture. All expressed their willingness to help return copies of documents to SI. Therefore, a good opportunity now exists to create an informal network among these people in order to coordinate and assist with scanning, copying and returning priority documents to SI. Copies of many of the documents obtained during this assessment will be given to DAL.

However, even if a majority of the information can be recovered, a system is needed to ensure that it is managed efficiently and rapidly made available to all stakeholders in an appropriate form. This will require the design, development

and implementation of a comprehensive national agricultural information and communications strategy.

The key issue is whether to re-establish the National Agriculture Library. Generally, people prefer to access information where they work, rather than remotely. Therefore, it is not recommended that the ministry or any organisation attempt to recreate the National Agriculture Library as it existed at the Dodo Creek Research Station. The ministry should develop an information system and library based on the information that the ministry needs to have at hand. It does not need (and is unlikely to receive) a physical copy of everything written about agricultural research and development in SI.

The Agricultural Information Association for Australasia has offered A\$2000 to help rebuild the national agriculture library in SI.

The SIBAF database will need to be incorporated into the current DAL electronic catalogue system in order to help identify and coordinate the restocking of the Agricultural Information Unit.

Although the library was a significant resource for research, it was only occasionally used by other stakeholders (such as extension workers) because it was located outside Honiara. Any future development needs to ensure that the information is available to as wide a group of stakeholders as possible. One way to achieve this could be to develop distribution systems or provincial nodes. Another possibility might be to expand the use of the electronic People First Network, which is already being used by PestNet to distribute information to farmers about pests and disease problems (see Section 7). A third option would be to use existing networks, such as extension, to act as information providers and as advance scouts to identify information needs. This could, in turn, influence policy and planning at the national level, justify the need for research, and ensure that the results of research make a difference. An initiative similar to the scenario sketched here is taking place currently in PNG, with the development of resource centres by the National Agricultural Research Institute and its partners.

5 Extension and training

5.1 BACKGROUND

Solomon Islands (SI) is made up of hundreds of islands spread over a large area with poor transport and communication infrastructure. Eighty-four per cent of the population (345 000 people) rely directly on subsistence farming for food. Servicing their agricultural extension and training needs is an enormous challenge (SIG 2002).

There are currently about 150 extension staff, but many are in long-term, nonestablished posts, and restructuring is currently taking place. Restructuring plans allow for a total of 100 established extension staff, including about 10 staff in each province, except Western and Malaita provinces, which will have 20 staff each, and Rennell and Bellona Province with three). In many cases, staff are based or 'stuck' in the provincial capital. Extension in DAL Honiara is headed by a director (who is also the acting undersecretary) and five staff; three of whom are attached to specific projects.

The major educational and vocational agricultural training institutes in SI are the rural training centres (RTCs) and the Solomon Islands College of Higher Education (SICHE), which includes the School of Natural Resources near Honiara, the National Agricultural Training Institute in north Malaita, and various agricultural and forestry training institutes.

5.2 MAJOR INITIATIVES AND ACTIVITIES

5.2.1 EXTENSION

Three major projects have assisted extension in the past:

1. **Rural Services Project** 1984–91, ADB and the International Development Association (part of the World Bank), US\$12 million (SIG 15%)

Major extension activities included (EU 1993):

- > National Agricultural Training Institute at Fote Field Experiment Station (FES), north Malaita:
 - Amalgamated into SI College of Higher Education in 1991.
 - Now back with DAL, survived the ethnic tension, but is currently inoperative. Core training assets, such as the library, are to be relocated to SICHE, which itself has been heavily affected by the ethnic tension.
- > Support for extension services such as salaries, housing and travel.
- > Rural development centres: seven built in the provinces to provide training, extension and demonstrations:
 - These have not had great success. Infrastructure running costs were too great for the provinces after the Rural Services Project (and subsequent projects) funding was withdrawn. The centres are largely defunct or have been taken over by the provinces.

- > Re-established Agricultural Information Unit (now defunct).
- > A review of the project in 1992 identified the main problems, including:
 - over-ambitious targets
 - too little time for integration into MAL
 - SIG unable to finance asset and recurrent infrastructure, resulting in follow-up project proposals not being implemented.

2. Smallholder Development Programme 1989–93, EU Stabex funds

- > Focused on increasing production and productivity of smallholder copra and cocoa.
- > An assessment of the program concluded:
 - policy was misguided. Emphasis should have been on increasing welfare through value adding and greater participation
 - large-scale delivery of free inputs through a centrally administered system is a highly wasteful use of resources.

3. Farmers Support Programme 1994–2000, EU Stabex, S\$11 million per year

- > Focused on farmers' needs and supporting extension delivery mechanisms.
- > Prematurely ended with the ethnic tension.

All three projects failed to integrate themselves sufficiently into DAL, so that when donor support finished, the department was unable to continue support for project assets and activities (AgriSystems 1993, Morgan and Lokay 2000). Any future donor-driven projects aimed at supporting and increasing the extension capacity of DAL and other divisions must be completely integrated from the start, and have a clear exit strategy.

The Women's Agricultural Extension Services Project NZODA 1997–2000 was designed to increase rural women's ability to produce food crops for subsistence and income generation by providing support for female agricultural extension officers within DAL. The project made significant progress in training women for extension before it was prematurely ended by the ethnic tension; however, poor support within the department

resulted in a separate women's extension service being established.

Implementation of the FAO-funded 'Capacity building for farming systems development in support of the Special Programme for Food Security' project (2004–06) was delayed because of the ethnic tension. The project includes activities to improve food production through participatory on-farm demonstrations and by reinforcing extension and research capacities.

Agricultural extension was to have been a major part of the ministry reform process initiated in 1999 with assistance from NZODA, but was prematurely ended because of the ethnic tension (see Section 3). The current focus of extension is support for copra and cocoa production (mostly financed by AusAID's Community Peace and Restoration Fund), and rice production (financed by Taiwan).

The Melanesian Farmers' Network, recently created with the assistance of KGA, aims to facilitate cooperation and peer-to-peer extension between SI, Bougainville and PNG farmers.

5.2.2 TRAINING

The National Agricultural Training Institute was established by the Rural Services Project at Fote field experiment station in north Malaita in 1989 as part of DAL. The institute was amalgamated into the Honiara-based SICHE in 1991. Badly damaged during the ethnic tension, it is now inoperative and has been handed back to DAL. The teaching components and library are to be relocated back to SICHE.

It is understood that an FAO mission in 1989 designed a 10-year training program, but details could not be obtained during this study.

Residential and nonresidential vocational RTCs were established in a number of places by the churches in the 1970s and 1980s, in particular the Catholic Church agricultural training centre at Vanga Point on Kolombangara, Western Province. RTCs have proved to be effective and remarkably durable, because they have community support and church and donor backing.

The Solomon Islands Association of Rural Training Centres was established in 1982 and now has 34 members in eight provinces.⁵ From 1993, the EU, and more recently AusAID via Union Aid Abroad APHEDA (Australian People for Health, Education and Development Abroad), have provided assistance to the association and its members in training and capacity building (SIG 2003b).

5.3 CONSTRAINTS AND OPPORTUNITIES

Extension has been subject to frequent restructuring, and substantial finance and staffing cuts. There is currently no overarching strategic plan for extension. All or part of the service has been periodically decentralised and recentralised by various governments, most recently in 1996. Staff in provinces are paid from central government funds, but are mostly managed by provinces. At times, this has inevitably led to problems with management and accountability, and broken and disjointed lines of communication.

The SIG spends less than 1% of its budget on agriculture. The 2004 recurrent budget for extension was S\$1.3 million (about A\$250 000), 75% of which is paid for by the Australian Government's Regional Assistance Mission to Solomon Islands. There are currently very few extension services boats (motorised fibreglass canoes) in operating condition, and most staff housing is in very poor condition.

If an effective government extension service is seen as necessary, significant resources will need to be invested. Farmers' networks and cooperatives are a potential alternative, but it is doubtful whether they could be expanded enough to replace government services (and it may be undesirable to do so). Instead, there are opportunities for government extension services and farmers networks to grow and complement each other. Changes in the role

and format of government extension are easier to make at the provincial level than centrally.

Ironically, problems and advantages experienced by RTCs are the same as those of extension. The remoteness and relative independence of RTCs has meant that, with EU support and community involvement, they have managed to survive the ethnic tension, although they have been severely weakened. Unfortunately, this also means that RTCs are hampered by poor communication, unreliable local funding and lack of central government support (SIG 2003b). There is a general need to raise standards and add capacity (APHEDA 2003).

The potential for RTCs to improve rural livelihoods through vocational training is significant. With additional long-term support and capacity, they could also host training facilities for extension and other rural services. With appropriate funding and support, RTCs could also provide an excellent opportunity for a subprovincial base from which extension services could operate and offer assistance to their hosts.

5 See <http://www.siarctc.org.sb>

6 Research

6.1 BACKGROUND

The Research Division of DAL is currently divided into seven sections:

- > tree crops
- > field crops
- > soils and plant nutrition
- > entomology
- > plant pathology
- > farming systems
- > library and management services.

Only tree crops, plant pathology and library services are currently operating, and only in a limited capacity. The other sections are inoperative, because key staff are absent, because they lack facilities, or both.

Details of library services and plant protection (including entomology) are given in Sections 4 and 7, respectively.

6.2 MAJOR INITIATIVES AND ACTIVITIES

Agricultural research was based at Dala in north Malaita (a typically wet, sloping site on weathered oxidised soils) until the mid 1970s, when it was moved to the Dodo Creek Research Station and nearby Tenaru on the Guadalcanal plains (an atypical dry and flat site on sandy soils). To extend research to the provinces and more representative

environments, the following four field experiment stations (FESs) were developed with the assistance of the Rural Services Project in the 1980s:

- > Ringi on Kolombangara (black volcanic soil)
- > Fote in north Malaita near the old station at Dala and the site of the new National Agricultural Training Institute
- > AvuAvu on the wet Weather Coast of Guadalcanal
- > Lata in Santa Cruz on raised coral.

The Dodo Creek Research Station was destroyed during the ethnic tension in 2000. Information, equipment, reference collections and files from more than 40 years of research were lost. In addition, staff lost their homes and possessions. Government housing in Honiara was not available, and some staff went home to their villages. The remaining staff are now based within DAL in a dilapidated and inadequate building in the centre of Honiara. Staff have very little funding available for fieldwork and travel to the FESs, and are poorly motivated. The FESs are run-down and effectively closed, but their tree crop collections are intact. DAL has recently expressed its intention to develop a new research centre, but not at the Dodo Creek Research Station.

The following sections discuss previous major research projects that are not specifically covered elsewhere in this report.

6.2.1 TREE CROPS

The tree crop collections held at the FESs include coconut and cocoa varieties and hybrids, imported and local grafted varieties of exotic fruit (rambutan, durian, carambola, avocado, mango, jackfruit etc) and more than 50 cultivars of indigenous nuts, including ngali, alite and cutnut (Evans 1999).⁶ According to a University of the South Pacific survey in 1993, SI had the largest germplasm collection in the Pacific. Vegetatively propagated seedlings from the fruit collections were previously sold at cost to the public and were very popular. The tree crops section has produced guides to growing coconut, cocoa and coffee (Trewren and Linton 1992; Trewren 1992ab).

6.2.2 FIELD CROPS

Large cultivar collections and assessments of taro, sweet potato, yam and pana were maintained by the Research Division, as well as a successful vegetable assessment and seed production program. Applied research and development was also carried out on a range of spices, including chilli, cardamom, pepper and vanilla. Research trials established at Tenaru FES are still providing the bulk of the planting material for the current vanilla boom.

6.2.3 SOILS AND FARMING SYSTEMS

Research and on-farm trials have examined soil fertility maintenance, erosion control on sloping land, indigenous farming systems, and the use of traditional plants (Henderson and Hancock 1988).

6.2.4 FOOD TECHNOLOGY UNIT

A new unit was established at the Dodo Creek Research Station in 1994 with funding assistance from the FAO to develop appropriate on-farm and secondary processing techniques for traditional food crops. The work included trials on storage, fixing, drying, cooking, flavouring and packaging.

Projects previously and currently supported by the Australian Centre for International Agricultural Research are given in Appendix 5.3.

6.3 CONSTRAINTS AND OPPORTUNITIES

There is a cadre of qualified and experienced research personnel within DAL who could make a valuable contribution to the rehabilitation and future development of agriculture in SI. However, they are currently underused and unmotivated because they lack funding and a suitable venue for research.

The tree crop collections planted at the FESs are a major asset for SI agriculture and could provide valuable, improved germplasm for smallholders throughout the country. Collaborative semicommercial nurseries for selling planting material from the collections could be set up and managed by local communities and DAL's Research Division.

Previous collections of sweet potato and yam by the research division, and recent collections of taro and banana by NGOs, have demonstrated the huge cultivated diversity of field crops in SI and the feasibility of farmers' networks for managing them. Opportunities exist to develop collaborative agreements between NGOs, farmers and DAL to extend field crop collections around the country and to enhance their use by providing technical support and encouraging research using DAL personnel.

6 See <http://www.spc.int/pgr/>

7 Plant protection and quarantine

7.1 BACKGROUND

Pests and diseases have dominated agriculture development in SI for more than 70 years, in both the plantation and subsistence sectors.⁷ This is not altogether surprising. Rainfall and temperatures are high and show little seasonal variation.

These conditions allow rapid increases of insects and pathogens. Furthermore, the country is an archipelago, and therefore vulnerable to invasion by exotic pests. This vulnerability is heightened by the proximity of SI to Papua New Guinea (PNG), which has been the origin of numerous pest incursions in the past, and has the potential for others. For this reason, quarantine remains an important aspect of crop protection management in SI.

Attempts have been made to estimate crop losses from pests and diseases of major plantation and subsistence crops; however, the meaning of these estimates is often hard to interpret, because they were made at research stations (usually on individual pest problems), and difficult to extrapolate to farmers' fields. For example, taro leaf blight reduces corm yields by 40%; however, in farmers' fields, taro leaf blight is rarely present alone, and estimating its impact in the presence of lethal viral diseases, nematodes and taro beetles is fraught with difficulty.

In addition, it is not an important disease in the higher, interior areas of the islands. Overall, there are a number of pest and disease problems of the major SI crops that are often limiting factors to production.

7.2 MAJOR INITIATIVES AND ACTIVITIES

Solomon Islands has employed entomologists almost continuously since the 1930s, concentrating initially on pests of coconut, and later on those of cocoa, exotic forest species, oil palm, rice, sweet potato and taro, among others. Entomological research was originally based at Kukum on Guadalcanal, before shifting to the nearby Dodo Creek Research Station in 1972. A valuable collection of insects was made over the years, but was lost when the Dodo Creek Research Station was destroyed in 2000.

In contrast, plant pathology has a much shorter history in SI, starting in 1970 at Dala Experiment Station, Malaita, and then continuing at the Dodo Creek Research Station in 1976. Surveys of diseases were made and published, and research was initially done on diseases of cocoa and taro, before being broadened to include all root crops, coconut, rice and oil palm. Until the late 1980s, crop protection personnel were supported under ODA technical assistance schemes.

⁷ Details of pest and disease problems in SI during the past 50 years in SI are given in Appendix 5.4.

Although crop pests and diseases are well documented, information on some areas is incomplete (see Appendix 5.4). Of all the problems identified, the most urgent is to find controls for *Nisotra*, a beetle on sliperi kabis (*Abelmoschus manihot*). Overall, there is a wealth of published and unpublished literature on crop pests and diseases, which has been summarised by Reilly (1985). Information has not been updated since 1985, except for information on fruit fly. Currently, the most pressing problem is to distribute information to growers in a timely manner.

Quarantine was given major prominence in the late 1970s, with the development of a quarantine act and regulations. New Zealand provided technical expertise in the 1990s, creating a relatively efficient and effective quarantine barrier that withstood the difficulties associated with the ethnic tension, while other divisions collapsed.

A previous weakness in the subsistence sector was the lack of consultation with growers in developing national priorities; too often, these were influenced by the commercial sector or the whims of individual scientists. Today, there is no meaningful crop protection capability, apart from that provided for rice by the Republic of Taiwan's research farm. Pests and diseases are unchecked and control measures (especially those involving pesticides) are often applied incorrectly. NGOs have tried to fix the inadequate quarantine controls, with KGA producing a useful manual on integrated pest management.

7.3 CONSTRAINTS AND OPPORTUNITIES

The current situation in SI is that the limited crop protection expertise within the Department of Agriculture and Livestock (DAL) is not being managed properly. The department lacks funds to establish effective crop quarantine, but has made no attempt to obtain them. There appears to be no vision for the future, including how staff might identify the most urgent needs with farmers; how problems might be tackled with the resources available; how linkages might be built with NGOs active in the sector; and how funding might be obtained.

There has been talk about re-establishing the Dodo Creek Research Station but this would not be cost-effective even if funds were available and sufficient for building, equipment and training scientists. Disastrous mistakes were made in the past, including the closure of Dala, the establishment of the Dodo Creek Research Station for reasons that were later found wanting, and the use of loans from the Asian Development Bank (ADB) to create substations throughout the country that could never be sustained past independence.

Times have changed, and now most countries of the region, including SI, do not have the capacity for agricultural research, including crop protection, and should not try to establish it. SI should look to Vanuatu for ideas, such as creating a small crop protection unit attached to quarantine. At the same time, SI should develop close ties to the Secretariat of the Pacific Community (SPC) and to countries in the region with similar problems but greater capacity (for example, the National Agricultural Research Institute in PNG), as well as with institutions and expert networks outside the region that are willing to help.

There is an urgent need to identify both the current problems, and practical solutions to test within communities. Generally, the problems are known, and can be addressed cost-effectively and in a sustainable way if donors and government departments engage with NGOs and farmers to build on local knowledge and cultural practices. Surveys throughout the country would confirm the situation and provide a basis for simple trials to develop appropriate solutions. The PestNet *Linking Farmers to Plant Protection Networks* takes this approach in working with DAL, NGOs and farmers, doing surveys, reporting results to local farmers' groups to prioritise crop problems for investigation, and using expert networks (PestNet, SPC, FAO) to support activities by email. Most farmers do not expect much from DAL, because the department considers that agriculture focuses on coconut and cocoa crops, and is about 'projects', rather than food crops.

Farmers would welcome information on the problems of concern to them. Mostly, they want information and advice on food crops, but there is

also a demand for information on cocoa (it would be useful to test the new varieties produced in PNG) and minor cash crops (vanilla, chilli and cardamom). Vegetable seeds always appear to be in demand, and the Planting Material Network (associated with KGA) is responding to this need.

A field officer at Malu'u in north Malaita recently provided an interesting insight into the sorts of questions farmers were asking. Most often, they wanted to know how to control:

- > *Nisotra* on sliperi kabis
- > leaf roller on sweet potato
- > alomae on taro
- > mealy bugs on papaya and eggplant
- > sucking bugs on beans
- > diamondback moth on head cabbage and watercress
- > leaf rots and caterpillars of watermelon.

Most, but not all, are relatively minor problems for which there are control measures. Current solutions to some involve introductions of parasitoids, changes to cultural practices and the use of pesticides. However, the latter are not available, too expensive, or dangerous for human health and the environment. The integrated pest management manual published by KGA is useful and stresses cultural controls and natural sprays. However, knowledge of these sprays is limited, and further research is needed to measure their effectiveness for controlling pests. Where commercial pesticides are being used routinely (eg on watermelon in north Malaita), more benign products should be recommended and training should be given in their use.

If and when cash cropping for export is promoted by government and donor agencies, many of the pest and disease problems previously experienced in monoculturing exotic annuals could be minimised by promoting — wherever feasible — the development of products from indigenous perennial woody species grown in mixed plantings.

8 Subsistence farming and food security

8.1 BACKGROUND

Approximately 345 000 Solomon Islanders (84% of the population) rely directly on subsistence farming for food (SIG 2002). The most common subsistence food crops are sweet potato, cassava and banana, followed by taro, yam and pana (*Dioscorea* spp.).

The predominant farming system is low-input, extensive, rotational 'swidden' (slash and burn) agriculture in forested customary owned land.

Problems associated with decreasing fallow periods without improved husbandry practices (such as poor soil fertility, low yields and increased pest and disease problems) are widely recognised. Periodic cyclones have a devastating localised effect on food availability, especially in isolated and vulnerable areas with high population densities and on islands towards the southeast of the Solomon group.

On smaller outer islands, where land pressure has always been high and where soils are unable to sustainably support ground-based staples, predominantly tree-based agricultural systems have evolved using a mix of multipurpose species to provide staples (eg breadfruit), protein (eg nuts) and edible leaves (eg *Gnetum*).

Food security issues have been noted in the past (IBRD 1969), but were not considered to be a major problem. However, an increase in the consumption of purchased imported staples, tinned and snack food, urbanisation and increased population density have resulted in pockets of malnutrition, diet-related diseases (such as diabetes and heart disease) and

increased vulnerability to natural and human-made disturbances. Recent reports of root crop failure in east Malaita caused by prolonged heavy rain is an example of contemporary vulnerability caused by population shift and land pressure.

DAL's focus on cash crop production and a general feeling that farmers could take care of themselves has resulted in comparatively few resources being directed towards subsistence given its size and critical importance to the overall welfare of the vast majority of people.

8.2 MAJOR INITIATIVES AND ACTIVITIES

Subsistence agriculture and food security have been the focus of a number of studies:

- > Food production, aspects of food security and marketing were studied in the 1970s (Eele 1978, Bathgate 1978).
- > The South Pacific Smallholder Project (1985–86) reported on village food systems and marketing from two sites in north Malaita and the Weather Coast of Guadalcanal (Frazer 1987, Jones et al 1988, Fleming 1989), and to some extent on Ontong Java (Bayliss-Smith 1986).
- > The Rural Services Project conducted detailed surveys in 12 sites (some of which were still recovering from damage by Cyclone Namu in 1986) around the country from 1986 to 1988. Data for each site are given in separate volumes which contain details on household

composition, income-earning activities, access to extension services, livestock, holding size distribution, labour density, cropping patterns, coconut and cocoa production, fallows, landform, adverse factors affecting production, crop yields, smallholder production, labour, crop and farm budgets, cash crop processing, and marketing (Mackay 1989).⁸ Considering the size, scope and detail of effort, and the fact that — along with the physical surveys conducted by Wall and Hansell (1974–77) — these surveys were meant to form the information backbone of agricultural planning in the 1990s, remarkably little follow-up work appears to have taken place. This is partly due to the lack of government funding for activities and sections established by the Rural Services Project.

- > The Ministry of Finance’s Statistical Unit surveyed Honiara, provincial and rural income and expenditure patterns and markets between 1990 and 1992 (MoF 1992, 1995ab).

In the late 1980s, the Village Food Garden Rehabilitation and Improvement Project and ‘SupSup’ Garden Project both aimed to improve nutrition through better use of village and urban permaculture systems.

The Kastom Gaden Association (KGA), which began in the mid-1990s, has run a number of projects aimed at assisting farmers to develop more intensive, sustainable farming systems. KGA has also developed national networks (eg the Solomon Islands Planting Material Network) and regional networks (eg the Melanesian Farmers’ Network) for facilitating peer-to-peer cooperation and extension and technical assistance as needed.

A number of NGOs have subsistence- and food security-related projects and proposals (eg World Vision’s Makiar Sustainable Rural Livelihoods Project).

The Taiwan technical mission has supported the introduction of mostly upland (dry) rice to smallholders for the past 10 years, but it relies heavily on external inputs of pesticides and

herbicides, and economies of scale for production and processing. Therefore, participation and total production has not been significant.

The grain mill in Honiara closed because of the ethnic tension but has now reopened. Vegetable seed production on government research and extension stations (see Section 6) and on the Taiwan experimental farm has stopped.

8.3 CONSTRAINTS AND OPPORTUNITIES

Potentially, there is a wealth of technical data and ethnobotanical knowledge on subsistence agriculture that could be used for planning and assistance; however, it is often not in a readily accessible or usable form. There are good opportunities to use, build on and update this information by re-examining and rationalising existing data, conducting follow-up research and analyses, and presenting the information in more readily available formats for all potential users.

Strategic food security in SI is threatened by a lack of large-scale milling capacity and limited central seed production. Wherever possible, private enterprise should be encouraged to meet these needs, but government may have to fill gaps.

DAL currently has few activities aimed at supporting subsistence agriculture. In part, this is caused by a chronic lack of capacity, but it is also due to a historical focus on cash crop production and a lack of strategic direction to address the imbalance in the future.

Historically, subsistence agriculture has also not been a priority for NGOs (compared with, for example, forest conservation), but some are now responding to farmers’ needs. The ground-level networks being developed by NGOs to facilitate their work provide an excellent opportunity for delivering external technical assistance. There is a danger, however, that they will compete with, rather than complement, government services unless the two collaborate.

⁸ Despite being given the highest priority and intensive effort, only three volumes could be found during this study: Marau Sound in east Guadalcanal, Simbo Island in Western Province and Afio in south Malaita. Obtaining and reprinting the remaining volumes along with restocking of Hansell and Wall’s lands surveys are the two most important baseline information needs for any future agricultural planning in SI.

9 Cash cropping

9.1 BACKGROUND

Traditionally, copra has been the main cash crop. Cocoa and plantation-based oil palm are relatively new introductions. Many attempts have been made to introduce a number of exotic annual cash crops, with mixed results. The main cash crops now are coconut (copra and oil), betel nut (*Areca catchu*) and cocoa, which are all woody perennials. In addition, vegetables and fruit are produced for local markets and interest and activity are currently high in domestic markets for chilli and export markets for vanilla.

9.1.1 COCONUT

Coconut remains the predominant source of cash crop income. The last census, taken in 1985, recorded nine million trees on more than 60 000 hectares. Production of copra fell dramatically during the ethnic tension but is now rapidly recovering (see Figure 4). More than 80% of copra is produced by smallholders.

9.1.2 COCOA

Cocoa was first planted in Malaita in the late 1950s and in Guadalcanal in 1962, but extensive planting only began in the late 1970s after in-country research had identified varieties resistant or tolerant to SI pests and diseases (Trewren 1992a). The number of households producing cocoa has doubled every 10 years, from 5% in 1976 to 20% in 1999 (SIG 2002). Exports grew by 40% per year in

the 1980s, and by 1990, earnings from cocoa had surpassed those from copra. Production reached 4500 tonnes (dry bean) in 2003; an equal record harvest with 1991 (see Figure 4).

9.1.3 BETEL NUT

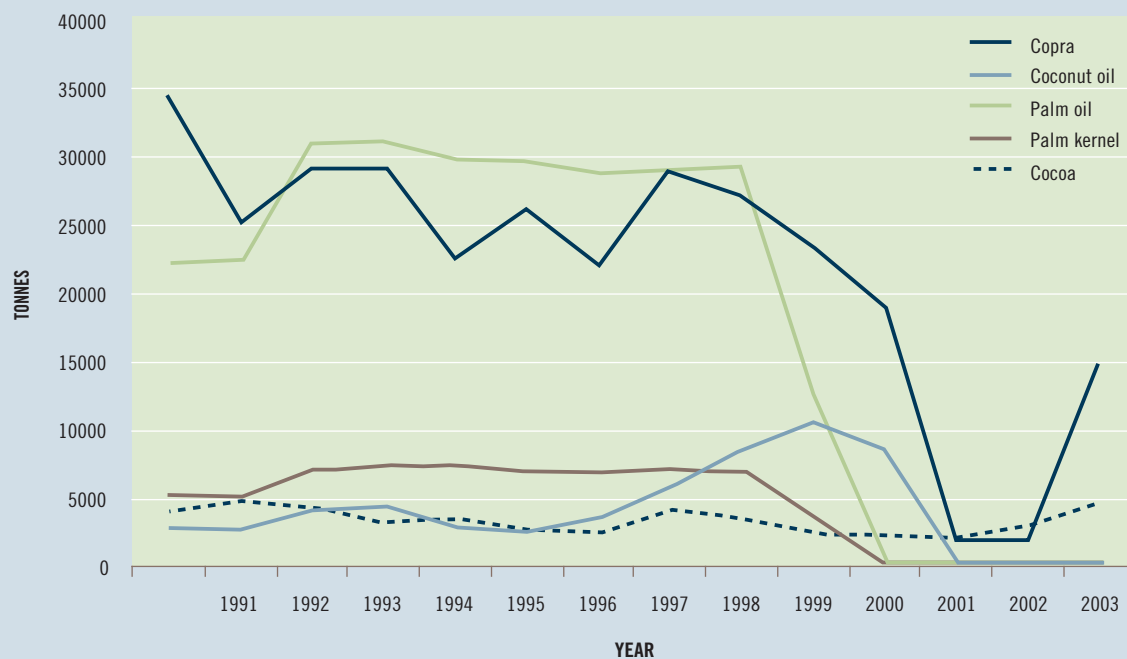
Approximately 30% of all households produce betel nut for sale, double the proportion 15 years ago, making it the second most common cash crop.

9.1.4 OIL PALM

Oil palm was introduced in the 1970s. A joint venture between the Commonwealth Development Corporation and the SIG established Solomon Islands Plantation Ltd, a 6000-hectare plantation and mill on Guadalcanal. Despite widespread damage by Cyclone Namu in 1986, palm oil, and to a lesser extent kernel oil, became important export revenue earners for the government and provided more than 10% of revenue until the mill and offices were destroyed in the 2000 ethnic tension, and the plantation was abandoned.

Returns to labour for the major cash crops are given in Appendix 5.5.

Figure 4 Solomon Island major agricultural commodity production



9.2 MAJOR INITIATIVES AND ACTIVITIES

9.2.1 COCONUT AND COCOA

A history of the coconut industry in SI is given by Ilala (1989). Since the mid-1970s, major ‘prescribed’ commodities, such as copra, cocoa and oil palm, have benefited from EU Stabex price stabilisation funds, administered by CEMA from 1985 to 2002 (Coulter 1989, GFA Management 2001, SIG 2002). Private enterprises are now able to purchase a licence to buy and export commodities.

Copra and cocoa have been the focus of most extension and development work by DAL and two associated EU-funded projects over the past 20 years. In particular, the EU-funded Smallholder Development Programme (1989–93) and the Farmers Support Programme (1994–2000) (see Section 5) helped raise total production and productivity.

Moves to introduce high-yielding hybrids were unsuccessful in most cases because of resistance by farmers, poor husbandry and susceptibility to pest, disease and weed infestation.

Since the ethnic tension, assistance to commodity producers has shifted towards rehabilitation of processing and transport infrastructure, encouragement of product diversification, local marketing and value adding. Coconut oil is being

produced by a number of medium-sized provincial mills, and subprovincial and village-based micro-oil expellers. Both the Community Peace and Restoration Fund and the EU-funded Micro Projects programs are assisting these developments.

The former Levers company, Russell Islands Plantation Estates Ltd, based at Yandina, Central Province, was the largest single producer and buyer of copra and cocoa in the country (and the largest employer), but the company became insolvent in 2001 and there is now a protracted labour strike with no production.

The Ministry of Commerce is currently focusing on the creation of production and marketing cooperatives for copra and cocoa production.

Targets set by the national government for copra and coconut production in 2005 (SIG 2003a) are already being met. Copra production has reached 20 000 tonnes, despite the closure of Russell Islands Plantation Estates Ltd, and cocoa production has reached 5000 tonnes. This suggests that smallholders are responding to relatively high prices and assistance from the Community Peace and Restoration Fund and others. A detailed report on the Peace and Restoration Fund’s copra program was due at the end of August 2004.

9.2.2 OIL PALM

The Commonwealth Development Corporation has withdrawn interest in Solomon Islands Plantation Ltd. The most likely buyer for the plantation is now New Britain Plantations Ltd, which proposes to rehabilitate the mill and offices and operate production under a 'nucleus plus outreach' system. Detailed feasibility studies for an expansion of oil palm to outgrowers (on the old rice lands) have been prepared (Rankine 1992, Rankine and Pauku 1992) but never implemented because of complex and longstanding disputes over land and the use of non-Guadalcanal labour.

A logging company has established a nursery and small oil palm plantation on sloping, clear-felled land on Vangunu Island in the watershed of the Marovo Lagoon (a UNESCO World Heritage-listed site) in Western Province. Plantations require agricultural licences that allow logging companies to clear-fell land. There are widespread and valid concerns over the environmental and social impacts of the existing plantation and the support it enjoys from the central government at the expense of more appropriate local development (LaFranchi 1999, Hviding and Bayliss-Smith 2000, Shearman 2000).

9.2.3 SPICES

Donor-supported projects aimed at diversifying cash crop production into spices (including chilli, vanilla, cardamom, pepper, turmeric and ginger) were initiated in the late 1970s and 1980s. Farmer uptake was initially enthusiastic and supply to CEMA increased, but production waned after prices began to fall. Throughout the 1990s, production of Nepalese akabare chilli, mostly for use in production of 'chilli tuna' at Noro fish canning factory (Western Province), was the most successful, despite several studies showing low returns to labour and handling problems. More recently, demand for vanilla planting material has increased dramatically in response to favourable prices. Vanilla cultivation has been helped by the availability of simpler on-farm processing techniques developed in neighbouring Vanuatu and PNG. However, vanilla production is likely to be limited in most areas because it requires a pronounced dry season.

9.2.4 OTHER CASH CROPS

Temperate vegetables, such as potato and onion, have been successfully introduced into populated high-altitude areas of Malaita and Isabel for sale in local markets.

Pineapples have been promoted for juice, canning and out-of-season exporting, but have been more successful in local markets.

Robusta coffee was piloted in the mountains of Guadalcanal in the 1980s by agricultural research, but has been relatively unsuccessful, because of high rainfall and difficult access to markets. Robusta coffee production has been more successful in Isabel, where it was introduced later.

In 1989, CEMA started to purchase ngali nuts in shell. Supply quickly rose from 3 tonnes per year (about 300 kg of kernel) to nearly 100 tonnes per year (1000 kg of kernel), but processing and marketing failed to keep pace because of lack of private sector involvement. CEMA eventually stopped buying the nuts in 1997. Kernel oil has previously been exported to Australia for use in herbal medicines by a community based operation in Makira, but production has ceased because of financial disputes.

A large-scale project to grow wet rice on the Guadalcanal plains in the 1970s failed after persistent pest and disease problems and damage caused by Cyclone Namu in 1986.

9.3 CONSTRAINTS AND OPPORTUNITIES

The majority of rural smallholders produce secondary cash crops in addition to subsistence crops. Hence, cash cropping is often not allocated the time and resources considered necessary by outside observers.

In order to succeed, cash crops must fit the social, economic and environmental context within which rural SI people live. This context includes:

- > complex cultural relationships and dependencies
- > customary land tenure
- > steep land
- > short life expectancy

- > low education
- > geographical isolation
- > minimal transport or communication infrastructure
- > poor government services.

There are deep-seated sociocultural problems associated with the creation and running of western-oriented businesses (Gegeo 1998). Community based businesses promoted by many NGOs and later by governments have largely been unsuccessful because of a lack of ultimate responsibility, jealousies, and poor management and financial control.

Shipping services are poor and canoe travel is restricted because of regulations on carrying fuel. The greatest factor constraining the marketing of existing cash crops from most rural areas is the lack of regular and affordable intra and inter-island transport. This has constrained the marketing of new cash crops, which are perishable and bulky, and will continue to do so.

Most CEMA buying centres and points are now unused. Without assistance, there seems little chance of them operating privately. Only one copra export licence holder outside Honiara (at Noro, Western Province) buys copra. All 20 cocoa export licence holders are in Honiara.

Copra plantations usually occupy prime, flat, accessible coastal land. Pressure to use such land for alternative crops and purposes will increase as population densities increase. Most sites are unsuitable for annual cropping, but alternative useful coastal tree species (such as alite nuts and breadfruit) can be planted.

There is some concern that cocoa is being planted in unsuitable sites, and that little or no screening is taking place.

Wet cocoa beans are often produced and sold by women and older children. Production of dry cocoa beans adds value, but families do not necessarily benefit, because fermentation and drying are mainly carried out by men, who then sell the beans.

Government supply of vanilla planting material only meets demand from Guadalcanal, and parent stocks of vanilla cuttings have been exhausted.

There is a chronic lack of capacity in DAL and the Ministry of Commerce, Industry and Employment, and services to small farm enterprises are poor.

A 1997–98 nuts, spices and coconut oil marketing project commissioned by CEMA concluded that the best market potential in Australia and New Zealand was in ngali nuts and coconut oil for hair and skin products (Marketshare 1997, 1998). The report advised against cardamom and found that SI (Nepalese) akabare chilli could not compete with Indian birdseye chilli without in-country value adding.

Good opportunities exist for private sector involvement in processing and marketing ngali and other indigenous nuts, if reliable supply lines can be restored.

Area-based integrated conservation and development projects often lack the capacity and skills to develop agriculturally based cash crops and nontimber forest and agroforest products. However, they have excellent long-term, ground-level engagement with communities, making them an ideal conduit for third party technical assistance.

Betel nut growing enjoys a rare comparative economic and agronomic advantage in SI. Potential export markets exist in PNG and Asia, and to expatriate Melanesians.

A survey in the 1980s identified more than 500 ‘useful plants’ in SI (Henderson and Hancock 1988), including indigenous fruits, nuts, leaves, fungi and resins. Some of these may now have potentially lucrative markets overseas because of the emergence and exponential growth in global markets for ‘green’ products (ten Kate and Laird 1999, Shanley et al 2002). Some products require only minor investments in existing appropriate processing and packaging techniques in order to market them locally. Others, however, may require significant longer-term investment in research and development, and careful handling because of intellectual property rights issues, before they can be marketed overseas. In many cases, domestic markets exist.

10 Small-scale forestry

10.1 BACKGROUND

The log price boom of the early 1990s (caused mainly by the banning of round log exports from Indonesia and Malaysia) transformed the forestry industry in the Solomon Islands (Bennett 2000). Exports doubled from an average of less than 300 000 m³ before the boom to an average of 645 000 m³ per year in the past 10 years. This is two to three times the sustainable rate, which is now calculated to be 263 000 m³ per year (URS Corporation 2003). At this rate, with insignificant systematic replanting, accessible forest will be exhausted by 2015. Such extensive logging, combined with poor practices, has resulted in enormous environmental and social costs which, although well known and sometimes documented locally (eg LaFranchi 1999), are rarely audited on a national scale.

International demand and prices for tropical timber are increasing and are set to continue to rise in the medium term (Adams 2004). In the long term, demand is also likely to remain high. In the face of increased vulnerability to flash floods, China has stated that it will continue to increase its forest cover, requiring it to import 60% more timber than it produces domestically.

Despite significant donor assistance (see Section 10.2), the Solomon Island Government (SIG) has been unable to effectively control industrial logging. At the same time, it has also become dependent on income from log exports, which now represents more than 80% of its total export earnings. The small-scale forestry sector has been largely unsupported and ignored by the government.

Government policy (SIG 2003a) is now to:

- > gazette the new Forestry Act 2004 and implement the Code of Logging Practice contained in the Act
- > continue the moratorium on issuing new logging licences
- > support family-based reforestation initiatives
- > encourage community portable and small-scale sawmilling and ecotimber production.

The SIG has resigned itself to the fact that accessible forest will be depleted within the next 10 years, for fear of costly legal disputes and compensation claims if it tries to rescind existing licences. Apart from the inevitable environmental and social costs, this policy by omission assumes that logging companies will lose interest and go home when the accessible sustainable timber runs out. Evidence from elsewhere suggests that this is unlikely, because, for established logging companies, the marginal cost of extracting another log is low and opportunities to go elsewhere are poor. Therefore, companies have used increasingly unscrupulous methods to gain access to 'inaccessible' forest.

10.2 MAJOR INITIATIVES AND ACTIVITIES

Before 1990, the British Government assisted research and plantation development in SI. Since then, the Australian Government has been the major donor for SIG forestry. Major projects include the SI Timber Control Unit (1991–95); the SI Forest Resource Inventory (1991–94); and the ongoing Sustainable Forest Management, which started in 1999 and was scheduled to finish at the end of 2004. While these projects have had a limited effect on small-scale forestry, they have mainly been concerned with managing large-scale logging through the SIG forest services (Fortech 1998, URS 2003). Most small-scale forestry initiatives have been supported by NGOs.

A few small, static sawmills were introduced into SI by churches in the 1970s. In the early 1990s, the number of mobile sawmills (particularly small, chainsaw-based ‘wokabauts’) increased rapidly to more than 700. Production rose to about 8000 cubic metres per year — still less than 2% of round log timber production. Most small sawmills did not last long, because of mechanical breakdown, low usage and the lack of overseas markets for the rough-sawn green timber. Despite debate over the impact and sustainability of wokabauts (Wyatt 1993, Evans 1997, Rosoman et al 1998, Tolfts 1998), most NGOs encouraged their use as an alternative to large-scale logging and — with appropriate environmental and management practices — as a sustainable income-earning opportunity for rural people.

A significant number of projects run by NGOs in SI aimed to provide technical and managerial training and support for the mills, improve environmental management (including by the drafting of codes of practice and national standards and criteria for certification) and assist the export of the timber in the burgeoning European ‘ecotimber’ premium markets. NGOs involved and major initiatives included (Evans 1997, Wairiu 2004):

- > Village Eco-Timber Enterprises, supported by the Ecoforestry Project, which is a joint initiative of Solomon Islands Development Trust, Greenpeace, the Foundation of the Peoples of the South Pacific and the New Zealand Imported Tropical Timber Group, and is still operating

- > the Solomon Western Island Fair Trade, which ceased in 2000
- > SOLTRUST
- > the EU-funded Isabel Sustainable Forest Management Project, which finished in about 1997
- > the Solomon Islands Eco-Timber Trust.

Even though these initiatives failed to have a significant impact on industrial logging, by the late 1990s SI had more forest certified by the Forest Stewardship Council than did its Melanesian neighbours. Returns from small sawmills were (and still are) significantly higher than logging royalties (Rosoman et al 1998). Unfortunately, because of the collapse of many NGOs and NGO-supported projects during the ethnic tension, the momentum of the 1990s has been lost. Kolombangara Forest Products Ltd (co-owned by Commonwealth Development Corporation and the SIG) is now the only forest operation currently certified by the Forest Stewardship Council.

An ODA-financed FAO initiative to develop a national Tropical Forestry Action Plan in the mid-1990s was abandoned because political support from the SIG was poor.

Logging licence holders are obliged to reforest one-third of logged-over land, but this is seldom done. Large areas of logged-over alienated and mostly customary land bear the scars of poor logging practices. Reforestation is a priority.

The NZODA-funded Custom Land Reforestation Program, which began in 1990, only achieved a small proportion of its target reforestation in Malaita and Isabel (Frizelle 1998).

The North New Georgia Sustainable Social Forestry and Rural Development Project (which began in 1999) is a relatively novel partnership initiated and managed by the Christian Fellowship Council (a local community church group) within a trust arrangement with The University of Queensland. The project is aimed at sustainable forestry, reforestation of logged-over land and income generation (Makim 2002). Despite its inception being severely disrupted by the ethnic tension, the project has built a community-run tree nursery

and has replanted more than 1000 hectares (P Dart, Principal Research Fellow, School of Land and Food Sciences, The University of Queensland, pers comm, August 2004). The use of an audited trust to oversee and manage the project is aimed at ensuring long-term financial independence and integrity. In turn, this will help the community to obtain funds to support the reforestation of the logged area and also to better manage the area's natural resources. It remains to be seen whether this model of ownership and management can be replicated elsewhere in areas of SI not managed by the Christian Fellowship Council, because the council can demonstrate a level of unanimity among its constituents that other churches and community based organisations may find hard to achieve (Makim et al 2002).

More recently, a 'teak boom' has produced very high demand for seed. Despite concerns about the silviculture (the care and cultivation of forest trees), suitability and short-term economic benefits of small teak plots, the forestry department has supplied seed and limited assistance to landowners who are keen to replant, perhaps concluding that any replanting is better than none.

10.3 CONSTRAINTS AND OPPORTUNITIES

There is a comparative 'service vacuum' for small sawmill operations in SI.

Good opportunities exist to support and build on the initiatives, experience and expertise of NGOs in sustainable forest management that developed during the 1990s.

Price premiums and significant niche markets for ecotimber exist in New Zealand and Australia. Higher premiums exist in Europe for timber certified by the Forest Stewardship Council. Certification by the council is comparatively expensive, but cheaper and more appropriate group certification systems have now been developed in PNG and elsewhere. Ecotimber can be produced using less stringent environmental and management auditing. Reforestation is a prerequisite of Forest Stewardship Council certification.

The teak boom suggests that there may be good opportunities for renewed efforts at community based reforestation, but management models need to be evaluated.

The Forestry Act 2004 has not yet been gazetted. Demand in the small-scale subsector is focused on three species of timber (rosewood, vasa and kwila), but these species are protected from export logging under the Act (URS 2003).

11 Livestock

11.1 BACKGROUND

Pigs and chickens are an important part of traditional agriculture. Pigs are used for ceremonies, feasts and bride price, and more than 90% of households own some pigs during the year (de Frederick 1971). Scavenging chickens are ubiquitous in SI villages and an important source of protein from eggs and occasionally meat. In contrast, cattle are less important, being confined mostly to plantations and missions for commercial production. Before the ethnic tension, most households had an average of one to five pigs, and about half had between five and 20 chickens. In contrast, less than 10% of households had cattle, which were used mostly for controlling undergrowth in coconut plantations (Mackay 1989, SIG 2002).

The livestock industry in SI is currently worth about SI\$10 million per year. Demand for meat is estimated to be four times greater than current supply.

In 1999, there were about 500 beekeepers in SI, with 2000 hives producing approximately 75 tonnes of honey. Of this total, 35 tonnes were exported (SIG 2002).

11.2 MAJOR INITIATIVES AND ACTIVITIES

Cattle were first introduced to SI in the late 1800s to graze on large coconut plantations. Numbers peaked at about 25 000 head in the late 1970s, but have declined steadily since and were drastically reduced during the ethnic tension. Currently, there are less than 5000 cattle in SI. The remnants of DAL's breeding stock were moved to Gizo in Western Province, where the stock has been further depleted in quality and quantity because of inbreeding and theft, respectively.

The Cattle Development Authority was created in the late 1970s with assistance from Asian Development Bank (ADB) to increase domestic and possibly export production. With additional assistance from the Australian International Development Assistance Bureau (now AusAID), the authority became the Livestock Development Authority in 1984 in order to handle the commercial side of the livestock industry, including breeding, feed production, slaughter and export marketing. The authority was restructured and corporatised in the early 1990s after most donor funding finished. Eventually, it collapsed in the late 1990s because of longstanding problems with management and cash flow.

The authority built a feed mill in the 1980s, providing valuable feedstock to growers by using locally sourced byproducts, such as copra meal, fish cake, mill run and rice bran, supplemented by some vitamins. The mill was destroyed during the ethnic tension and has not been replaced. Wheat-based mill run can be bought from the reopened Fielders mill.

In the 1980s, the Cattle Under Trees Project funded by the Australian International Development Assistance Bureau on Kolombangara, Western Province aimed to combine beef and timber production by planting improved tropical pasture under plantation timber species on logged-over land, but production of both failed to meet expectations and the model was not adopted elsewhere.

Funding and support for veterinary services in SI was primarily provided by the ODA until the 1990s. SI is currently without a vet.

Donor-funded projects involving pigs have included studies of local production systems and breeds (de Frederick 1971) and improvements in feed quality for semicommercial, village-based crossbred pigs (Thorne 1989).

Donor-assisted research on chickens by DAL focused on medium-sized operations, but from the 1980s the emphasis moved towards smaller operations. This included feed analysis, trials on hybrid broilers and evaluations of village-based systems.

Through Micro Projects, the EU currently provides support for 25 poultry projects, worth a total of SI\$0.75 million, and 22 pig projects worth nearly SI\$0.8 million, as well as SI\$175 000 for a provincial butchery.

European honeybees were introduced to SI by missionaries. From 1988 to 1999, NZODA successfully encouraged and supported beekeeping and honey production through a number of projects that provided technical training in production and processing, helped develop supply chains via a cooperative and producer association, and assisted with market development. The SI Honey Producers Association infrastructure near Honiara was destroyed during the ethnic tension. Production of honey around the country has fallen because of the ethnic tension and loss of markets, and the introduction of a bee mite and the Asian honeybee.

11.3 CONSTRAINTS AND OPPORTUNITIES

The commercial development of cattle, pigs and chickens in SI is constrained by three common factors:

- > *Breeding stock* — The genetic quality of cattle, pigs and, to a lesser extent, chickens is declining in SI because of depletion of stocks, lack of new breeding stock and subsequent inbreeding. There is an urgent need to import breeding stock from overseas to improve quality and critical breeding numbers.
- > *Quarantine* — Livestock in SI is free from most major diseases that affect performance and trade elsewhere (Martin and Epstein 1999). However, there are currently no government quarantine facilities to help protect existing livestock and screen the introduction of new breeding stock from overseas.

- > *Feed* — Commercial development of livestock, especially pigs and chickens, is generally constrained by a lack of appropriate and affordable feedstock because of the absence of a feedstock mill and the high cost of imported feed. Limited opportunities exist to use locally sourced ingredients (such as leafy legumes) to supplement feeds, but some centralised feed mill capacity is needed for production and distribution.

11.3.1 CATTLE

Demand for beef, and consequently its price, is high, especially in the major urban areas of Honiara, Gizo, Noro and Munda. The abattoir in Honiara (the only one in the country) was destroyed during the ethnic tension. Basic slaughterhouses in the provinces supply carcasses packed on ice to Honiara, but proposed new legislation will make this practice illegal. Use could be made of trained meat inspectors in SI if the slaughterhouses were upgraded with refrigerated storage facilities. The dual use of cattle to control weeds under coconut palms and for breeding and meat stock is still possible for plantations in SI. However, smallholder cattle production is problematic, because smallholders are too small and isolated to maintain herd size and genetic quality, and these problems are compounded by poor transport and communication.

11.3.2 PIGS

The ceremonial role of pigs tends to disrupt supply, making commercial operations difficult. Opportunities for improving smallholder pig production are high because of the animals' long history and integration into existing agricultural systems, high reproductive rates and lack of major disease, high demand for meat, and their ease of transport (compared with cattle). However, a lack of improved feed and over-reliance on copra as a primary feed for tethered pigs results in excessively fatty meat. Further work is therefore required on the production and use of locally produced leafy legumes as low-fat protein supplements for pigs.

11.3.3 CHICKENS

Demand for chickens and eggs are high in urban areas, providing a good market opportunity for semi-intensive broiler and layer units in surrounding areas. The main constraints to increasing poultry production are the lack of a clear model for enhanced subsistence production and the need for improved feed for hybrids.

11.3.4 HONEYBEES

Beekeeping for honey production is an appropriate smallholder activity in SI, and there is proven potential to produce a reasonable amount of honey (Frizelle 1997). Significant surpluses can be sold overseas in premium niche organic markets. The main constraints to restoring and increasing production are start-up costs (between SI\$1000 and \$5000), excessive rainfall (which limits flying and lowers honey quality), the availability of new queens, and the impact of Asian bees and mites.

12 Inshore fisheries

12.1 BACKGROUND

Most villages are coastal and rely heavily on marine resources as a source of food and cash to buy essential items, such as fuel and food. This reliance has been exacerbated by unscrupulous Asian buyers and poor exchange rates.

SI has relatively well-developed offshore and inshore tuna fisheries, with management advice and enforcement delivered through the Forum Fisheries Agency and the SPC.

The Department of Fisheries and Marine Resources National Development Plan 2003–2006 (Fisheries Sector) outlines activities to concentrate on:

- > promoting aquaculture of seaweed, pearls, giant clams, prawns etc (an aquaculture section was created, headed by a deputy fisheries director and with four staff)
- > initiating national management, conservation and sustainable use of coastal and aquatic living resources
- > reviewing existing and formulating new fisheries legislation and management plans, including a specific subsection for aquaculture.

12.2 MAJOR INITIATIVES AND ACTIVITIES

The following list summarises past and present major initiatives and activities of the SI inshore fishing industry:

- > SI had a long history (since the 1800s) of trading in bêche-de-mer (sea cucumber), trochus and pearl shell, green snails and shark fin.
- > SI banned the export of turtle shell, crayfish and coconut crab as a conservation measure.
- > A ban on the export of wild giant clams supported an ICLARM (now the WorldFish Center) project to develop hatchery techniques and farming methods, with resulting exports of farmed giant clams. Farming was successful, but is now halted.
- > A ban on the export of pearl shell in 1993 aimed to increase wild stock and reproductive potential. ICLARM used this opportunity to initiate the ACIAR-funded project 'Development of small-scale village farms for black lip pearl oysters in Solomon Islands using wild spat'. The demonstration farm was successful, but the project is now halted.

- > SI banned the export of sandfish (a valuable species of sea cucumber) to try to prevent a collapse of this stock. ICLARM used this opportunity to initiate a (successful) project to look at the culture of three of the most valuable commercial species, with a view to on-growing and release trials at the village level. The project was halted because of ethnic tension and transferred to New Caledonia.
- > Prawn farming was successful and expanded to supply local market, with major output exported. The facility was destroyed during ethnic unrest and the industry is halted.
- > Seaweed farming was initiated in late 1989 by ODA, but failed because of grazing by herbivorous fish, inadequate drying procedures and the closure of the processing company. Interest in seaweed farming revived in 1999 and in 2002 after the ethnic tension subsided. The industry became part of the EU-funded Rural Fishing Enterprise Project and proved successful, quickly growing in the absence of other available alternatives for villagers (SPC 2003), and is continuing. There are plans to expand the industry to increase volume.
- > The EU funded the Rural Fishing Enterprise Project to develop an inshore fishery for snapper. The project is halted.
- > A private exporter ships ornamental marine fish and invertebrates.
- > Continued export of marine products, in the absence of alternative exports, has led to severe depletion of resources and the lifting of the ban on sandfish and wild giant clams.
- > Export of live reef food fish by Asian operators has occurred in the past, but the industry is currently believed to be inactive.
- > Coral farming initiated by ICLARM resulted in the export of cultured coral. This is ongoing, and is now coordinated by the Solomon Islands Development Trust and funded through the Foundation of the Peoples of the South Pacific International, based in Fiji.
- > The effect of fishing closures on stock revival is being studied at the Marine Conservation Area in Anarvon Islands. The project is funded by the Nature Conservancy and coordinated through the Department of Environment and Conservation.
- > Funding from the EU and NZAID is being sought to commercialise black pearl farming. A demonstration farm exists and four small crops of pearls have been produced.
- > ACIAR Post Larval Reef Fish Project phase II aims to disseminate knowledge to SI and the Pacific region on the capture and culture of postlarval reef fish.
- > The International Waters Programme of the South Pacific Regional Environment Programme aims to address the underlying causes of coastal water degradation by creating programs that target sustainable coastal fisheries.
- > Most WorldFish Center research and projects were cancelled or severely disrupted by the ethnic tension when the headquarters near Honiara was destroyed.

12.3 CONSTRAINTS AND OPPORTUNITIES

The following list summarises the main constraints and opportunities for the SI inshore fishing industry:

- > Fisheries legislation, including aquaculture, has not been updated, but will be in the near future.
- > Logistics are problematic:
 - domestic flights do not go to all areas, have limited freight capacity, and are constrained by fuel shortages
 - international flights have limited capacity for large freight volumes
 - inter-island shipping has become infrequent and unreliable
 - poor telephone coverage causes reliance on high-frequency radio, which is much less immediate.

- > The knowledge base in government is restricted (there is a need to develop project-specific capacity).
- > Project participants at the village level lack funding for equipment.
- > The economy needs stability to encourage local and overseas investors.
- > Population and government are eager for any economic opportunities.
- > Assistance to complete legislation would remove a large development bottleneck.
- > Coordination of existing projects and discussion with other donors on new projects are needed.
- > Requirements for projects include:
 - control of buyers of marine products (set price structure, quality, export tax etc)
 - information to producers on value adding (eg optimal processing of shark fin, sea cucumbers, seaweed)
 - coordination of marine exports (fund fisheries officers to track exports and ensure operator compliance)
 - transfer of technology (eg aquaculture and underused freshwater resources).

Appendix 5.1

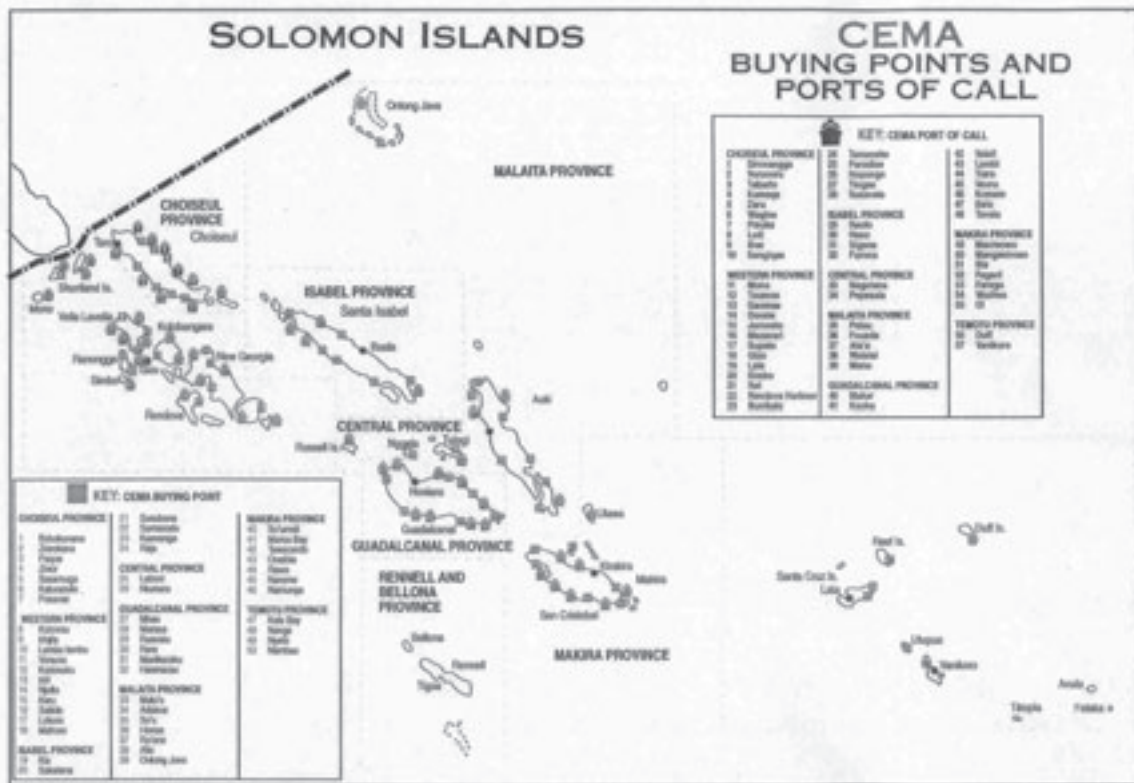
Key national demographic indicators

KEY INDICATOR	VALUE
Total population	409 042
Intercensal annual growth rate	2.8%
Sex ratio (males per 100 females)	107
Life expectancy at birth (years)	61.1
males	60.6
females	61.6
Infant mortality rate (deaths before age 1 per thousand live births)	66
Crude birth rate 1999 (births per thousand population)	36
Crude death rate 1999 (deaths per thousand population)	9
Rate of natural increase 1999 (per thousand)	27
Total fertility rate (1997–99)	4.8
Number of households	65 014
Average household size (people)	6.3
Population aged 14 years and over, doing paid work	57 472 (23%)
males	39 761 (31%)
females	17 711 (15%)
Population aged 14 years and over, looking for paid work	27 652 (11%)
Population aged 14 years and over, doing unpaid work	111 328 (45%)
Self-reported literacy, population aged 15 years and over	77%
males	84%
females	69%
Children aged 5–19 years attending school	56%
males	58%
females	54%
Disabled population	2.7%
Population using bednets	53%
Population displaced due to ethnic tension (1999)	35 309
Household amenities	
access to modern toilet facility	23%
access to SIWA/RWSS water supply	61%
households with electricity	16%
households with working radio	41%

Source: SIG (2002).

Appendix 5.2

Former CEMA network of commodity buying centres around Solomon Islands



Appendix 5.3

Past and present SI agriculture projects supported by the Australian Centre for International Agricultural Research

BILATERAL PROJECTS (CONCLUDED)	
Agricultural development policy	
ADP/1994/005	A bioeconomic analysis of tuna purse seining in the Pacific Islands region
ADP/1998/094	Sustainable management of the live reef fish trade-based fishery in Solomon Islands
Agricultural and natural resource economics 1	
ANRE1/1996/224	Participatory planning and management of resource development in Vanuatu
Animal sciences 2	
AS2/1989/013	Ecological and host-genetic control of internal parasites of small ruminants in the Pacific Islands
Crop sciences 1	
CS1/1982/004	South Pacific root crops
CS1/1984/033	Pathogen-tested sweet potato germplasm for the South Pacific
CS1/1988/012	Virus-free germplasm of sweet potato
CS1/1988/031	Virus-like diseases of coconut palm
Crop sciences 2	
CS2/1992/826	A guide to the aphids and associated biota of the South Pacific
CS2/1994/003	Identification of pest fruit flies in Vanuatu, Solomon Islands and Federated States of Micronesia
CS2/1995/034	Integrated control of lantana taxa in Australia and the South Pacific
CS2/1996/148	Survey of <i>Bemisia tabaci</i> biotype B whitefly and its natural enemies in the South Pacific
Economics and farming systems	
EFS/1985/006	South Pacific farming systems
EFS/1988/023	Economics of giant clam (Tridacnid) mariculture
Fisheries	
FIS/1985/043	Research on baitfish biology in Solomon Islands, Maldives and Papua New Guinea for the tuna industry
FIS/1990/003	Research on baitfish in Solomon Islands, Kiribati and Fiji for use in the tuna industry
FIS/1991/031	Pacific Island pearl oyster resource development
FIS/1993/004	Application of underwater visual census to assessing coral reef fish stocks in the tropical Pacific
FIS/1994/117	Use of protected marine areas to restore and manage tropical multispecies fisheries
FIS/1995/042	Large-scale village grow-out trials for giant clams
Forestry	
FST/1991/014	Nutrition and mycorrhizal requirements of tropical trees for plantation and agroforestry systems
FST/1995/103	Ecology and control of tip moths feeding on red cedar and allied forest trees in the Meliaceae: review workshop
FST/1996/085	Nutrition of tropical hardwood species in plantations in the south-western Pacific

Impact assessment program	
IAP/2001/057	Access and use of agricultural statistics in the Pacific
MULTILATERAL PROJECTS (CONCLUDED)	
Fisheries	
FIS/1993/720	A collaborative investigation of options for spat collection and hatchery production of pearl oysters in the central western Pacific
FIS/1995/703	Development of methods for mass rearing of tropical sea cucumbers for the purpose of enhancing wild stocks
FIS/1996/235	Development of small-scale village farms for blacklip pearl oysters in Solomon Islands using wild spat
FIS/1998/013	Development of new artisanal fisheries based on the capture and culture of postlarval coral reef fish
Forestry	
FST/1996/187	Electronic compendium for forestry in the Asia–Pacific region
FST/1995/103	Ecology and control of tip moths feeding on red cedar and allied forest trees in the Meliaceae: review workshop
BILATERAL PROJECTS (CURRENT)	
Agricultural systems economics and management	
ASEM/2001/036	Maximising the economic benefits to Pacific Island nations from management of migratory tuna stocks
Fisheries	
FIS/1997/031	Pearl oyster resource development in the western Pacific
FIS/2001/075	Sustainable aquaculture development in Pacific Islands region and northern Australia
Forestry	
FST/2002/010	Domestication and commercialisation of multipurpose indigenous trees and shrubs for food and other products in Papua New Guinea, Solomon Islands and Queensland: a feasibility study with special reference to <i>Canarium</i> nut
MULTILATERAL PROJECTS (CURRENT)	
Crop protection	
CP/2001/068	Technical support for regional plant genetic resources development in the Pacific
Fisheries	
FIS/1999/025	Optimal release strategies for restocking and stock enhancement of the tropical sea cucumber, sandfish (<i>Holothuria scabra</i>)

Appendix 5.4

Details of specific pest and disease problems of the past 50 years in Solomon Islands

COCONUT

Work on coconut dominated entomological research until the destruction of the Dodo Creek Research Station in 2000. Early work by Lever and Brown on premature nut fall caused by the coreid bug, *Amblypelta cocophaga*, was one of the first examples of biological control in the region. The strategy was to use the green tree ant, *Oecophylla smaragdina*, to disturb the bug from feeding and prevent them from injecting a toxin that causes young nuts to fall.⁹ However, the initial problem was to rid the *Phiedole* or *Iridomyrmex* palms of their existing ant colonies, and replace them with the 'beneficial' *Oecophylla*. This was not easy, and was only achieved in the 1960s by Jim Stapley using a mixture of dieldrin and herbicide (and only for one species, the ground-nesting *Phiedole*). Ironically, the problem was solved in the mid-1980s following the accidental introduction and spread of *Wasmania auropunctata*, a fire ant, from PNG. This ant arrived in the mid-1960s and is now found throughout SI. It is a nuisance because of its sting, but is not a crop pest. It is often referred to, unfairly, as 'Agriculture Ant', as it is thought to have been introduced to control nut fall, breaching quarantine.

Amblypelta was not the only target of entomologists. *Brontispa longissima* causes considerable damage to the young fronds of coconut while they are still furled, and the *Tetrastichus* parasitoid was brought from Samoa to control it in Levers' plantation, Yandina and elsewhere. Extensive research has also been done on *Scapanes*, a dynastid beetle that bores into the heart of coconut palms and often kills them. Young plantations in the western provinces are severely affected, although the beetle occurs throughout the country. Thus, establishing or re-establishing plantations can be a problem. Control was achieved using the insecticide benzene

hexachloride (now banned), but attempts to use the biological controls for *Oryctes* (baculovirus and *Trichoderma* fungus) were not successful, although Bob Macfarlane tried after finding breeding sites at Mt Austin near Honiara, which made the research logistically easier. There were also comparisons of different coconut varieties to find those that grew quickly, reducing the time during which the palms were susceptible to attack. Attempts to use the pheromone being trialled in PNG have not been made.

Apart from these major problems, there have been occasional outbreaks of the stick insect, *Graphea*, as well as the palm moth, *Agonoxena*, which is usually controlled by natural enemies that have also been introduced successfully in other Pacific Island countries. There is also a longstanding problem of low-bearing palms at Lata, Santa Cruz, associated with the shield bug, *Axiagastus cambelli*.

The establishment of the Dodo Creek Research Station in the early 1970s saw much activity on the Guadalcanal Plains, with rice and oil palm and later coconut and cocoa replanting. The station was well placed and intended to assist these developments. Oil palms grew well without major problems, although there was a scare in 1972 when a shipment of seed from West Africa was found to have *Fusarium oxysporum* and, as a precaution against it being the lethal wilt strain, plants in the nursery were destroyed. Occasional outbreaks of bagworm were controlled by lead-based insecticides, and attacks by rats. Cocoa grew well and was without the problems that plagued the crop in wetter areas, such as *Phytophthora* black pod and *Pantorytes* borer. David Friend established varietal trials at Black Post, near the field station, and endeavoured to maintain extensive trials at Dala.

⁹ The coreid bug also causes problems in cassava, and severe dieback of *Eucalyptus deglupta* and other species, resulting in stunted, branched growth rather than tall trees — a problem investigated by Mike Bigger on Kolombangara for two years in the early 1980s.

RICE

In contrast, rice pests were considerable. Rice had been tried as a smallholder crop long before it was grown in paddies on the Guadalcanal Plains. Its development as a dryland crop was set back by armyworm (*Spodoptera litura*) and by the brown plant hopper (*Nilaparvata lugens*) when grown as paddy. There were also huge logistical problems associated with milling. On the Guadalcanal Plains, which lack a grassland ecology, problems were enormous. The brown plant hopper dominated the work of government and company entomologists, and there was assistance from the International Rice Research Institute (IRRI). Overlapping generations of the hoppers from staggered plantings meant that they were always present, controlled only by relatively resistant varieties and frequent applications of systemic pesticides. However, new biotypes developed that had not been detected previously by IRRI scientists, and the resurgence in insect numbers after the use of insecticides that eliminated natural enemies had also not previously been seen to the same extent.

These problems, combined with highly mechanised production practices and yields below projections meant that the enterprise was unlikely to succeed financially. Hence, there was little incentive to re-establish the plantings after the destruction caused by Cyclone Namu in 1985. In recent years, there has been a return to smallholder rice production, perhaps ignoring the lessons of the past. Somewhat incongruously, smallholder rice production is the only work of DAL, because the department receives funding from Taiwan.

FINANCIAL AND RESEARCH ASSISTANCE

From the mid-1970s onwards, there was less need for government assistance to the companies developing the Guadalcanal Plains. Levers had established a joint research program earlier (to produce a high-yielding hybrid), and the Commonwealth Development Corporation and Solomon Islands Plantation Ltd (oil palm) and BSA (rice) had their own research divisions. This gave the government entomologists more time to investigate the problems of smallholders. Research examined

the control of the taro beetle (*Papuana* spp.) using insecticides; on sweet potato weevil (*Cylas formicarius*) using insecticides and a pheromone produced by AVRDC (the World Vegetable Center); and attempts to control diamondback moth of head cabbage. A useful book for smallholders was written by Bob Macfarlane. When the Pacific Regional Agriculture Programme (PRAP) began in 1987, it was logical that the work on *Papuana* beetle was established at the Dodo Creek Research Station (although PNG was always keen to host the project). Thirteen years later, much information on the biology of the beetles had accumulated and biocontrol strategies using viruses, fungi and nematodes were tried, but there have been few solutions for subsistence growers.

PRAP was an acknowledgment that most countries of the region could not, for various reasons, carry out agricultural research independently, and that a collaborative approach could bring substantial gains. The Secretariat of the Pacific Community (SPC) had realised a few years before that a new change of direction was required, and the regional fruit fly project was a result. This project spanned a decade, and SPC still retains expertise in Suva. Solomon Islands benefited from having a volunteer at the Dodo Creek Research Station who, among other concerns, looked into ways of controlling the melon fly that had entered the country from PNG in the 1980s. The fly remains a problem of cucurbits.

From the outset, plant pathology looked at problems of cash and subsistence crops. The responsibility of the first pathologist, Grahame Jackson, was to research *Phytophthora* diseases of taro and cocoa. Assistance was provided under New Zealand aid for visits by Frank Newhook of Auckland University, an expert on such diseases. Apart from research into cocoa, taro and other crops, surveys (of fungi and viruses) were done and published. For the first four years, the division was at Dala Experiment Station, after which it was relocated to the Dodo Creek Research Station.

COCOA

The pests and diseases of cocoa have been well researched and documented. Appropriate controls are known for *Pantorytes* borer, *Corticium* pink disease, *Marasmius* horse hair blight and *Phellinus* brown root rot, as are measures to reduce *Phytophthora* black pod disease using resistant varieties, copper fungicides or hygiene measures (frequent removal of diseased pods). The research also identified the many sources of black pod inoculum, increasing the understanding of the epidemiology of the disease in SI. Varietal tests on the Sabah hybrid collection showed that Levers and others had, fortuitously, selected Na33 x Amelonado, the clone most resistant to canker (and, most likely, black pod).

TARO

In contrast, control of the *Phytophthora* leaf blight of taro was more problematic. The disease first appeared in Choiseul in 1949, after spreading from PNG. By the time work started on the disease in the late 1960s at Dala Experiment Station, most susceptible varieties had been eliminated because they were too difficult to grow, and those that remained showed little difference in resistance. Tests with fungicides found that frequent applications of copper fungicides, applied by motorised knapsack sprayer, or drenches of metalaxyl, a systemic (and expensive) product, were needed to control leaf blight. Neither measure was relevant to growers, even to those who sold excess to household consumption at local markets. There was also a misunderstanding on the importance of the crop (which distorted the allocation of research resources), and while research concentrated to a great extent on taro (leaf blight, viruses, nematode rots, storage rots, *Papuana* beetles), sweet potato supported more than 75% of the population. It was never likely that taro would regain its significance in coastal areas even if solutions to leaf blight were found. The intensity of agriculture in these areas with potassium-deficient soils precluded taro as a main staple, and in the highlands, taro leaf blight was not a problem.

Nevertheless, taro leaf blight research continued, and alternative approaches to control in SI in the late 1970s were supported under a regional root crops project funded by the United Nations Development Programme and the Food and Agriculture Organization of the United Nations (FAO). Volunteer plant breeders were recruited and considerable efforts were made to produce plants resistant to taro leaf blight as well as diseases caused by viruses and nematodes. Unfortunately, success was marred by discontinuity of funding, and only one leaf blight resistant clone was released. However, the work laid the foundation for the successful breeding program at the University of the South Pacific under TaroGen, which began in 1998 after taro leaf blight destroyed the crop in Samoa in 1993 and put several other countries at risk. This work continues today.

In higher, inland areas, alomae — a lethal virus disease — is the greater threat, especially on Malaita, where inland villages are still numerous and where taro remains the only cash crop. Much research has been done on this disease (known only from SI and PNG), the various viruses found associated with it, and the likely vectors. Work began in SI in the late 1960s and continues under regional efforts supported by the SPC, ACIAR (QUT) and others. There is a regional need to ensure that taro transferred from germplasm centres has been adequately indexed for all the viruses of taro found in Pacific Island countries. From this research, there is now a good understanding of the diseases.

YAM

Other root crops have received attention, although small in comparison to taro. Yam collections have been made, first at Dala, then at the Dodo Creek Research Station, and more recently at Fote Field Station (under a subregional South Pacific Yam Network, SPYN). These collections identified varieties of *Dioscorea alata* with resistance to *Colletotrichum* dieback, and also produced interesting results from studies on the cause of the sudden blackening of the leaves during *Colletotrichum* epidemics. Unfortunately, the yam varieties were not sent to the SPC for safekeeping as agreed and may have been lost, although some

are retained at Dala training centre. Similarly, collections of sweet potato are no longer available, although they were screened for resistance to witches' broom mycoplasma, an occasionally serious disease on the Guadalcanal Plains, and elsewhere where there are seasonal long dry periods (eg Santa Ana). Witches' broom mycoplasma is also present in PNG, particularly in the Port Moresby area. In contrast, cassava is relatively free from pests and diseases in SI, although the fungus *Fomes* sometimes causes root rots, and a previously undescribed virus for cassava was recorded from Choiseul, probably spread by nematodes. People were advised to pull out and burn affected crops, and this seemed to prevent the spread

OTHER DISEASE OUTBREAKS

At various times, there have been disease outbreaks that have caused considerable concern. Seed of oil palm from West Africa with *Fusarium oxysporum* has been mentioned. A second was the identification of *Marasmiellus cocophyllis* in Yandina in 1978, coinciding with a major replanting program of coconut hybrids on the Guadalcanal Plains. Reports from East Africa indicated that the fungus caused a lethal bole rot of coconut. The result was a quarantine embargo until treatments of nuts from the Russell Island plantations ensured that they were free from the fungus. This considerably delayed the replanting scheme. Later, there were doubts that the fungus found on coconut in East Africa was the cause of the disease ascribed to it; this was supported by research in SI, which showed that the fungus was unlikely to be of concern. A third disease outbreak was associated with a sclerotium-forming fungus, *Sclerotium hydrophilum*, which destroyed large areas of BSA rice. Its similarity to stem rot diseases in Asia required investigation, which found it to be secondary to attack by brown plant hopper.

Finally, the discovery on the Guadalcanal Plains in the late 1980s of a viroid in coconut similar to cadang-cadang, a slow but lethal disease of coconut in the Philippines, had major repercussions, especially when it was found that viroids were present throughout the region and also in other palms (eg genetic orange spotting of oil palms)

and associated weed species. Guidelines produced by the FAO and the International Plant Genetic Resources Institute on the international transfer of coconut at the time suggested that movement should be restricted to indexed embryos. This was not only contentious, but also difficult to do, because there were few centres in the world where it could be done. The matter was resolved some years later when pest risk analyses suggested that the viroids, although similar to cadang-cadang, were sufficiently different for the quarantine restrictions to be unwarranted. This was bolstered by the fact that they did not cause disease. Therefore, they were not 'pests' by the accepted definition. Not all scientists were convinced by the logic, but the wisdom of the decision will have to await the passage of time. The appearance of diseases of coconut associated with viroids — cadang-cadang in the Philippines, *tinangaja* in Guam, and a lethal disease of betel nut in the Reef Islands — suggests that recombinations of viroids occasionally occur to produce aggressive forms, and that assisting this hybridisation with transfers of viroid-infected germplasm from diverse locations might not be sensible.

Occasionally, farmers complain about rats, and there is no doubt rodents are a major pest in artificial islands (in lagoons of Malaita) and other locations. However, research into rat damage of sweet potato over several years at Dala found that damage was directly related to yield, and in most instances only a small percentage of the crop was affected. In cocoa, the situation is different: if rats are not controlled, yields can be very low. Rat control in trials at Dala was just as important, or more important, than control trials for black pod. Methods of rat control using warfarin (or other rodenticides) in wax blocks have been well documented.

Much less attention has focused on weeds and their control. Surveys, funded by ODA were made in the late 1970s, funded by the Overseas Development Administration, British Government (ODA, now the Department for International Development), but little has been done since. Biological control of Koster's curse was attempted using a thrip (a sap-feeding insect), but failed. Weed surveys have not been done in SI for the past 30 years, although they are scheduled under SPC assistance, as are surveys for other pests.

Appendix 5.5

Cash crop budgets

Table 5.5.1 Summary of findings^a from crop budget analyses

Crop	Farm gate price (\$/kg)	Average maximum yield/ha ^b	Years to positive net cash income ^c	Average return to labour/day ^d (\$)	FIRR labour costs (%)	
					Excluded	Included ^e
Existing 20-year-old coconuts with half-share in new drier ^f	0.45	550	2	7	>50	17
1 ha local tall coconuts without fertiliser ^f	0.45	550	7	7	18	Negative
1 ha hybrid with fertiliser ^f	0.45	1500	6	10	21	8
1 ha cocoa (wet bean)	0.65	2500	4	13	>50	32
1 ha cocoa (dry bean)	1.32	1000	4	8	38	16
1 ha rehab cocoa (wet bean)	0.65	2250	2	14	>50	>50
1 ha rehab cocoa (dry bean)	1.32	900	3	9	>50	>50
Honey producer (10 hives)	1.50	40kg/hive	2	34	18	12 ^g

FIRR = financial internal rate of return; ha = hectare

- a Caution should be exercised in interpreting these findings; refer to main text and assumptions listed in Annex 3.2 in EU (1993). Annex 3.2 also includes a number of rudimentary sensitivity analyses
- b Not to be confused with yields under research or fully commercial conditions
- c Excludes any labour costs
- d Average of first five years after achieving positive cash income
- e Labour costed at \$3/day
- f These estimates do not include any allowance for coconuts used for subsistence purposes
- g Labour at \$4/day

Source: EU (1993).

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