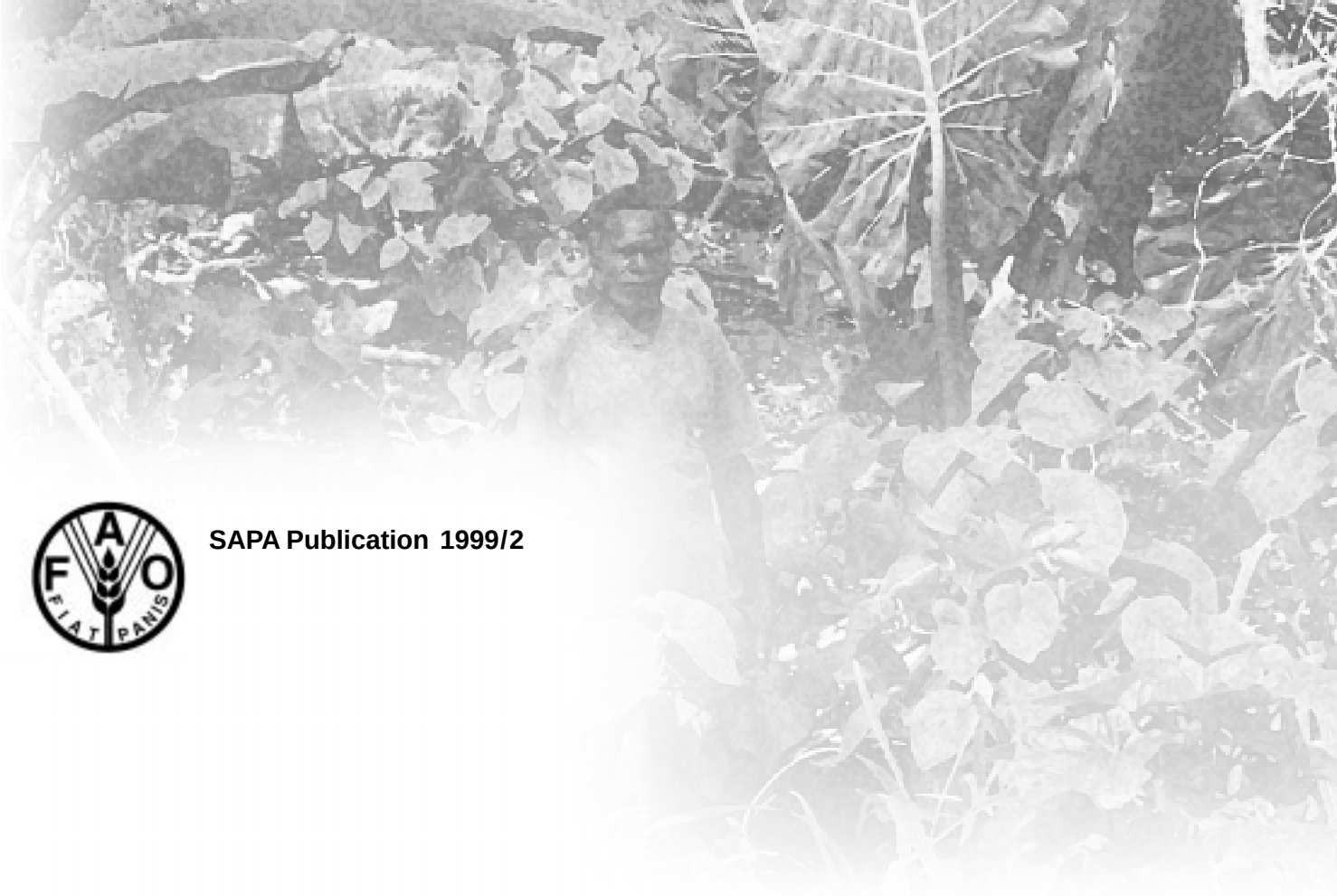

SAPA Publication 1999/2

Linking market development to farming systems in the Pacific Islands

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Foreword

Developing commercial markets based on traditional farming systems is one of the many challenges for agricultural sector planners, heads of agricultural departments, experts of technical support agencies in the South Pacific Island Region. Often too little attention is given by agricultural policy makers to past experiences – both failures and successes.

As a step forward in addressing the topic of improving agricultural marketing and markets, FAO convened a "FAO Regional Workshop on Improved Agricultural Marketing Development" held in Apia, Samoa, in April 1999.The workshop covered three major topic areas, namely:

- how to overcome constraints to efficient marketing by focusing more attention on the provision of marketing extension services, timely market information and adequate market infrastructure;
- requirements for export market development with regard to quarantine, effective post-harvest handling, and the opportunities and threats Pacific Island States are facing on international markets; and
- how to promote the development of sustainable market-oriented production systems, by way of overcoming socio-economic constraints and furthering production skills and capacity building.

This publication is based on a report prepared as a background paper for above workshop and has been revised taking into account the conclusions and recommendations developed during the course of the workshop's deliberations. It is one of two publications resulting from the workshop. The other is entitled "Agricultural Marketing in the South Pacific" (SAPA Publication 1999/1).

The paper is based on examples taken from field work carried out in Fiji and Vanuatu. It shows that for the vast majority of farmers expanding domestic market sales provides the best opportunity to increase incomes. Apart from the traditional commodities, agricultural exports have contributed relatively little to the wellbeing of most farm households (Tonga may be taken as an exception). While some growth in exports can be expected, the paper concludes that this will be the situation for the foreseeable future.

It is to be hoped that this paper will be of value for governments, international organisations, the private sector and non-governmental organisations in planning future activities aiming at improved market orientation of farm households in the Pacific Islands region. FAO believes that the publication can make a positive contribution towards improving rural incomes and employment opportunities by expanding market sales of agriculture products as well as also to improved national food security. Thus, it will contribute to sustainable economic development in the Southwest Pacific.

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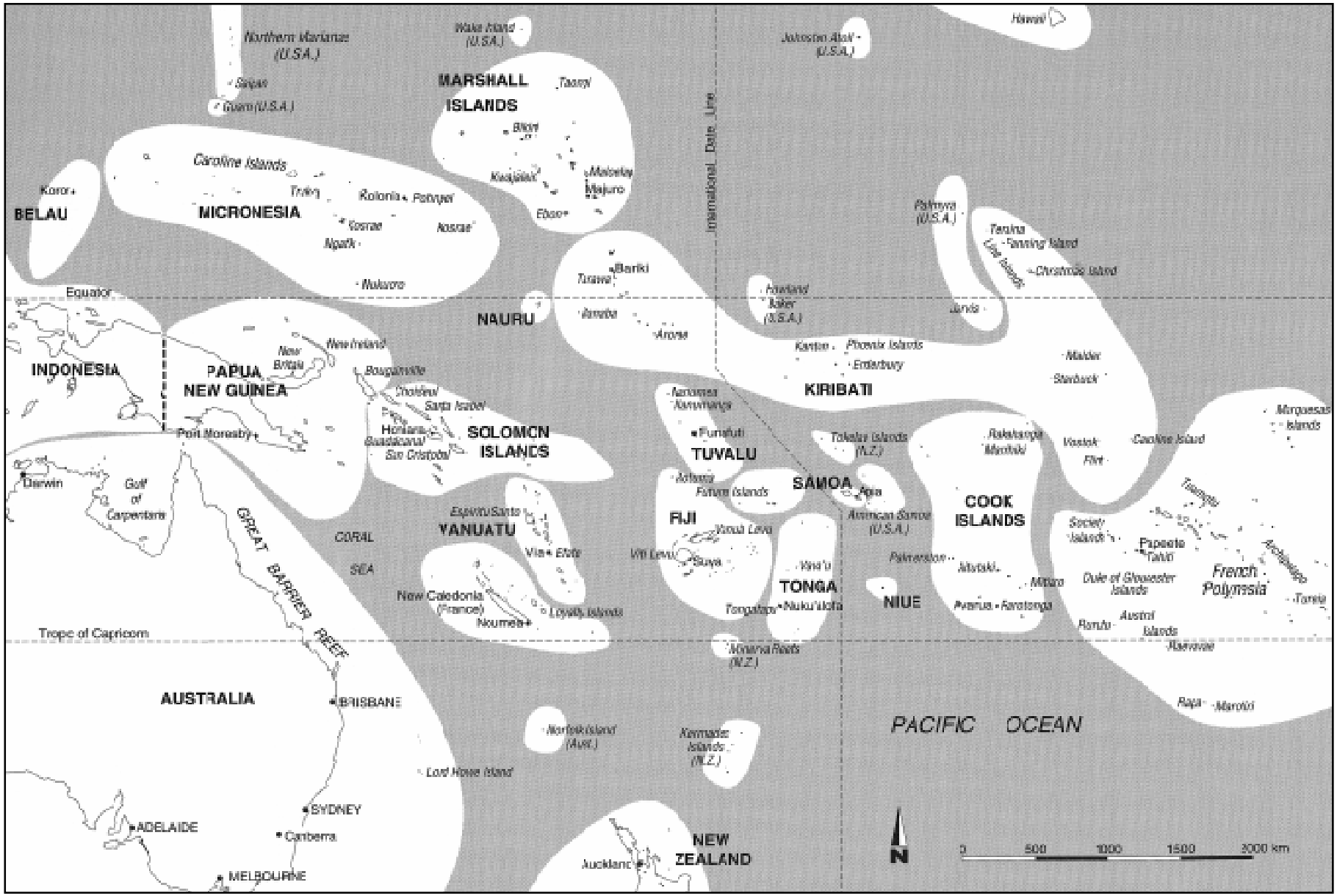
Acknowledgements

This publication is seen as relevant to all the Pacific Islands, although it emphasizes the situations of Fiji and Vanuatu. This stems from the author's particular familiarity with the agriculture of these two countries. Since the early 1970s he has worked in Fiji in various research, planning, and consultancy capacities, as well as a produce grower, trader and exporte. While his association with Vanuatu has been more recent, this has been the focus of the author's research and consultancy work in recent years. He recently co-ordinated the production of a series of Land Use Profiles for the Vanuatu Land Use Planning Project. This publication has been has been able to draw on these Profiles and for this AusAid and the Vanuatu Land Use Planning Office are greatly acknowledged.

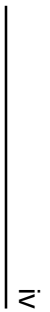
A large number of farmers, exporters, researchers, and officials have contributed to this publication. However, particular acknowledgement is given in Vanuatu to the Farm Support Association members: Freddie Johnson, Charles Rogers, Tavai Perei, Piero Bianchessi, Peter Kaoh, Peter Enkae, and John Peter. In Fiji, particular recognition is given to the contribution of Ratu Semisi Rakuro and Sant Kumar, Manager of Natures Way Cooperative (Fiji) Ltd.

Map 1. Pacific Islands



Map: Pacific Islands Development Program, East-West Centre, Honolulu

Map 2. The Fiji Islands



Map 3. Vanuatu

Executive Summary

The first substantive part of this report, Chapter 2, deals with traditional farming systems and economic performance, and the second part, Chapter 3, with developing commercial markets based on these traditional systems. The report focuses on Fiji and Vanuatu. Fiji, which is often presented as a model for other Pacific island countries to emulate, has a useful experience of market and marketing development. Vanuatu has rich land resources and a vibrant traditional production base yet, along with most Pacific island countries, faces severe, often intractable, marketing constraints.

1 Traditional farming systems and economic performance

The failure of Government-led agricultural development projects

Too little attention has been given by agricultural policy-makers to the past experiences of agricultural development programmes. Institutional memory tends to be short and previous mistakes are often repeated. As a result, scarce public funds are often wasted and agricultural development is constrained. The economic contribution of traditional food production also tends to be insufficiently recognised by agricultural and national planners, and under-estimated in national accounts. This has distorted agriculture policies and their implementation.

'Government-led' agricultural development projects have featured prominently in the development plans of most Pacific island countries and have usually involved the establishment of parastatal marketing boards and agencies. In Fiji, major loan and grant-aided projects were mounted to increase agricultural production. Government not only set the policy, but also provided managers, extension and administrative staff to implement these projects. The role of farmers (the private sector) was merely to respond to the benefits provided. Almost without exception, these projects could not be sustained. In the immediate post-independence period in Vanuatu, many development projects were initiated to promote agricultural growth and diversification and to encourage ni-Vanuatu participation in commercial agriculture. Yet despite the substantial investment of aid and government resources, many of these agricultural projects also failed or fell short of the expectations of planners.

Despite the general failure of agricultural development projects, most Pacific island countries retain strong traditional agricultural production systems and farmers grow an impressive quantity and range of traditional food. Traditional food production has been identified as a hidden strength of these economies. The ability to grow these crops, together with consumer preference and the non-availability or high cost of imported substitutes, provides a long-term competitive advantage in their production. Furthermore, if they are grown in the traditional manner, without chemicals and in rotation, this production is quite sustainable. Samoa provides the most striking example of the resiliency of these small island economies to external economic shocks and natural disasters. In no small measure, this can be attributed to the strength of Samoa's traditional cropping systems.

Measuring the economic contribution of traditional farming systems

In Vanuatu, the value of subsistence is officially estimated to be around 7 per cent of GDP, but the method used to calculate this significantly under-estimates the value of self-sufficiency. In Papua New Guinea, where a similar percentage of the population lives in rural areas, the value of subsistence is estimated to be about 15 per cent of GDP.

Some Pacific island countries have produced farm management manuals that show gross margin budgets for various crops and livestock activities. These manuals are useful planning tools if they are regularly and accurately updated, but they are least useful in estimating the returns from traditional small holder production. A better form of analysis would give a much higher value to traditional crops and cropping systems, and higher priority to them in the formulation of agricultural policy. A realistic set of budgets for small holder farms would help in evaluating the constraints on increasing household income and in identifying activities and technologies that could reduce these constraints. The case of traditional kava production is examined in this report.

The value to the household of self-sufficiency crops is equivalent to the cost of purchasing an equivalent amount of energy, protein, and vitamins. A simple method would be to value crops that are consumed by the household at their farm-gate value, for if they did not grow these crops the household would have to purchase them in the market. In most cases, however, this would lead to an over-valuation, for the alternative to not consuming their own crops is often to purchase rice. The value of growing their own food should therefore be costed in rice equivalents. Self-sufficiency cropping systems in Vanuatu show a higher return to labour than either copra or cocoa.

Risk analysis and the transformation of traditional cropping systems to intensive monoculture

The resiliency of Pacific island small holder agriculture comes from the integrated nature of the whole farming system. Certain traditional crops, especially root crops and kava, have become important sources of household income, without undermining the viability of the farming system. Other introduced cash crops,

such as cocoa and vanilla, have also been successfully integrated into the system. But while there is good scope to increase the productivity of traditional cropping systems, particularly the returns to labour, problems can occur when a traditional crop is intensively mono-cultured, as is described here for kava production in Vanuatu.

2 Developing commercial markets based on traditional farming system

The report examines three areas of market opportunity:

- Domestic market sales;
- Produce and other high value exports; and
- Commodity exports.

Increasing domestic market sales: a realistic policy objective

For most farmers, the best opportunity to increase incomes comes from expanding domestic market sales. There is a natural competitive advantage in traditional food production. Most garden produce is consumed by the household that grows it, or as part of traditional exchange arrangements. With increasing urbanisation, trade in traditional food staples has grown. This report examines the production and marketing constraints on expanding domestic markets, constraints which apply in varying degrees in all Pacific island countries but particularly in the western Melanesian countries.

Despite the high price of produce on municipal markets in Vanuatu, produce seldom comes from the outer islands. The high cost of shipping and the small quantities that are usually grown require exceptionally high prices to justify the effort involved. As well, there are insufficient middlemen and traders to facilitate this trade, and highly restricted access to municipal markets. Increasing the price of rice through tariffs or quotas is sometimes suggested as a way to make domestic food production more competitive. With its relatively low cost per unit of energy, imported rice is an important part of food security in all Pacific island countries. Increasing the price of rice would be detrimental to the whole economy, including farmers. Instead, traditional crops need to be sufficiently price competitive and available in urban markets to take market share from rice. This could best be achieved by increasing farmer labour productivity and reducing price expectations, encouraging the development of middlemen and traders, facilitating competition in inter-islands shipping, and reducing regulatory restrictions on urban markets.

Produce exporting: unrealistic expectations

The promotion of produce exports has become the focus of agricultural policy in Pacific island countries, despite the handicaps of location and distance from market that preclude even modest success in this area. In most Pacific island countries, exports have not been significantly viable because of the combination of high producer prices, poor transportation linkages, high transport costs, and

quarantine constraints. New Zealand, an important market for some Fiji farmers and a worthwhile market for Cook Islands, Samoa, Tonga, and New Caledonia, has a population of only 3.6 million people and, therefore, is a limited market. Although Australia produces tropical produce itself, it offers Pacific island produce a potentially much larger market than does New Zealand. Fiji has direct shipping and air links to Sydney and Melbourne and could readily compete in southern markets with produce grown in northern Australia. Yet Australia's fresh produce imports from the Pacific are less now than they were a decade ago. The Australian Quarantine Inspection Service (AQIS) has adopted pest risk assessment and industry consultation procedures that make it difficult for Pacific island produce to obtain access. Quarantine restrictions are not only directed towards potential 'fruit fly host' material. For example, Southern Australia could be a big market for ginger growers in Fiji and Vanuatu, but ginger can not be imported on quarantine grounds.

Exporting commodities: continued viability despite depressed prices

Tree crop commodities continue to be the only source of cash income for most small farmers in western Melanesia. Here, small holders find it worthwhile to devote their labour to tree crop production even though the terms of trade have continued to move against these commodities. This contrasts to the situation in Fiji and Polynesia where farmers have found alternative uses for their labour.

Small holder tree crop production requires few if any purchased inputs. Crops such as cocoa and coconuts are now part of self-sufficiency farming systems and place few demands on household labour, yet they provide a guaranteed, albeit modest, return to effort. Production is low risk, although marketing can be a constraint.

Farm management analysis is used in this report to examine the viability of small holder cocoa production in Vanuatu. Small holders have integrated cocoa growing into their self-sufficiency cropping systems and the crop gives a sufficient return despite a five-year low in the international cocoa price. Vanuatu small holders could expand cocoa exports if the right incentives were provided, which include better marketing arrangements, better infrastructure, and the reintroduction of healthy competition in the industry.

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20 Cocoa planted and beans sold to a grading point: with a planting area of 2,000 sq.m. in three successive yam gardens

Fiji and Vanuatu exchange rates

November 9, 1998, at cheque buying rate.

	$Fiji	**Vatu**
US	0.5186	126.66
Australia	0.8292	80.36
UK	0.3088	209.04
Fiji	-	64.31
New Zealand	0.9812	68.12
Papua New Guinea	1.1111	58.80
Tonga	0.7016	79.88
Solomon Islands	2.4652	26.77
Vanuatu	66.43	-

1 Agriculture in the Pacific Islands: a brief introduction

1.1 A region of diversity

Pacific island countries are spread over a vast area of the world's surface. The area stretches from the Commonwealth of Northern Mariana Islands (20°N) in the north, Irian Jaya and Palau (135° E) in the west, Easter Island (110° W) in the east, and New Caledonia and Tonga (25 ° S) in the south. Within this area there are some 25 discreet political entities, including some of the world's smallest countries (Map 1). The total land area of these countries is 960,000 sq. km. of which Irian Jaya (410,660 sq. km.) and Papua New Guinea (461,690 sq. km.) make up 90 per cent. The total population of the sub-region is around 6.7 million, of which 4.3 million (64 per cent) live in Papua New Guinea.

There is great diversity among these countries in terms of their size, population, resource endowments, the importance of agriculture, and economic performance (Table 1). Countries like Tuvalu and Papua New Guinea have little in common other than their approximate location on the globe. Tuvalu is a small atoll country with a population of 10,000 people and a mere 26 sq. km of land. Papua New Guinea, with a population over 4 million occupying a land area of some 460,000 sq. km, is one of the world largest producers of minerals and has vast endowments of arable land, forests, and minerals. Pacific island countries run the full range of human development status, as shown by the 1999 Human Development Index which ranged from 0.863 for the Cook Islands to 0.302 for Papua New Guinea. As a generalisation, however, Pacific island countries can be placed in four categories in terms of their resource endowments, size, and the importance of the agricultural sector.

Group 1: the relatively large countries of Melanesia (Papua New Guinea, Fiji, Solomon Islands, New Caledonia, and Vanuatu). These countries have the best natural resources and most of the land and population of the region. The countries of western Melanesia—Papua New Guinea, Solomon Islands, and Vanuatu—have fast growing and fast urbanising populations, yet they are predominantly agrarian societies in which agriculture provides most employment and household income. As much as three-quarters of the Papua New Guinea work force is engaged in subsistence agriculture. In Vanuatu and Solomon Islands, similarly, some 80 percent of the population live and work in the rural areas. Despite rich resource endowments, all three western Melanesian countries havelow ranking on the Human Development Index: Vanuatu, 142; Solomon Islands, 147; and Papua New Guinea, 164.

The Fiji economy is more diversified, and a larger proportion of the population lives in urban areas. While the sugar industry remains the largest net foreign exchange earner and the biggest employer of labour, and the GDP value of subsistence agriculture is equivalent to that of sugar, Fiji's location gives it a large advantage in diversifying agricultural exports. The human development status of Fiji is higher than the western Melanesian countries, in terms of per capita income, life expectancy, and adult literacy levels, and is reflected in a HDI ranking of 102.

Group 2: The middle level countries of Polynesia (Tonga and Samoa). These countries have more modest land resources. Tonga's economic growth has been led by agriculture and the development of new export crops: vanilla, squash, and more recently kava. In Samoa, taro was the main export until the early 1990s when the industry was decimated by taro leaf blight. Even so, Samoa continues to have a high level of domestic food security. These two countries have slow-growing populations because of emigration and receive high levels of remittances from expatriate communities in Pacific Rim countries. They are among the best performing economies in the region.

Group 3: Resource-poor, small, predominately atoll states (Cook Islands, Kiribati, Tuvalu, Federated States of Micronesia, Marshall Islands, Niue, Palau, and Tokelau). These are amongst the tiniest nations on earth, yet some are spread over vast areas of ocean. While they have very limited land resources, their marine resources are vast. Agriculture is the mainstay of household subsistence and the national economies of these countries. Most earn meagre, but important, cash income from copra, while Cook Islands has significant export earnings from papaya and Niue from taro. The human development status of these countries ranges from very high (Cook Islands, Palau and Niue) to moderately low, although above that of the western Melanesian countries. These atoll states face serious environmental problems from the combination of sea level rise, coastal erosion, and, in some countries, rapid population growth.

Group 4: Countries where agriculture is of limited importance (Nauru, American Samoa, Guam, and the Northern Marianas). Because of the insignificance of the agricultural sector in these countries, they are not mentioned in this study.

1.2 The Fiji and Vanuatu experience with agricultural market development

This report focuses on the experiences of Fiji and Vanuatu. Fiji's economy is the most developed, diversified, and urbanised in the region, and the country is the best located for agricultural export market development. Fiji is often presented as a model for other Pacific island countries to emulate. It is important, therefore, to look closely at Fiji's experience with market and marketing development.

Of all the countries in the region, Vanuatu is the most dependent on agriculture. The country has rich land resources and a vibrant traditional production base which provides a high level of food security, yet it faces severe, even intractable, marketing constraints that preclude the export of most types of produce. The Vanuatu experience is relevant to other Pacific island countries, particularly the other Melanesian countries.

Table 1 Summary of Pacific island countries and territories

	Land area (sq. km)	Population at last census*	Geographic type	Importance of agricultural sector	Economic and social indicators	
					GDP per capita (US$) *	Human Development Index (& global ranking) **
American Samoa	240	61,100	High islands, with a few atolls.	Minor: some subsistence and limited market gardening		
Cook Islands	180	19,000	High islands and atolls	Considerable: main export earner - subsistence a significant component of GDP	5,301	0.863
Federated States of Micronesia	702	111,800	High islands and atolls	Some: small export earnings, some domestic cash income, and some subsistence	2,021	0.568 (120)
Fiji Islands	18,376	779,200	High islands and a few minor atolls	Fundamental: main employer and net foreign exchange earner, subsistence a significant proportion of GDP	2,661	0.668 (102)
French Polynesia	3,521	222,300	High islands and atolls	Some: small export earnings, domestic cash income, and subsistence		
Guam	549	145,400	High island	Limited: some market gardening and a little subsistence		
Kiribati	726	83,400	Predominately atolls	Considerable: important for subsistence - copra important for outer island cash income and some foreign exchange	659	0.507
Marshall Islands	720	60,000	Atolls	Limited: some subsistence and income earned from copra	1,894	0.568 (127)
Nauru	21	11,200	Raised coral island	Insignificant		0.66
New Caledonia	19,103	201,300	High island	Important, particularly in the south		
Niue	258	2,100	Raised coral island	Significant: subsistence and some root crop exports	3,117	0.677
Palau	475	18,100	High islands and atolls	Some market gardening	8,025	0.860

	Land area (sq. km)	Population at last census*	Geographic type	Importance of agricultural sector	Economic and social indicators	
					GDP per capita (US$) *	Human Development Index (& global ranking) **
Papua New Guinea	461,690	4,311,500	High islands with a few small atolls	Fundamental: main source of employment, provides a substantial proportion of net export earnings, and subsistence production is a significant component of GDP.	1,198	0.302 (164)
Samoa	2,934	170,700	High islands	Fundamental: subsistence found to be strength of economy	1,025	0.598 (118)
Solomon Islands	29,785	401, 100	High islands with a few atolls	Fundamental: main source of employment, provides a substantial proportion of net export earnings, and subsistence production is a significant component of GDP.	560	0.370 (147)
Tokelau	12	1,500	Atolls	Some subsistence		
Tonga	696	97,800	High islands with a few small atolls	Fundamental : agriculture-led economic growth	1,861	0.654
Tuvalu	26	10,900	Atolls	Some: subsistence and some cash income from copra	1,255	0.590
Wallis and Futuna	255	14,200	High islands and atolls	Some subsistence		
Vanuatu	12,189	177,200	High islands with a few small atolls	Fundamental: main source of employment, provides a substantial proportion of net export earnings, and subsistence production is a significant component of GDP.	1,208	0.408 (142)

2 Traditional farming systems and economic performance

2.1 The general failure of agricultural development projects and parastatal marketing

Too little attention has been given by agricultural policy makers to the past experiences with agricultural development programmes, to both their failures and successes. Institutional memory tends to be short and thus past lessons are often not learned and mistakes are repeated. As result, scarce public funds can be wasted and agricultural development constrained.

After independence, government-led agricultural development projects featured prominently in the development plans of most Pacific island countries. These projects usually involved the establishment of parastatal marketing boards and agencies. They included Fiji's National Marketing Authority (NMA), the Tonga Commodities Board (TCB), Western Samoa Produce Marketing Division and the Cocoa and Copra Boards, Solomons Islands Commodity Export Marketing Authority (CEMA), and Vanuatu's Commodities Export Marketing Authority (VCMB). In some countries, such as Fiji and Samoa, the agricultural sector was also protected and subsidised.

The Fiji experience

In Fiji, a series of major loan and grant-aided projects were mounted to increase agricultural production. Government not only set the policy, but it also provided managers, extension and administrative staff to implement these projects. The role of farmers (the private sector) was merely to respond to the benefits provided and to increase production. Almost without exception, these projects were not sustained and failed.

Government also became involved in the processing and marketing of some goods, particularly rice and cocoa. The aim was to fill the perceived gap in the marketing of agricultural produce, and to ensure that farmers did not suffer from wide variations in price or from 'exploitation' by middlemen. Despite the intention to support farmers, the interventions proved to be detrimental to them and the development of these industries. In the case of rice, government-funded rice mills competed directly with very efficient small mills in the farming areas. While these small mills could not produce high quality milled and polished rice, they were able to offer better prices to the farmers and lower transport costs. Cocoa

marketing and fruit exports to Japan were handled exclusively by the NMA as Government deemed that it was not in the farmers' interest to have private sector involvement in these areas. Yet the consequent lack of competition and inefficiency led to huge marketing margins (ranging from 30 to 45 per cent) and low prices for farmers even when world market prices were high (ADB, 1996:15). The NMA, and its successor NATCO, also failed.

The pursuit of these policies cost the taxpayers a lot of money and raised the prices of basic food for urban consumers. Not only were the projects expensive, but the wide range of hidden subsidises in the form of cheap farm inputs, credit, and mechanisation services consumed a large portion of the national budget each year (ADB, 1996). At the end of 1989, in a mood of deregulation, the Ministry of Finance turned its attention to the agriculture sector.

The 1996 ADB Agriculture Sector Review attributed the improved performance of the sector in recent years to deregulation and to the move toward private sector-led agricultural development after 1989. Despite this, in 1997 there was a major reversal in agricultural policy, back to government-led agricultural development, with the initiation of a four year (1997-2000) investment programme, known as the Commodity Development Framework (CDF). Fiji's 1997 Budget allocated of $F69 million to the CDF for capital expenditure over this period, an allocation which quadrupled the Ministry of Agriculture Forests and Fisheries (MAFF)'s capital budget. The programme was to focus on increasing production of coconuts, ginger, taro, kava, fruits, vegetables, dairying, beef, sheep, and seaweed. Significantly, a good part of the budget was earmarked for the rehabilitation of NATCO to act as MAFF's marketing arm.

The Vanuatu experience

The immediate post-independence period in Vanuatu saw the instigation of many development projects in the agricultural sector that aimed to promote agricultural growth and diversification and increase ni-Vanuatu participation in commercial agriculture. During the first development plan (1982-1986), there were 26 aid-assisted projects in the agricultural sector that involved 13 donor or technical assistance agencies (Weightman, 1989:25). Most resources were allocated to large production-orientated projects in the coconut, cocoa, coffee, and livestock sectors.

The VCMB was established in 1981 as a response to the difficulties faced by the copra industry in marketing copra from the outer islands and ensuring its quality. In 1984, VCMB assumed sole responsibility for cocoa marketing, and at various times kava and ginger were also prescribed commodities under the VCMB Act. The VCMB should be credited with providing stability in the copra industry and market access to outer island producers. It also contributed significantly to improving the previously deplorable quality of Vanuatu copra. On the other hand, the involvement of the VCMB has not encouraged the coconut industry to diversify into higher value products. For cocoa, the monopoly held by the VCMB probably detracted from the development of an industry. It discouraged the competition that was able to bid up grower prices in Papua New Guinea and Solomon Islands (Coulter 1990; McGregor and Coulter 1991).

Despite the substantial investment of aid and government resources, many agricultural projects failed or fell far short of their expected achievements. The 1997 ADB Sector Review (ADB, 1997:40) listed some of the lessons that can be gleaned from this experience:

- The targets of the planners were set unrealistically high.
- There was poor project planning and implementation on the part of the joint venture partners, particularly for cocoa and coffee;
- These aid driven projects were beyond the absorptive capacity and sustainability of government extension and support services;
- The inefficiencies of government services meant that not all farmers received the planned assistance at the right time and that farmers became dependent on this assistance;
- The assumption that ni-Vanuatu semi-subsistence farmers could acquire the attitudes of commercial farmers in the duration of a project was unrealistic;
- There was a general failure to identify the needs of project beneficiaries; and
- There was a general failure to take account of marketing requirements for new crop development.

An objective look at agricultural investment projects in other Pacific island countries would no doubt produce a similar list of short-comings.

Large agricultural projects are no longer a feature of Vanuatu's national budget. This could be interpreted as a consequence of the lessons learned from this experience, but that is not entirely the reason. Vanuatu faces much more severe budgetary constraints than Fiji and its capital budget is heavily dependent on the generosity of donors. The VCMB still retains its monopoly status for the marketing of copra and cocoa.

2.2 The maintenance of strong traditional agricultural production systems

Despite the general failure of agricultural development projects, most Pacific island countries retain strong traditional agricultural production systems. Farmers grow an impressive quantity and range of traditional food. Weightman describes a typical multi-crop garden in Vanuatu:

> The gardens are planted to a variety of crops, often inter-planted as single plants, though sometimes planted with patches of one crop, such as sweet potato, taro, yam or manioc. The soft yams are planted first and take pride of place where the garden offers the best conditions for their cultivation. Other crops follow: sugarcane, island cabbage, *naviso*, pineapple, pawpaw, water melon, tomato, Chinese cabbage, sweet potato, manioc, bananas, taro, and kava. A single garden will generally contain many varieties of yam or taro and several other crops (Weightman, 1989:54).

The food derived from such a food garden, if supplemented with other sources of protein, readily satisfies the nutritional requirements of a household. As far back as the 1950s, the South Pacific Commission had noted that, 'a mixed diet of yams, taro, or sweet potato with green leaves would supply a balance of amino acids necessary for an adequate diet' (Peters, 1959).

The resiliency of Pacific island small holder agriculture comes with the integration of the whole system, the system being stronger than the sum of the component parts. These systems are adjusted for resource endowments, the seasons, and occasional disasters in the form of cyclones, droughts, and volcanic eruptions. Traditional disaster mitigation was based on a multi-crop food garden protected by forest. This remains the basis of disaster mitigation strategies throughout much of the region today (McGregor, 1999).

Fiji: traditional food production constitutes a hidden strength of the economy

The 1996 Fiji Agricultural Sector Review described traditional food production to be a 'hidden strength' of the economy (ADB, 1996). These crops include a wide range of root crops, coconuts, traditional rice varieties, leafy vegetables (both Fijian and Indian), other traditional Indian vegetables, fruits, and leaves for weaving. These crops are grown without subsidies or protection and their contribution to GDP is approximately equivalent to that of sugar.

The economic value of this production is evident in that Fiji's food imports are comparatively low and have fallen slightly as a percentage of total imports over the last decade, despite deregulation. This suggests that food supply has been able to expand to meet the increased demand from a rapidly growing urban population. This apparently high level of food security was severely tested with the drought of 1997-8. While some vulnerable groups in the population required food rations for an extended period, overall the level of food imports as a percentage of total imports did not increase. Since the return of the rains at the end of 1998, there has been a rapid turn-around in food production, as witnessed by the increased volume and price of produce in municipal markets. The strong upward trend in traded food crops indicates that Fiji's agricultural sector is far from stagnating at subsistence levels and that it has undergone a dynamic process of increased commercialisation during the past decade. This provides a strong base for the economy. However, as is now recognised in Fiji's current Strategic Plan, 'Increasing food security does not mean protecting farmers from international competition, which increases the cost of food and ultimately reduces food security'(Government of Fiji, 1999:5).

Tonga: the substantial value of the domestic traded food sector.

During most of the 1980s and 1990s, the Tongan economy was somewhat unique, in that it enjoyed steady economic growth that was driven by agricultural exports, principally squash (Sturton, 1992). Even so, in 1997, the value of the domestic traded sector was $T3.5 million (Taufatofua and Taufatofua, 1999:5). The application of the methodology described below for Vanuatu, would suggest that the value of food production consumed by rural households was at least three times this amount to give a total value of around $T14 million, as against the value of agricultural exports that year of approximately $T9 million.

Samoa: a striking example of economic resiliency

Samoa provides the most striking example of the surprising resiliency of these small economies to external economic shocks and natural disasters, particularly cyclones, a resiliency that in no small measure can be attributed to Samoa's traditional cropping system. Within five years, Samoa experienced two 'one hundred year' cyclones and the loss of the country's most important staple food and principal export through disease. For most countries, this would have been a catastrophic disaster, equivalent, perhaps, to a disease that eliminated most of Thailand's rice crop or last century's potato blight in Ireland. Yet in Samoa, there was no famine and, overall, exports have now been restored to their previous levels.

Paulson and Rogers (1997:177) described the adjustments that took place in the agricultural sector after taro leaf blight (*Phytophthora colocasiae*) destroyed the taro (*Colocasia esculenta*) crop:

> By June 1995, two years after the taro leaf blight first appeared in Western Samoa, the taro zone in the two main villages had been almost completely abandoned and was under fallow vegetation. Most households had redirected their efforts to the area nearest the village. This area of old gardens, secondary growth and senile coconuts had been transformed into well-tended mixed gardens producing a variety of food and tree crops. All gardens had several varieties of banana and at least two varieties of ta'amu (*Alocasia macrorrhiza*). Most had yams, cassava, and several varieties of breadfruit, and a variety of minor crops and useful plants. Most farmers were intercropping coconut and cocoa seedlings in the mixed gardens. There was much experimentation, with land managers visiting each other gardens for ideas.

Economic activity in Samoa is now buoyant. Real GDP grew 6.7 percent in 1996 and 3.0 per cent in 1997, the best performance of any Pacific island country. The Samoan experience is testimony to the strength of the seemingly weak Pacific island economies that lies with their traditional food production systems.

Unfortunately, the economic value of traditional food production tends to be not well recognised by agricultural and national planners and is usually much under-estimated in national accounts. This has had a distorting effect on agriculture policies and their implementation. For example, Paulson and Rogers noted that key Department of Agriculture officers were not impressed by the diverse mixed gardens of traditional food crops that sprung up after the blight. These officials 'held a vision of a more export-orientated, commercialized agricultural system modelled on those of industrialised countries'(Paulson and Rogers, 1997:182). This type of attitude persists even though the disadvantages posed by the location and size of countries like Samoa will likely continue to preclude even modest success along this route.

2.3 Measuring the economic contribution of traditional farming systems

Valuing self-sufficiency production in the national accounts

In Vanuatu, the value of subsistence is officially estimated to be around 7 per cent of GDP, an estimate that is derived indirectly from the 1983 Agricultural Census, from estimates of time spent in gardening. (Unfortunately this agriculture census did not attempt to measure agricultural production.) That this method significantly under-estimates the value of self-sufficiency is suggested by Papua New Guinea, where a similar percentage of the population lives in rural areas but the value of subsistence production is estimated to be around 15 per cent of GDP. In Papua New Guinea, a consumption method is used to measure the value of non-market agricultural production, in contrast to the production-based approach used in Vanuatu (Bain, 1996:29).

A simpler version of Papua New Guinea method would be to compare the estimated calorific needs of the population with the calories that are supplied by imported rice and wheat flour, the difference then providing a measure of the calories that are supplied by subsistence agriculture. The estimate for Vanuatu is about 4 billion vt, or about 16 per cent of GDP at wholesale prices. This could be regarded as a minimum estimate of the value of subsistence, because further allowance needs to be made for the protein and vitamins that are also supplied by subsistence agriculture.

Estimating the value of traditional crops at the farm level

Some Pacific island countries, in particular Fiji and Tonga, have produced management manuals that show gross margin budgets for a range of crops and livestock activities (e.g. Government of Fiji, 1980). These manuals are useful planning tools if they are regularly and accurately updated—which in Fiji has not been the case. These manuals, however, are not particularly useful in evaluating the returns from traditional small holder production systems, particularly for food production, for the following reasons:

- The models used assume a high level of purchased inputs, whereas most small holder farmers in Pacific island countries use none or very few purchased inputs;
- The models focus on the return to land, whereas the primarily concern of most small holders is the return to labour input;
- The models do not take account of marketing costs in terms of labour input (whereas Vanuatu's kava budgets showed this to be the most important cost); and
- No account is taken of the value of self-sufficiency consumption.

A proper analysis would lead a much higher value being ascribed to traditional crops and cropping systems and, perhaps, a higher priority given to them in the formulation of agricultural policy.

Applying farm management analysis to traditional cropping systems[1]

Crops that are sold are readily valued. Market prices can be adjusted to the 'farm-gate' to take account of the cost of getting the produce to the market. Valuing crops consumed by the household is more complicated, although the principle is simple. The value to the household of self-sufficiency crops is equal to the cost of purchasing an equivalent amount of energy, protein, and vitamins.

The simplest approach is to value crops that are consumed by the household at their farm-gate value, on the assumption that if they did not grow these crops the household would purchase them in the market. This would provide a reasonably accurate estimate for a commercial root farmer who retains some of his produce for household consumption. It would, however, probably lead to an over-estimate for most self-sufficiency farmers. For these farmers, the alternative to not consuming their own root crops is often to purchase rice. The value of growing their own food should therefore be costed in rice equivalents, as is shown for Vanuatu in Table 2.

Table 2 Rice equivalents, in energy, for staple food crops

Staple	Boiled product produced from a 1kg fresh staple[i]	Energy derived from boiled product (kcal) [ii]	vt value in rice equivalent of 1kg of fresh product (rice valued at 100 vt per kg)
Rice	2.60	3,198	100
Breadfruit	0.99	703	22
Taro	1.10	1,089	34
Yams	1.02	836	26
Fiji taro[iii]	1.03	930	29
Manioc	0.97	1,271	40
Kumala	1.03	970	30
Cooking banana	0.98	1,078	34

Sources: (i) Estimated empirically by the author; (ii) Obtained from SPC: The Pacific Islands Food Composition Tables;

Note: The Fiji Pacific Island Food Composition Tables do not include Fiji taro (*Xanthosoma taro*). Chinese taro is considered to be of approximately the same bulk density and thus is used as proxy for Fiji taro.

On the other hand, valuing the self-sufficiency crops grown by the household entirely in their rice equivalents would lead to an under-estimate of the value of crops such as yams, taro, kumala, and cooking bananas. Rice equivalents would not fully account for the superior vitamin and dietary fibre content of these crops and their accompanying leafy vegetables. The true value of self sufficiency crops consumed by the household would therefore lie somewhere between the two extremes of measuring household self-sufficiency consumption. Models using both methods of valuing self-sufficiency consumption for 'typical' taro-based and yam-based cropping systems are presented in Tables 3, 4, 5, and 6.

The taro based model

This model is derived from data supplied by Tavai Perry, a farmer from South Santo. Tavai is a semi-commercial taro producer and market gardener. He has a permanent water (*wota*) taro (*Colocasia esculenta*) garden from which he harvests 500 taro corms annually. The plant spacing is 60cm x 60cm (plate 1). Tavai sells approximately 50 percent of his taro in the Santo market. The rest are consumed by his family. For this commercially orientated farmer, the quantity of taro sold on the market is relatively high. Table 3 is based on an estimated overall market value for taro of 100 vt per kg.

Table 3 *Wota* taro in South Santo: assuming 500 corms are planted, 50 per cent is sold, and household consumption is valued at the market price

Year	**1**	**2**	**3**	**4**	**5**	**6**	**Total**
Number of corms	500	500	500	500	500	500	
Production kg (including top)	750	750	750	750	750	750	4,500
Value @ 100 vt per kg	**75,000**	**75,000**	**75,000**	**75,000**	**75,000**	**75,000**	**450,000**
Cash expenditure							
Transportation @10 vt per kg	7,500	7,500	7,500	7,500	7,500	7,500	45,000
Net revenue	**67,500**	**67,500**	**67,500**	**67,500**	**67,500**	**67,500**	**405,000**
Family labour (person days)							
Site preparation	25						
Site maintenance		5	5	5	5	5	
Planting	15						
Replanting suckers		5	5	5	5	5	
Water management and weed control	15	15	15	15	15	15	
Harvesting	24	24	24	24	24	24	
Marketing (assuming 25% of effort to WT)	6	6	6	6	6	6	
Sub-total	**85**	**55**	**55**	**55**	**55**	**55**	**360**

Average labour per annum	**60**
Average annual gross margin per ha (vt)	**3,780,000**
Average return for family day of labour (vt)	**1,125**

If valued at the cost of purchasing the equivalent energy from rice, the taro consumed by the household is worth approximately 34 vt per kg. Table 4 presents the *wota* taro model for this alternative measure of the value of household consumption.

Plate 1: Permanent water (*wota*) taro, South Santo, Vanuatu

Table 4 *Wota* taro in South Santo: assuming 500 corms are planted, 50 per cent is sold, and household consumption is valued at the equivalent price of rice

	Year	1	2	3	4	5	6	Total
Yield (number of corms)		500	500	500	500	500	500	
Yield kg (including top)		750	750	750	750	750	750	4,500
Value - market @100 vt per kg		37,500	37,500	37,500	37,500	37,500	37,500	225,000
- household @34 vt per kg		12,750	12,750	12,750	12,750	12,750	12,750	76,500
- total		**50,250**	**50,250**	**50,250**	**50,250**	**50,250**	**50,250**	**301,500**
Cash expenditure								
Transportation @10 vt per kg		7,500	7,500	7,500	7,500	7,500	7,500	45,000
Net revenue		**42,750**	**42,750**	**42,750**	**42,750**	**42,750**	**42,750**	**256,500**
Family labour (person days)								
Site preparation		25						
Site maintenance			5	5	5	5	5	
Planting		15						
Replanting suckers			5	5	5	5	5	
Water management and weed control		15	15	15	15	15	15	
Harvesting		24	24	24	24	24	24	
Marketing (assuming 25% of marketing effort to WT)		6	6	6	6	6	6	
Sub-total		**85**	**55**	**55**	**55**	**55**	**55**	**360**

Average labour per annum	**60**
Average annual gross* margin for area planted (vt)	**128,250**
Average return for family day of labour (vt)	**713**

The yam based model

The model is derived from data supplied by farmers in Northwest Malekula, Southeast Malekula, Southeast Malekula, Fanafo (Santo) and North Ambrym[2]. The yam farmer modelled has 300 mounds of yams (*Dioscorea spp.)* followed in the second year by 200 Fiji taro (*Xanthosoma sagittifolium*). Table 5 is based on all yam production being valued at the market price of 100 vt per kg., and Fiji taro, of 40 vt per kg.

Table 5 A yam garden followed by Fiji taro: assuming 50 per cent is sold and household consumption is valued at the market price

300 mounds (1m x 1m) yams 200 plants of Fiji taro Year	1 (Yams)	2 (Fiji taro)	3 (Fiji taro)	Total
Yield (kg)	1,500			
(yam 5 kg per mound; Fiji taro 10 kg per plant)	1,000	1,000		
Value - for 50% sold @ 100 vt per kg yams; 40 vt per kg	**150,000**	**40,000**	**40,000**	**230,000**
Fiji taro				
Cash expenditure				
Transportation @10 vt per kg	15,000	10,000	10,000	
Net Revenue	**135,000**	**30,000**	**30,000**	**195,000**
Family labour (person days)				
Land preparation (slash, cut trees, burn, and pile)	28			
Planting	13	3	3	
Staking	4			
Weeding	4	2	2	
Harvesting	10	6	6	
Marketing (assume markets twice monthly with 50% of time attributed to yams and Fiji taro)	10	10	10	
Sub-total	**69**	**21**	**21**	**111**
Average labour per annum (person days)	**37**			
Average annual gross margin for area planted (vt)	**65,000**			
Average return for family day of labour (vt)	**1,757**			

It is estimated that the value of yams consumed by the household, if valued at the cost of purchasing the equivalent energy from rice, is 26 vt per kg., as shown in Table 3. For Fiji taro, purchasing the equivalent would cost 30 vt per kg. Table 6 presents the taro-based model for this alternative measure of household taro and Fiji taro consumption. With respect to returns per person day, both of these self-sufficiency-cropping options give a higher return than either copra or cocoa (Table 14).

Table 6 A yam garden followed by Fiji taro: assuming 50 per cent is sold and household consumption is valued at the equivalent price of rice

300 mounds (1m x 1m) yams
200 plants of Fiji taro

Year	1 (Yams)	2 (Fiji taro)	3 (Fiji taro)	Total
Yield (kg)	1,500			
(yam 5 kg per mound; Fiji taro 10 kg per plant)		1,000	1,000	
Value – 50% sold @ 100 vt per kg yams; 40 vt per kg Fiji taro	75,000	20,000	20,000	
- 50% consumed by household	19,500	15,000	15,000	
	94,500	**35,000**	**35,000**	**164,500**
Cash expenditure				
Transportation @10 vt per kg	15,000	10,000	10,000	35,000
Net Revenue	**79,500**	**25,000**	**25,000**	**129,500**
Family labour (person days)				
Land preparation (slash, cut trees, burn, and pile)	28			
Planting	13	3	3	
Staking	4			
Weeding	4	2	2	
Harvesting	10	6	6	
Marketing (assume markets twice monthly with 50% of time attributed to yams and Fiji taro)	10	10	10	
Sub-total	**69**	**21**	**21**	**111**
Average labour per annum (person days)	**37**			
Average annual gross margin for area planted (vt)	**43,167**			
Average return for family day of labour (vt)	**1,167**			

2.4 Using farming system models to identify marketing constraints

A realistic set of small holder farm budgets would be useful in evaluating constraints against increasing household income, and would help identify activities and appropriate technologies that could reduce these constraints.

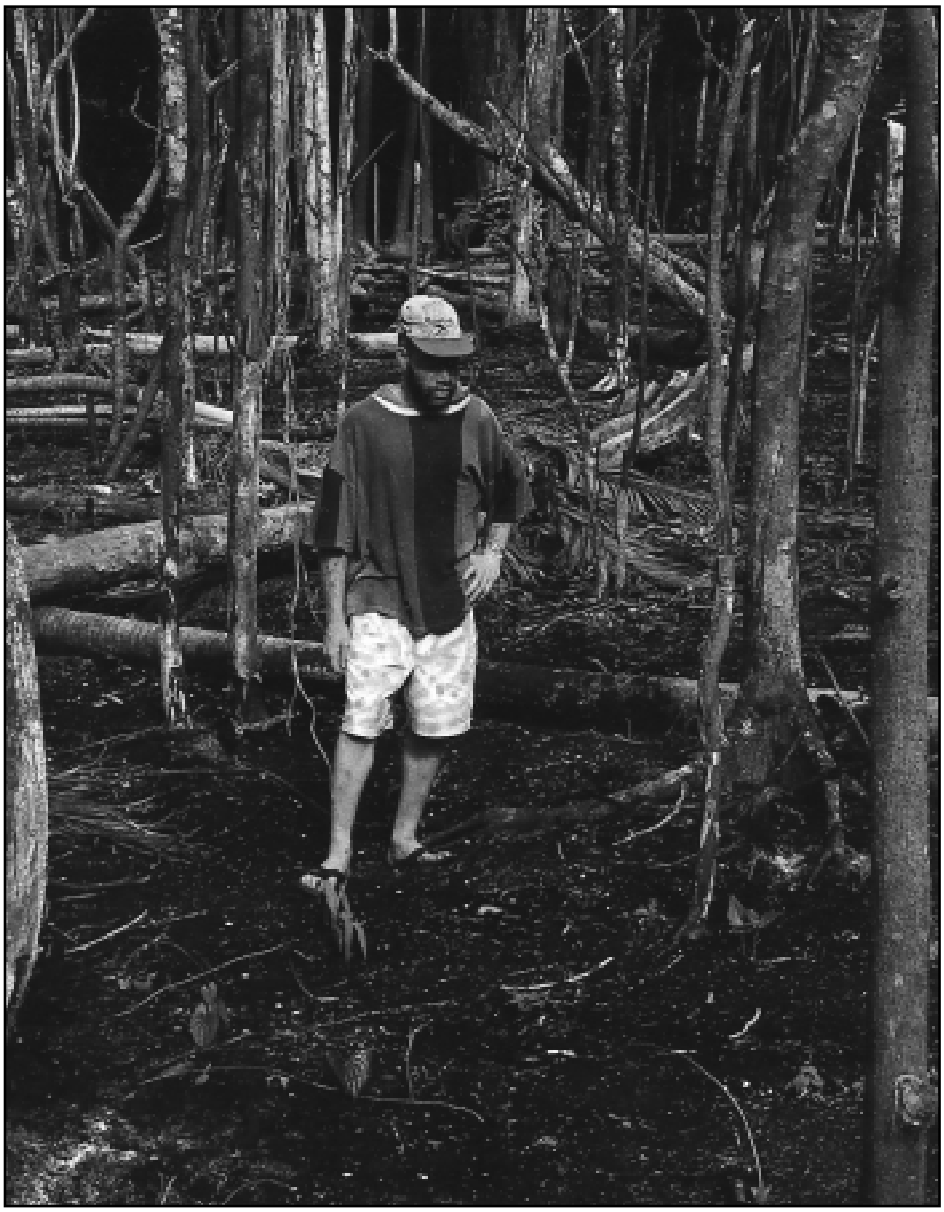

Plate 2: Year 1 garden, (yams); Northwest Malekula

The example of traditional kava production

Table 7 presents the situation of a typical farmer in Northwest Malekula (plates 3, 4, and 5). After harvesting yams, a farmer usually plants dry-land taro (*Colocasia esculenta*), Fiji taro (*Xanthsoma sagittifolium)*, island cabbage, banana, pawpaw,

cane, cocoa (the second cash crop), and kava. The other crops are planted first to provide shade for usually somewhere between 50 and 100 young kava plants, which are planted around March. In year 3, a mixed cash garden of cocoa and kava remains, with banana and pawpaw providing shade. The kava is harvested in year 4, leaving a stand-alone block of cocoa trees. The situation presented is for three successive gardens

Plate 3: Year 2 garden (taro, Fiji taro, banana, kava, and cocoa); Northwest Malekula

Plate 4: Year 3 garden (banana, kava, cocoa); Northwest Malekula

Table 7 Green kava (50 plants after three consecutive yam gardens) planted in an isolated garden, with the produce carried to the road: assuming 50 plants are planted after three consecutive yam gardens and a market price of 300 vt per kg

Year	1	2	3	4	5	6	Total
Yield per plant	0	0	0	20	20	20	
Production	0	0	0	1,000	1,000	1,000	3,000
Sales av.300 vt per kg	0	0	0	300,000	300,000	300,000	900,000
Cash expenditure transportation (by road 300 vt per bag plus 750 vt per person)				41,786	41,786	41,786	125,357
Net Revenue				258,214	258,214	258,214	774,643
Family labour (person days)							
Clearing (done as part of garden, with 25% of time attributed to kava)	6	6	6				18
Preparing planting material and planting	2	2	2				6
Weeding	6	12	18	12	6	2	56
Harvesting and preparing for sale				8	8	8	25
Carrying to market (man carrying 20 kg)				50	50	50	150
Sub-total	14	20	26	70	64	60	254
Average labour per annum (person days)		**42**					
Average annual gross margin		**129,000**					
Average return for family day of labour		**3,050**					

This is a very low intensity situation, with only 50 plants planted on three successive plots. The kava is harvested after 4 years and yields 20 kg of green kava per plant. The kava is carried to the road and then taken by carrier to the buying point. Over the six year cycle, from the time of planting the first 50 plants to harvesting the last 50 plants, an average of 40 person days of labour is used, some 60 per cent of it in carrying the kava to the road. Ample household labour is available to grow other self-sufficiency crops and cocoa.

The small amount of kava planted gives a high return to household effort, of approximately 3,000 vt per person day. Low intensity kava planted in a food garden is a high return but low risk activity. Widely spaced kava planted in a new

food garden has virtually no risk of disease or damage by pests such as nematodes. The forest surrounding the small garden offers some protection from cyclones and, to some extent, prolonged droughts. The presence of crops like Fiji taro in the garden, furthermore, provides a high degree of food security if a natural disaster does occur.

The number of kava plants could be doubled or even quadrupled without undermining the basic strength of this cropping system. This would substantially increase household income. The reason it is not feasible for households to do this, however, is the extremely high amount of labour required to market the kava. Typically, it takes some two hours to carry the kava to the point where it can be transported for sale, with one man usually being able to carry only about 20 kg. Cartage therefore represents by far the largest labour input, around 60 per cent of the total. Many farm households throughout Vanuatu face this type of situation. If a road could be constructed and maintained, the returns from this investment would likely be high. In Northwest Malekula, however, as in many parts of Vanuatu, road building is very problematic. More appropriate and lower cost ways to increase marketing efficiency therefore need to be investigated.

The amount of labour required could be significantly reduced by investing in a pack-horse, which can carry 150 kg. A few high quality pack-horses can be purchased from the La Source plantation near Vila, at a price of 71,000 vt per horse. The purchaser, however, is required to spend two to three months at La Source to be trained to use and care for the horse. The returns to an investment in a pack- horse are shown in Table 8. In this table, with the capacity to carry kava greatly improved, the number of plants per half-hectare garden has been increased from 50 to 100. Thus the investment in the pack-horse has allowed production to be doubled with slightly less labour required. A very high return to family labour is thereby achieved of about 7,600 vt per person day, assuming the price of kava is 300 vt per kg. This high return is achieved without any increase in risk, as 100 plants in a half-hectare food garden is still a very low intensity cultivation of kava. Furthermore, not only would the investment in the horse free up household labour for other self-sufficiency activities, but it could also be hired out to carry kava for other growers or used for other purposes, so greatly increasing the returns from its purchase.

Table 8 Green kava planted in an isolated garden after investing in a pack-horse: assuming 50 plants are planted after three consecutive yam gardens and a market price of 300 vt per kg

Year	**1**	**2**	**3**	**4**	**5**	**6**	**Total**
Yield per plant	0	0	0	20	20	20	
Production	0	0	0	2,000	2,000	2,000	6,000
Sales (av. 300 vt per kg)	0	0	0	600,000	600,000	600,000	1,800,000
Cash expenditure			71,000	23,571	23,571	23,571	141,714
Purchase of pack-horse			71,000				71,000
Transportation by road (300 vt per bag plus 750 vt per person)			23,571	23,571	23,571	70,714	
Net Revenue	**0**	**0**	**-71,000**	**576,429**	**576,429**	**576,429**	**1,658,286**
Family labour (person days)							
Clearing (50% attributed to kava)	13	13	13				39
Preparing planting material and planting	3	3	3				9
Weeding	9	18	27	18	9	3	84
Harvesting and preparing for sale				16	16	16	48
Carrying to road (horse carrying 150 kg)				13	13	13	39
Sub-total	25	34	43	47	38	32	219

Average annual labour input (person days)	**37**
Average annual gross margin	**276,400**
Average return for family day of labour	**7,570**

2.5 Risk analysis and the transformation of traditional cropping systems to intensive monoculture

The resiliency of Pacific island small holder agriculture comes about from the integration of the whole system. Some traditional crops, mainly root crops and kava, within the system have become important generators of household income. Other introduced cash crops, such as cocoa and vanilla, have also been successfully integrated into the system. There is much scope to increase the productivity of traditional cropping systems, particularly in the returns to labour. Serious problems can, however, be encountered when a traditional crop is intensively mono-cultured, for mono-culturing removes much of the protection provided by the traditional cropping system.

The case of kava

During 1998, kava prices throughout the Pacific reached unprecedented heights because of an explosion of interest from pharmaceutical, herbal, and natural flavouring industries in the active ingredients (kavalactones) of kava. The four kava exporting countries in the region, namely Vanuatu, Fiji, Tonga, and Samoa, all experienced huge increases in the value of their kava exports. In Fiji, for example, the value of kava exports in 1998 was $F36m, compared with only $F2.4 m in 1995. In Vanuatu, the value of exports increased four-fold over the same period (Table 9).

Table 9: Vanuatu kava exports, 1990-98.

Year	*Tonnes*	*Vatu (millions)*	*Thousand vt per tonne (fob)*
1990	39	14	359
1991	26	6	231
1992	63	19	302
1993	44	21	477
1994	85	57	670
1995	52	48	920
1996	64	73	1,141
1997	105	102	971
1998	749	888	1,185

Source: Vanuatu National Statistics Office.

The increase in export demand translated into a marked increase in grower prices. In Vanuatu, the prevailing farm price for kava in October 1996 was around 135 vt per kg. Two years later, in 1998, it had more than doubled, to 300 vt per kg. In November 1998, dried kava prices were between 1,000 and 1,200 vt per kg, up from 700 to 800 vt per kg at the beginning of that year.

Despite these substantial price increases in Vanuatu, they were well below the dried kava prices paid to Fiji farmers. In October 1998, prices for kava roots in Fiji ranged between $F25 and $F35 per kg—prices equivalent to between 1,600 vt and 2,200 vt. The difference can be explained, to some extent, by a severe drought in Fiji which significantly reduced supply. The cost of marketing (internal shipping, handling and external shipping) out of Fiji, Tonga and Samoa is also significantly lower than from Vanuatu. Furthermore, prices are not exactly comparable between Vanuatu and Fiji; in Vanuatu the price is established for the whole kava plant, whereas in Fiji, premium prices are paid for the roots (*waka*) which contain the highest percentage of kavalactones.

Throughout the region, kava is traditionally planted as part of a multi-crop food garden. In Vanuatu the average spacing of kava in food garden is three to four metres, which allows 600 to 1,000 plants per hectare, but even wider spacing is

quite common, as modelled in Tables 7 and 8, above. This traditional wide spacing within an inter-cropping system minimises the dangers of disease and wind damage, which are the two greatest risks to this crop.

With the very high prices being offered for kava, there has been a tendency throughout the region to clear bush to plant kava alone and to replant kava on the same land it has grown on before. In Fiji, the intensification of kava production has been actively promoted as a part of the CDF programme, through the distribution of planting material and, initially, by providing planting subsidies.

Table 10 Returns from one hectare of intensive kava production: assuming a market price of 300 vt per kg of green kava

Year	**1**	**2**	**3**	**4**	**5**	**Total**
Number of plants harvested		4,500	2,225		2,225	8,950
Yield per plant (kg)		4	10		25	
Production (kg)		18,000	22,250	0	55,625	95,875
Sales (kg)		14,000	17,250	0	55,625	86,875
Sales @300 vt per kg		**4,200,000**	**5,175,000**	**0**	**16,687,500**	**26,062,500**
Cash expenditure	1,500,000	472,500	405,708	0	1,129,188	1,937,396
Purchase of cuttings (@50 vt each)	1,500,000					
Harvesting labour (50% of requirements @1,400 vt per day)	157,500	103,833	0	155,750	417,083	
Carrying labour (50% of requirements @ 1,400 vt per day)	245,000	301,875	0	973,438	1,520,313	
Transportation to buying point @300 vt per 60 kg bag		70,000				
Net revenue	**(1,500,000)**	**3,727,500**	**4,638,042**	**-**	**15,280,188**	**24,690,729**
Family labour (person days**)**						
Clearing	40					40
Preparing planting material and planting	90					90
Weeding	20	20	20	15	15	90
Harvesting and cleaning		113	74		111	298
Carrying to buying point @ 40 kg. per day		175	216	0	695	1,086
Sub-total	**150**	**308**	**310**	**15**	**822**	**1,604**

Average annual labour input	**321**
Average annual gross margin (vt)	**4,738,000**
Average return per day of household labour (vt)	**14,770**

In Vanuatu, on the island Pentecost, which is currently the main kava producing area, young farmers are now planting kava at a very high density of one metre by one metre, allowing for 10,000 plants per hectare. The standard practice is that after two years of growth, half of the plants are uprooted to allow more space for the remaining 5,000 plants. A year later, when the plants are three years old, again half of them are harvested and 2,500 plants are left to mature for up to five years. This production system generates astronomical returns to both land and labour, as shown in Table 10, with an average gross margin of 4.7 million vt over five years (assuming a price of 300 vt per kg).

At prevailing prices, such a cropping system generates a huge rate of return to labour and land that cannot remotely be matched by any other crop. Yet such intensive production evidently has considerable drawbacks. The labour required to harvest and carry the produce to the point of transportation and sale is much more than is available in most households. Waged labourers therefore have to be hired, if they are available, and all household labour diverted from self-sufficiency gardening activities. There are, therefore, food security implications from the intensive cropping of kava, particularly given the high risk of crop losses from cyclones, disease, and increasingly in some areas, from theft. There is also a tendency to concentrate intensive plantings near the road in order to reduce the labour required. The high demand for land near the road means that the fallow is shortened, and sometimes there is no fallow at all—yet because kava is such a heavy feeder, it requires a long fallow after intensive planting to avoid disease. The sustainability of this intensive kava production remains to be seen.

These risks need to be incorporated into farm management models and brought to the attention of farmers through extension programmes. The worse situation could be a complete loss of the crop due to 'die back' disease. While this is not likely for any one field, the experience on Tanna of intensive kava planting should not be ignored. A decade ago, Tanna was by far the largest supplier of kava to the urban market of Port Vila but today kava is difficult to grow on the island and virtually none is exported to Vila. A more likely event is the loss of a large part of the crop to a cyclone or prolonged drought, the latter possibly inducing 'die-back'. Mono-cultured kava is more exposed to wind damage than kava planted in a traditional food garden surrounded by forest. Furthermore, the high labour demand of intensive kava production means there is less household labour available to produce food. The expectation is that cash from the sale of kava will be used to purchase food.

Given the high frequency of cyclones in Vanuatu and in the kava growing areas of Fiji, there is a reasonable probability that one will affect an intensive kava plantation once in the five-year production cycle. The most damaging time would be in years 3 or 4, when half the crop remained to be harvested. The plants would be sufficiently large for there to be an almost a total loss from a reasonably severe cyclone. If torrential rain accompanied the cyclone, long-term losses could be even greater from soil erosion, if the intensive kava was planted on steep slopes. Another significant risk from an intensive mono-culture of kava, at least in some locations, is theft, and any realist farm budget needs also to take account of this.

There have been many demonstrations around the region of the risks associated with the intensification of traditional crops. Unsustainable kava planting on Pohnpei in the Federated States of Micronesia, contributed to severe land slides during a cyclone in early 1997. The clear felling of forest to plant kava on the island of Kadavu in Fiji has similarly placed the community at risk (McGregor 1998). In Samoa, the large-scale clearance of upland forest to plant taro after the cyclones of 1992 and 1993 may have contributed to the taro leaf blight disaster.

[1] The data used in the farm management models are derived from Land Use Profiles prepared by the author for the AusAid Vanuatu Land Use Project. The particular Profiles utilised are Kava, Root crops and self-sufficiency farming systems, Coconut, and Cocoa.

[2] The contributions of Peter Enkae, White Enkae, and Freddie Johnson are particularly acknowledged.

3 Developing commercial markets based on traditional farming systems

This section of the report analyses three distinct areas of market opportunities:

- Domestic market sales: Expanding this area appears to be the most realistic policy option, and the one that is likely to give the greatest return to farmers and the economy.

- Produce and other high value exports: Expansion of these exports has received considerable attention in recent years, but often unrealistic expectations have been created.

- Commodity exports: This remains an area of continued viability for Melanesian small holders, despite depressed prices.

3.1 Increasing domestic market sales: a realistic policy objective

For most farmers in most countries, expanding domestic market sales provides the best opportunity to increase their incomes. Other than the traditional commodities, agricultural exports have contributed relatively little to the wellbeing of most rural households. For most Pacific island countries, the combination of ability to grow these crops, consumer preference, and the non-availability or high cost of imported substitutes–other than rice–offers a long-term competitive advantage in the production of traditional food crops. There are opportunities to increase this competitive advantage by increasing productivity and reducing costs. While this analysis focuses on Vanuatu, the constraints and resulting policy recommendations apply in varying degrees to most other Pacific island countries, particularly those in western Melanesia.

Market potential created by rapid urbanisation

Most garden produce is consumed by the households that grow it, or is consumed as part of traditional exchange arrangements. However, with increasing urbanisation, trade has developed in traditional food staples. While the Pacific island countries are to varying degrees agrarian, most are experiencing rapid urbanisation (Table 9). The population of Vanuatu's towns is growing at over 7 per cent annually—essentially doubling every decade. Even in countries like Tonga, which have little urban population growth, a substantial market is available for locally grown produce. In Tonga, approximately two thirds of the

population live on the island of Tongatapu, one third of them in the capital, Nuku'alofa. As urban populations grow, the commercial market for traditional crops, particularly root crops, also expands. The substantial exploitation of these urban markets, however, depends on prices being reduced and marketing efficiency being enhanced. This is discussed further below.

Table 11: Urbanisation rates in Pacific island countries

Country	Annual urban population growth (%)	Urban population doubling time (years)
Melanesia		
Fiji	2.6	28
New Caledonia	2.7	27
Papua New Guinea	4.1	18
Solomon Islands	6.2	12
Vanuatu	7.3	10
Micronesia		
Federated States of Micronesia	1.3	55
Guam	1.9	38
Kiribati	2.2	33
Marshall Islands	8.2	9
Northern Mariana Islands	5.6	13
Palau	3.2	23
Polynesia		
Cook Islands	0.5	144
French Polynesia	1.4	51
Samoa	1.2	60
Tonga	0.7	103
Tuvalu	4.8	15

Source: Secretariat of the Pacific Community, 1997. Population Data Sheet.

Estimating the volume of domestic trade

There are few data available on the volume of produce that is traded on urban markets. The information that does exist, however, points to a substantial volume of trade.

A snapshot of the volume of produce trade can be gleaned for Vanuatu's capital, Port Vila, from a survey conducted by ORSTOM at the municipal market in September, 1998 (Table 12). Port Vila's urban and peri-urban areas have a population of about 32,000. Extrapolation based on just one week's data is difficult. Yet it appears that more than 250 million vt of produce is sold at the

Port Vila market in a year. In addition to produce sold in the market, a large quantity of root crops is supplied by the rural population to their relatives living in Port Vila. While no statistics are gathered on this informal trade, Mr Charles Long Wah from the Kava Store, who meets most of the boats arriving in Port Vila from kava-producing islands, estimates that 3,000 to 5,000 baskets of root crops destined for relatives arrive each week. The weight of a basket ranges from 10 to 20 kg. From these figures, it could be estimated that between 30 and100 tonnes of root crops enter the informal market in Port Vila each week. If so, then this informal trade exceeds the volume of root crops sold in urban produce markets and stores, and represents a significant component of Vanuatu's food security.

Table 12 Produce sold at the Port Vila Municipal Market, September 19 to 24, 1998

Product	Quantity (kg)	Value (vt)	Number of vendors
Oranges and mandarins	36,500	2,190,000	17
Bananas	15,000	507,000	271
Coconut	21,000	355,000	177
Kumala	6,500	295,000	90
Yams	2,500	294,000	90
Fiji taro	6,000	272,500	123
Round cabbage	3,000	202,000	55
Island cabbage	4,500	165,000	124
Taro	2,000	156,500	69
Lettuce	1,200	134,500	32
Cucumber	2,000	120,000	60
Laplap leaves		107,000	106
Tomatoes	1,000	97,000	30
Pamplemousse	1,600	96,500	33
White boon	2,000	91,500	66
Manioc	4,000	83,000	70
Papaya	2,000	79,000	94
Crabes cocotiers/terre		78,500	30
Green beans	300	60,500	49
Other		95,900	
Total		**5,480,400**	

Source: Greindl, 1998

In Fiji, data from the Agricultural Census were used by the Agriculture Sector Review to estimate the production and value of a range of commodities sold in the local markets. These results are presented in Table 13. Based on these findings the Review concluded, "The evidence of a strong upward trend in traded food

crops indicates that Fiji's agricultural sector, far from stagnating at subsistence levels, has sustained a dynamic process of increased commercialisation through the decade. Government's investment in roads, particularly on Viti Levu, has contributed significantly to this process" (ADB, 1996:4).

Table 13 Estimated production and value of selected domestically traded food crops in Fiji, 1995

Item	Production (tonnes) 1995	Value ($ million) 1995	Unit Price ($ per kg at farm gate)
Root crops	120,000	60	0.5
Kava	5,000	50	10
Pineapple	1,000	.2	0.2
Water melon	1,000	.8	.8
Vegetables	11,000	6	0.5
Total		**117**	

Source: ADB, 1996:4.

Taufatofua and Taufatofua present data on the main crops sold on the domestic market in their Tonga Marketing Profile prepared for the FAO Regional Workshop on Improved Agricultural Marketing Development in the South Pacific (Table 14).

Table 14 Volume and value of the main crops sold in the domestic market in Tonga

Crop	**Volume Marketed (tonnes)**	**Value (TOP$)**
Yams	544	821,621
Sweet potato	670	388,600
Talo (*Xanthosoma*)	582	337,560
Talo (*Colocasia*)	81	71,955
Kape (*Alocasia*)	264	145,398
Potato	31	38,440
Vegetables	734	812,654
Fruits	1907	930,544

Source: Taufatofua and Taufatofua, 1999:5.

The price of produce on domestic markets: the case of Vanuatu

The prices of produce sold on municipal markets tend to be quite high when compared with income level and the price of imported rice. This appears to be especially true for the countries of western Melanesia.

Market surveys conducted by Department of Agriculture and Horticulture's Market News Service reveal the high prices that can be obtained for garden produce at Port Vila's municipal market (Table 15). A price comparison for

staples is shown in Table 16. The preferred staples, yams and taro, are far more expensive in terms of the calories purchased than imported rice. The retail price of rice, purchased in a one kg bag, is around 100 vt. This amount produces approximately 2.6 kg of boiled rice, which provides about 3,200 kcal in energy. One vatu of expenditure on rice therefore yields 32 kcal in energy. By comparison, one vatu of expenditure on taro and yams yields only 10 kcal and 8 kcal respectively in energy. Fiji taro (*Xanthosoma*), kumala, and cooking bananas provide better value for money in terms of the calories that are purchased. Only manioc competes with rice. The fact that yams and taro cost some three times more than rice explains why many households will sell yams and taro and buy rice to eat at home.

Table 15 Port Vila Municipal Market prices for garden produce, November, 1998

Commodity	Week 1	Week 2	Week 3	Week 4	Monthly Av. Nov.	Monthly Av. Oct
Roots and staples						
Fiji taro	56	56	48	59	55	59
Island taro (Colocasia)	117	125	125	158	131	109
Kumala	48	44	44	44	45	49
Manioc	33	42	42	39	39	39
Yams	111			111	111	113
Cooking banana	58	53	53	58	55	56
Breadfruit		30	125	60	72	100
Fruits						
Orange		44				44
Mandarines		40			40	40
Pamplemousse	50	43	53	30	44	33
Lemons	133	133	167	100	133	194
Naus	10	20		30	20	21
Pawpaw	83	100	63	60	77	70
Eating banana	183	133	133	183	158	190
Vegetables						
English cabbage	175	100	200	200	169	137
Chinese cabbage		150		200	175	133
Island cabbage	117	133	167	150	142	100
Spring onion	100	100	100	100	100	100
Tomato		200	400	400	333	272
Eggplant	233	200		100	178	106
Cucumber	150	133	100	133	129	155
Long-yard bean	100	100	200	100	125	89
Pumpkin	43	38	48	62	48	56
Coconuts						
Dry (bundle)	100	100	100	100	100	107
Green each	33	27	37	33	32	35

Source: Department of Agriculture and Horticulture, Market News Service.

Table 16 Comparison of the unit cost of calories supplied by staples, Port Vila, October-November, 1998

Staple	Fresh product required per 1kg of boiled product (gm)[i]	Energy derived from a kg of boiled product (kcal) [ii]	The price of a kg of boiled product (vt) [iii]	Calories purchased per vatu of expenditure
Rice	385	1,230	39	32
Breadfruit	1010	990	87	11
Taro (*Colocasia*)	909	1,089	109	10
Fiji Taro [iv]	970	930	55	17
Yams	980	836	110	8
Manioc	970	1,310	40	33
Kumala	970	970	46	21
Cooking banana	980	1,100	57	19

Sources: (i) Estimated empirically by the author; (ii) Obtained from The Pacific Islands Food Composition Tables, SPC; (iii) Average in the Vila Market, October and November, 1998.

Note: The Fiji Pacific Island Food Composition Tables do not include Fiji taro (*Xanthosoma taro*). Chinese taro is considered to have approximately the same bulk density and thus is used as a proxy for Fiji taro

The production and marketing constraints to expanding domestic markets: the case of Vanuatu

Most produce sold at the Port Vila municipal market comes from Efate. Supplies to the Luganville market come from Santo and close-by islands such as Malo. The absence of garden produce from the outer islands, despite the high prices that can be obtained, is due to:

- the small quantity grown by most farmers, which means that exceptionally high prices are required to justify the effort involved;
- the absence of middle men and traders to facilitate the trade in produce;
- the high cost of shipping; and,
- restricted and regulated access to urban municipal markets.

These constraints to expanding the market are discussed briefly below.

The high price expectations of farmers

Traditional ni-Vanuatu farming systems are based on horticultural gardening, in which close husbandry is given to individual plants, principally yams. Ni-Vanuatu farmers are highly skilled at growing these crops. The average food garden is very small, between 0.2 and 0.8 of a hectare, and a digging stick and bush knife are the only implements used. Labour productivity is therefore relatively low and

there is usually only a small marketable surplus. Gardens are often a long distance from the village and pack-horses are rarely used to carry produce, which further reduces any incentive to increase food production much above household needs. With relatively small marketable surpluses, farmers expect to receive high prices for what they do sell in order to make their effort worthwhile. These high price expectations of farmers, especially when compared with the low cost of imported rice, seriously constrains the development of produce markets. Ways to increase labour productivity, and thereby production, include using simple labour-saving tools, such as a hoe or a pack-horse (for the latter, see Table 8). Work by members of the Farm Support Association (FSA) has shown that trellising certain yam varieties can significant increase yields. Meanwhile, the FAO Root Crop Project identified root crop varieties that have good yields and desirable marketing characteristics with respect to size, transportation and storability. The low availability of some of these varieties has been a constraint on their production that the FSA has endeavoured to address, in a limited way, for yams. There is scope for expanding these activities. More commercially oriented farm households may be prepared to accept lower root crop prices if the total returns for their effort can be raised through higher labour productivity. Well-prepared farm budgets can help illustrate this to farmers.

Referring back to the yam producing household depicted in Tables 5 and 6, we could propose that the number of yams planted is doubled and the yield per mound increased by 40 per cent. This increase could be achieved by creating a somewhat larger garden, adopting trellising techniques, and planting varieties that have desirable marketing characteristics (plate 5). Using a hoe increases labour productivity. Overall, it is estimated that a nearly three-fold increase in yam production can be achieved with a 40 per cent increase in household labour input devoted to yams, and an approximately 30 per cent increase in labour input over the three year cropping cycle. Average annual labour input increases, on estimate, from 37 to 47 person days. This household would now have a much larger marketable surplus to dispose of, but would be in a position to absorb a substantial decrease in the yam price. At this higher level of production and a lower yam price of 60 vt per kg, as compared with 100 vt per kg, the average annual gross margin is 93,000 vt, as compared with 65,000 vt. More importantly, returns per person day total 2,000 vt, as compared with 1,750 vt (Table 17).

Table 17 A yam garden followed by Fiji taro: assuming 80 per cent is sold and household consumption is valued at the market price

600 yam mounds
200 plants of Fiji taro

Year	1 (Yams)	2 (Fiji taro)	3 (Fiji taro)	Total
Yield (kg)	4,200			
(yam 7 kg per mound; Fiji taro 10 kg per plant)		1,000	1,000	
Value in vatu @ 60 vt per kg for yams;	**252,000**	**40,000**	**40,000**	**332,000**
40 vt per kg for Fiji taro				
Cash expenditure				
transportation @10 vt per kg	33,600	10,000	10,000	
Net Revenue	**218,400**	**30,000**	**30,000**	**278,400**
Family labour (person days)				
Land preparation (slash, cut trees, burn, and pile)	40			
Planting	13	3	3	
Trellising and staking	10			
Weeding	6	2	2	
Harvesting	20	6	6	
Marketing (assuming markets held twice monthly	10	10	10	
with 50% of time attributed to yams and Fiji taro)				
Sub-total	**99**	**21**	**21**	**141**
Average labour per annum (person days)	**47**			
Average annual gross margin for area planted (vt)	**92,800**			
Average return for family day of labour (vt)	**1,974**			

The absence of middlemen: a weakness in the marking chain

For farmers on Efate, Santo and Malo, the absence of middlemen and traders and the regulated municipals markets have constrained the development of garden produce sales. Farming households, usually the women, must market their own produce in the central municipal market but the days on which they can sell are rostered according to their geographical location. Deregulation together with more investment in market infrastructure, offers potentially high rates of return. Small peri-urban satellite markets should also be encouraged to develop.

Middlemen play an important, but often not recognised, role in facilitating market development and operation. Without middlemen, it is difficult for farmers to specialise in growing produce for the urban markets. At present, a

disproportionate amount of household resources are devoted to marketing rather than producing. This situation in Vanuatu is fairly typical of the Pacific region, other than Fiji. In Fiji, the developed and competitive trader sector has been a major contributor to the vibrant urban produce markets. Middlemen and produce traders should be promoted in programmes that aim to encourage small business and entrepreneurial development.

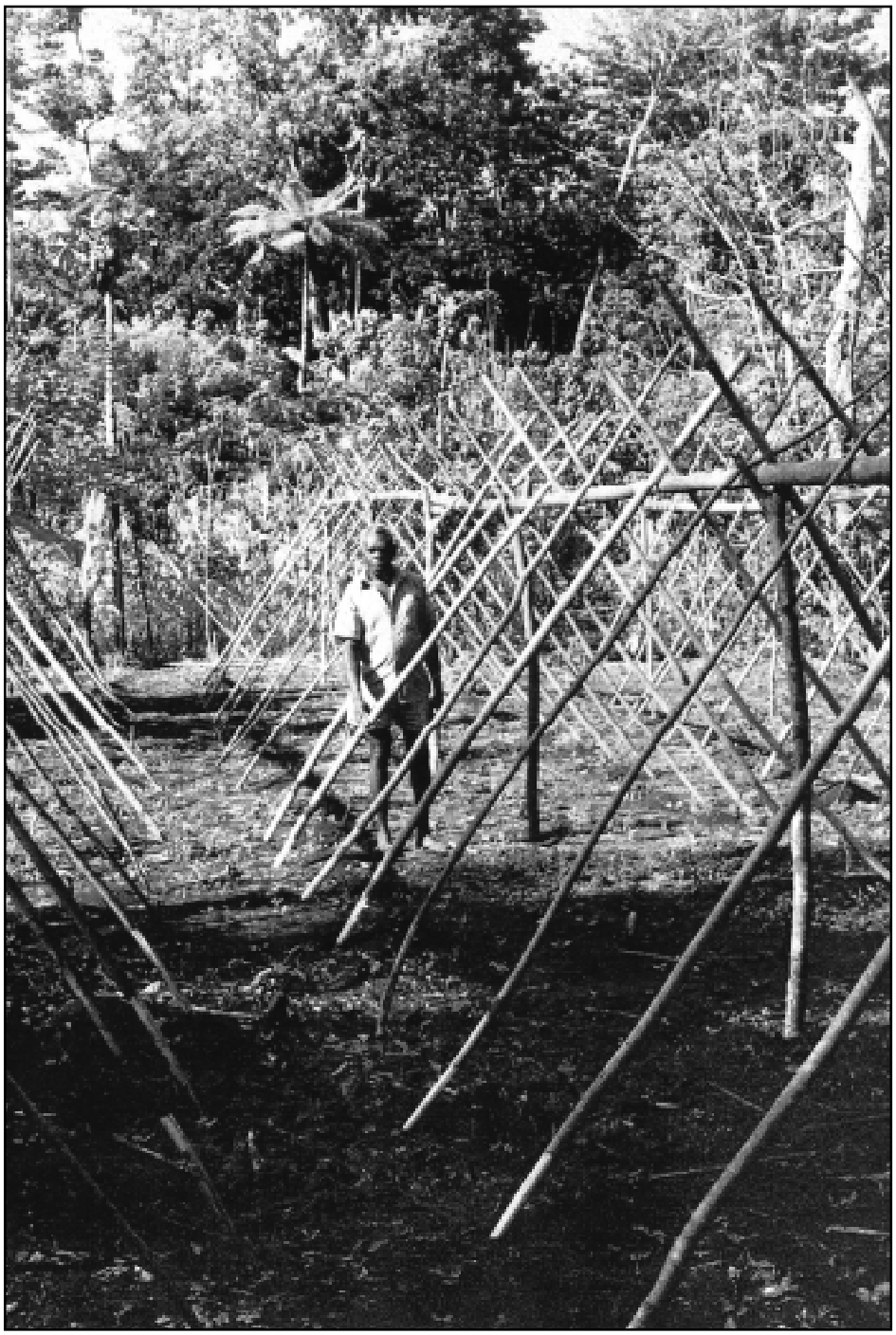

Plate 5: Trellising to increase labour productivity in yam production, South Santo Vanuatu

Market regulations containing market development

The municipal market roster that operates by geographical location could be justified on the grounds of orderly marketing, but there are drawbacks for market development. This system makes it difficult for farmers to profitably grow crops for which timely harvesting is critical, such as tomatoes, beans, and papaya—crops that have strong demand in urban markets, including from the more affluent expatriate sector. Restricting selling times by geographical location also reduces demand for produce. The types of crops that are available in different areas tend to vary, making what is available in the market on a particular day dependent on what location was rostered. Restricting consumer choice reduces overall demand for produce, to the detriment of farmers.

Shipping costs

As Vanuatu is a widely dispersed archipelago, shipping costs are inevitably high, currently around 250 vt per basket of produce. Paradoxically, it costs more to ship produce from Santo to Port Vila, than it does from Vila to Auckland or Sydney, which is a fairly common situation throughout the Pacific region. In Fiji, the cost of shipping produce from Vanua Levu to Suva is about the same as shipping it from Suva to Auckland—even though inter-island and international freight rates for Fiji are significantly lower than for Vanuatu.

In Vanuatu, the cost of inter-island shipping is probably even higher than it should be. Inter-island transportation is an economic activity that is reserved for ni-Vanuatu businesses. The objective of this policy is laudable but it has probably restricted investment and competition in the shipping industry. Vanuatu has no roll-on-roll off ferries, whereas it was the introduction of these ferries that enabled the island of Taveuni in Fiji to become the major supplier of taro to the New Zealand market. A policy to encourage ni-Vanuatu business development in one sector may therefore undermine the business development of a much larger number of ni-Vanuatu farmers.

Protecting farmers from cheap rice imports: an inappropriate policy option

Increasing the price of imported rice through tariffs or quotas is sometimes suggested as a way to make domestic food production more competitive. From 1970 to 1987, the Fiji Government attempted to reduce spending on food imports and increase self-sufficiency by imposing quotas on rice imports and heavily subsidising local rice production. Solomon Islands also attempted to establish a domestic rice industry under the umbrella of heavy protection. In both cases, these policies proved to be expensive failures. A study by Prasad (1997) showed that Fiji had no comparative advantage in capital intensive irrigated rice production. When quotas on imported rice were removed, the irrigated schemes—the cornerstone of Fiji's import substitution policy—collapsed.

Fortunately other Pacific island countries have resisted this temptation to protect domestic food producers with heavy tariffs or quotas on imported rice, even though rice represents a major source of foreign exchange leakage. Vanuatu, for example,

imports around 7,000 tonnes of rice annually, valued at some 400 million vt, which is equivalent to 4 per cent of imports and over 15 per cent of visible exports. To put the level of rice imports in better perspective, however, the value of self-sufficient food in Vanuatu, when measured in terms of the calories supplied, is estimated to be some six times this amount.

Similar estimates could be derived for Solomon Islands and Papua New Guinea. In Melanesia, most rice is consumed in rural areas, where it is the major purchased item. Consumption of rice is highly correlated to the level of cash income earned from copra and, more recently, kava (Foy, 1990). In Fiji, it is notable that since the deregulation of the rice industry, there has been no overall increase in the level of food imports (ADB, 1996:4).

Because of its relatively low cost per unit of energy, imported rice, is an important component of the food security equation of all Pacific island countries. Increasing the price of rice through projectionist measures is detrimental to the whole economy, including farmers. In order for traditional crops to take market share away from rice, they must become more price competitive and more available on urban markets. In Vanuatu, as explained above, this can be best achieved by increasing farmer labour productivity, reducing their price expectations, encouraging the development of middlemen and traders, facilitating competition in inter-island shipping, and reducing regulatory restrictions on urban markets. These same remedies would apply, to varying degrees, to most other Pacific island countries.

3.2. Produce exporting: unrealistic expectations

In recent years, the promotion of non-commodity export agriculture has been the focus of agricultural policy and donor programs in the sector, despite the inherent disadvantages that Pacific island countries face in this regard, including distance from markets and expensive transportation.

In Vanuatu, there has been considerable interest generated in producing taro *(colocasia)* for the New Zealand market since the demise of the Samoan industry through taro leaf blight in 1994. Fiji has, however, now taken over this market and exports around 10,000 tonnes of taro there annually. The wholesale price for taro in Auckland during 1998 ranged from $NZ1.43 to $NZ3.25 per kg (South Pacific Trade Commission Produce Price, various issues). This represents, in vatu equivalent, between 100 vt and 220 vt per kg. Taking into account an importer's margin, normally around 10 per cent, the landed price for taro in New Zealand would be equivalent to between 90 and 200 vt per kg. The freight to Port Vila to Auckland, furthermore, is around 15 vt per kg. The lower range of these prices therefore appear to be decidedly unattractive when compared with taro prices in the Vila and Santo markets, of between 70 to 130 vt per kg.

Fiji producers have various advantages that would make Vanuatu taro uncompetitive on the New Zealand market:

- More frequent shipping, with as many as six vessels going directly to New Zealand each month, as compared with one vessel every four to six weeks from Vanuatu, which often transhipps through Australia.
- Sea freight rates to New Zealand from Fiji are lower (equivalent to around 9 to 10 vt per kg) than freight costs from Vila or Santo to Auckland (of around 15 vt per kg).
- Internal freight cost in Fiji are significantly lower. Fiji furthermore has a major advantage of being served by roll on/roll off ferries that allow fully laden trucks to cart the taro to point of export. In Vanuatu, it costs significantly more to ship taro from the outer islands to Port Vila, than it does to ship it on to New Zealand.
- Fiji's main export production area, the island of Taveuni, is free of papuana beetle. By contrast Vanuatu's main production areas on Efate, which are strategically located with respect to shipping, are severely infested by the beetle. Any corm that is damaged by beetle, regardless of its eating quality, cannot be exported. There would be the further high cost of sorting out damaged corms from export quality produce.
- Fiji has ample supplies of the 'pink' taro (Taro Niue) that is sought by the New Zealand market, which is essentially the Samoan community. Although Vanuatu offers a rich variety of excellent quality taro, the taste requirements of the Samoan community are narrow and specific.[3]

Fiji's competitive advantage compared with other Pacific islands countries is reflected in its dominant position in produce exports to New Zealand (Table 18). In 1998, Fiji supplied 87 per cent of the produce exported to New Zealand from the Pacific. It is not surprising therefore that, despite all the talk about the New Zealand taro market, almost no shipments have been made from Vanuatu. This situation could change if taro leaf blight became established in Fiji.[4] For the foreseeable future, root crop commercialisation in Vanuatu should concentrate on improving 'exports' within Vanuatu-that is, shipping produce from other islands to Port Vila rather than to overseas markets where Vanuatu currently has no comparative advantage.

Table 18 Pacific island produce exports to New Zealand, 1998
(Prices in NZ$ thousand cf)

Product	*Cook Is*	*New Caledonia*	*Niue*	***Fiji***	*Samoa*	*Solomon Islands*	*Tonga*	*Vanuatu*	*Total*
Bananas					220 (100)*				220
Coconuts			7 (3)		2 (1)	53 (24)	160 (72)		222
Pawpaw	303 (57)			178 (34)			47 (9)		528
Cassava							106 (100)		106
Taro	21 (.2)		54 (1)	7,608 (98)	12 (.01)		43 (1)		7,738
Sweet Potatoes							9 (100)		9
Mangoes	85(30)			200 (70)					202
Squash		54 (100)							54
Limes		89 (100)							89
Honey			11 (65)			6 (35)			17
Preserved fruit and vegetables				773 (100)					100
Ginger				435 (100)					435
Chillies				461 (100)					461
Eggplant				650 (100)					650
Cocoa beans				79 (52)		48 (32)		8 (5)	152
Flowers				84 (100)					84
Watermelon		233 (85)					42 (15)		275
Total	409 (3)	376 (3)	72 (.05)	10,468 (87)	234 (2)	107 (1)	364 (3)	8(.01)	12,038

* Share of Pacific island country imports in parenthesis
Source: Statistics New Zealand and the South Pacific Trade Office (Auckland)

Vanuatu could be more competitive exporting yam rather than taro. Export markets require the smaller, usually round varieties. The main competition is from Tonga, where costs are relatively high. The US West Coast market is under-supplied (IRETA,1994), but Vanuatu has no shipping links to this market. Vanuatu growers would, moreover, have to accept significantly lower prices than those now provided by the local market, for any sustained market development to occur.

The US market for Fiji taro (*xanthosoma*) is much larger than the market for *colocasia*, for the latter is consumed mainly by the Samoan community (Brown, 1994). The better keeping qualities of *xanthosoma* also allow it to sustain longer sea voyages than *colocasia*. But without the availability of direct shipping, exporting to the US from Vanuatu is not feasible. Direct shipping is, however, available to Australia from both Port Vila and Santo and several containers of Fiji taro were shipped from Santo to Australia in 1998, most of it originating from Pentecost. The importer would like to import from Vanuatu to augment supplies from Fiji, but a major problem reportedly was that the containers were filled well below capacity, substantially increasing per unit shipping costs.

Limitations of the New Zealand market

New Zealand has become an important market for some Fiji farmers and a worthwhile market for a few farmers from the Cook Islands, Samoa, Tonga, and New Caledonia. Yet New Zealand's population numbers only 3.6million people–of which approximately 10 per cent are Pacific Islanders or Asians. In 1998, seven Pacific island countries together exported to New Zealand approximately $NZ12 million (landed value) of produce. This could undoubtedly be increased if prices were lowered and the quality and continuity of supply improved. But even if sales could be increased to, say, $NZ20 million, this would not represent a particularly large market for the whole Pacific island region.

The Australian market: intractable quarantine constraints.

Australia potentially offers a much larger market for Pacific island produce than does New Zealand. Fiji has direct shipping and air links to Sydney and Melbourne. Vanuatu has much better shipping and airfreight connections to Australia than it does to New Zealand, including frequent and regular direct shipping from Santo. There is no reason why Vanuatu could not compete in southern markets with produce that is grown in northern Australia. Yet Pacific island produce exports to Australia are negligible: a few millions dollars worth of root crops and coconuts.

The volume of produce exports from Pacific island countries to Australia is less than it was a decade ago. Fiji's shipments of papaya and mangoes ceased in 1992 when the use of ethylene dibromide (EDB) as a quarantine treatment was internationally banned. Four years ago, Nature's Way Cooperative (Fiji) Ltd. established a high temperature forced air (HTFA) quarantine treatment facility that is certified by New Zealand for the export of certain fruit fly host products, namely papaya, mango, eggplant, and breadfruit. Australia is yet to accept HTFA treated fruit from Pacific island countries, despite New Zealand's acceptance of this quarantine treatment.[5]

New Zealand has also adopted a simple protocol that allows for export products that are not fruit fly hosts, so avoiding the complications and cost of HTFA treatment. Products covered by this protocol include several varieties of chillies from Fiji, squash from New Caledonia, and cucumbers from Vanuatu. The New

Zealand non-host method is based on an experimental procedure that does not require the prohibitive sampling of large quantities of fruit. Even though New Zealand is a country free of fruit flies and its horticultural industries provide its major exports, other importing countries, including Australia and the United States, do not accept this protocol. Under the WTO Agreement on the Application of Sanitary and Phytosanitary Measures (ASPM), Pacific island countries may have a strong case to require a general acceptance of the New Zealand non-host protocol. Whether Pacific island countries have the expertise and resources to see a successful outcome of such a case, is another matter.

The Australian Quarantine Inspection Service (AQIS) has recently adopted pest risk assessment and industry consultation procedures which make it very difficult for Pacific island produce to access Australian markets. This difficulty is compounded by a lack of clear guidelines on AQIS requirements. Pacific island quarantine departments, furthermore, have proven themselves less than competent in their dealings with AQIS, as evident fom Fiji's two years of unsuccessful effort to re-establish papaya exports to Australia.

Australia's quarantine restrictions not only affect 'fruit fly host' material. Southern Australian potentially offers a sizable market for ginger growers in Fiji and Vanuatu, even though ginger is also grown in southern Queensland. Ginger imports are, however, prohibited on quarantine grounds—a difficult restriction to understand, given that Fiji exports fresh ginger to Hawaii and, via Hawaii, to North America.

Quarantine departments in Pacific island countries, starting with Fiji, could benefit from technical assistance in preparing submissions to AQIS and similar bodies in other importing countries. This would include the collection and presentation of risk assessment data to meet Australian requirements. The difficulty in accessing the Australian market, however, would seem to be a prima facie case to raise with WTO under its ASPM provisions, on the grounds of Article 3 (Harmonization), Article 4 (Equivalence), Article 5 (Assessment of Risk and Determination of Appropriate Level of Sanitary and Phytosanitary Protection), and Article 7 (Transparency).

3.3 Exporting commodities: continued viability despite depressed prices

Tree crop commodities continue to be the only source of cash income for the great majority of small farmers in western Melanesia. In Papua New Guinea, for example, the 1990 Agricultural Census recorded that 92,700 farmers were involved in growing cocoa, 246,000 in growing coffee, and 206,100 in growing coconuts (Papua New Guinea Government, 1999:8). Many small holders throughout western Melanesian find it worthwhile to devote their labour to tree crop production even though terms of trade continue to move against these commodities. This is in contrast to the situation in Fiji and the Polynesian countries, where farmers have found more attractive other uses for their labour.

Small holder tree crop production requires few if any purchased inputs. Crops like cocoa and coconuts have been integrated into self-sufficiency cropping patterns. They do not place heavy demands on farming households' labour yet provide a guaranteed, if modest, return. Low risk production and marketing are important considerations.

Farm management analysis of the viability of small holder cocoa production in Vanuatu

In 1997, Vanuatu's 7,500 small holder cocoa growers produced 1,758 tonnes of dried beans with a total fob value of 246 million vt, a sum equivalent to around 10 per cent of export earnings. Fiji farmers, by contrast, produced about 70 tonnes that year, even though cocoa was the priority export diversification crop during the 1970s and 1980s.

Plantation cocoa production in Vanuatu has declined dramatically as prices have fallen below production costs. Small holders, however, have integrated cocoa growing into their self-sufficiency cropping systems and the crop thereby still gives them a sufficient return despite depressed prices. A major labour cost associated with cocoa growing is the clearing of bush and initial weeding before the canopy is established. Most small holder cocoa is therefore planted in association with a food garden, usually before harvesting the first yam crop. The clearing and much of the initial weeding can thus be attributed to the food crops, as this work would have to be done anyway. An alternative method is to plant cocoa under already established coconuts.

The integration of cocoa into a food garden is modelled in Table 19, using data collected in Northwest Malekula. Around 65 per cent of Vanuatu's cocoa production come from Malekula. A typical farmer plants 300 hybrid cocoa seedlings in a 2,000 square metre yam garden. Cocoa plantings are usually accompanied by dry land taro, Fiji taro, island cabbage, banana, pawpaw, sugar cane, and kava as the second cash crop. In year 3, a mixed cash crop garden of cocoa and kava remains, with banana and papaya providing shade. The kava is harvested in year 4, leaving a stand-alone cocoa block.

The beans were dried in a small drier that was made from bush materials and a used 44 gallon drum, and made maximum use of the sun. They were then sold to a trader on the coast at the Grade 3 price, regardless of quality. As small farmers are unlikely to receive any reward for quality, it makes no financial sense for them to invest 95,000 vt in the recommended 'Samoan' type kiln drier. It takes some two hours to carry the dried beans to the point of sale. Cartage therefore represents a major labour input-almost 20 per cent of the total-but one that could be greatly reduced by investing in a pack-horse. In Table 19, the clearing of forest and weeding for the first two years is not attributed to cocoa but to the accompanying food crops.

Table 19 Cocoa planted and beans sold to a trader: with a planting area of 2,000 sq.m. in three successive yam gardens

Year	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Total**
Number of trees	300	600	900	900	900	900	900	900	900	900	
Yield per tree (kg of dry beans)	0	0	0	0. 05	0.1	0.2	0.4	0.5	0.6	0.7	
Production (kg)	-	-	-	45	90	180	360	450	540	630	
Sales @ 65 vt per kg[i]	-	-	-	2,925	5,850	11,700	23,400	29,250	35,100	40,950	**149,175**
Cash expenditure	4,500	4,500	9,700	600	1,200	6,300	1,600	1,800	6,900	2,000	**39,100**
Polybags [i]	4,500	4,500	4,500								13,500
Drier materials [ii]			5,000			5,000			5,000		15,000
Bags			-	100	200	300	600	800	900	1,000	3,900
Rat bait			200	500	1,000	1,000	1,000	1,000	1,000	1,000	6,700
Net revenue	**(4,500)**	**(4,500)**	**(9,700)**	**2,325**	**4,650**	**5,400**	**21,800**	**27,450**	**28,200**	**38,950**	**110,075**
Family labour											
(person days)											
Clearing (attributed to garden)											
Digging holes	4	4	4								
Shade management			5	7	7	3	3	3	3	3	
Weeding				2	4	6	3	3	3	3	
Pruning			1	5	5	5	5	5	5	5	
Picking and cracking				2	3	6	13	16	19	22	
Building drier				4							
Fermenting				1	1	1	2	3	3	4	
Marketing (transport of beans to beach) [iii]				1	2	4	7	9	11	3	
Sub-total	**4**	**4**	**10**	**22**	**22**	**25**	**33**	**39**	**44**	**50**	**253**

Average labour per annum (person days) 25

Average annual gross margin per area (0.6 ha) 11,000 vt

Average return for family day of labour 435 vt

Notes: [i] @ 15vt each; [ii] Built from used fuel drum and bush material; [iii] One man carrying 25kg.

The 900 cocoa trees planted yield the household on average around 11,000 vt a year, over a ten year period. The total returns to land and labour are, however, very much higher when the other crops on the same land are taken into account. The return per day of effort is a modest 435 vt but this is an assured income for farmers who have limited opportunities to generate cash.

Prospects for expanding small holder cocoa production

Despite the five-year low in world cocoa prices, Vanuatu small holders could expand cocoa exports if the right incentives were provided. This would require improved marketing arrangements and infrastructure, including the reintroduction of healthy competition in the industry. The model presented in Table 19 demonstrates the scope for increasing the returns to small holder farmers. Returns from growing cocoa as part of a food garden would substantially increase if farmers were rewarded for producing good quality dried beans.

Farmers now have two options in selling their cocoa: they can take their beans to the VCMB buying point on Santo or sell them to a dealer. The cost of freighting cocoa from Malekula to Santo is 300 vt per 62.5 kg bag. The cost of the passage is 2,000 vt and the return journey will take two to three days. Thus to sell a consignment of less than several hundred kilograms of cocoa, a trip to the VCMB in Santo cannot be financially justified. Most small farmers therefore sell their dried beans to a trader, usually a ship-owner, and receive the 'beach price,' which invariably is the Grade 3 price, regardless of the quality of the cocoa. In October 1998, the prevailing Malekula beach price was 55 to 65 vt per kg. This situation gives small holder farmers little incentive to improve quality, for any benefit from improved quality is captured by the trader. The substantial improvements in the quality of Vanuatu cocoa that have resulted from farmer education and the introduction of grading standards are therefore being lost. There is a risk of returning to the bad old days, as described by Weightman—only now they can buy good cocoa at the grade 3 price and sell it at the grade 2 or grade 1 price:

> The problems experienced with cocoa quality have been similar to those with copra, in that until recently there was no formal inspection and grading and only larger producers could benefit from selling on consignment. Cocoa of any quality not bought on the beach by one trader was likely to be bought by the next that came along, and the good and the bad—including even unfermented and smoke-dried beans—were mixed and sold as one lot. Nevertheless, thorough producer education has greatly improved the quality of processing, and the main reason for any continuing discounting of Vanuatu cocoa is the smallness of its bean size (Weightman, 1989:213).

One solution to the problem would be to re-establish a buying point on Malekula. This venture would be likely to give a high rate of financial return to farmers and a good economic return to the nation. If the Northwest Malekula farmer depicted in Table 15 sold to a grading point on Malekula and received the Grade 2 price of 90 vt per kg, this would increase the returns to labour to 600 vt per person day, a nearly 40 percent increase (Table 20).

Table 20 Cocoa planted and beans sold to a grading point: with a planting area of 2,000 sq.m. in three successive yam gardens

Year	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Total**
Number of trees	300	600	900	900	900	900	900	900	900	900	
Yield per tree (kg)	0	0	0	0.05	0.1	0.2	0.4	0.5	0.6	0.7	
Production (kg)				45	90	180	360	450	540	630	
Sales @ 90 vt per kg (Grade 2 buying point)					4,050	8,100	16,200	32,400	40,500	48,600	56,700
Cash expenditure	4,500	4,500	9,700	816	6,632	2,164	8,328	3,960	9,492	5,024	**55,116**
Polybags	4,500	4,500	4,500								13,500
Drier materials			5,000		5,000		5,000		5,000		20,000
Bags				100	200	300	600	800	900	1,000	3,900
Transport of beans @ 300 vt per bag					216	432	864	1,728	2,160	2,592	3,024
Rat bait			200	500	1,000	1,000	1,000	1,000	1,000	1,000	6,700
Net revenue	(4,500)	(4,500)	(9,700)	3,234	1,468	14,036	24,072	36,540	39,108	51,676	**151,434**
Family labour (person days)											
Clearing (attributed to garden)											
Digging holes	4	4	4								
Shade management			5	7	7	3	3	3	3	3	
Weeding				2	4	6	3	3	3	3	
Pruning			1	5	5	5	5	5	5	5	
Picking and cracking				2	3	6	13	16	19	22	
Building drier				4							
Fermenting				1	1	1	2	3	3	4	
Marketing (carrying beans to transport)				1	2	4	7	9	11	13	
Sub-total	**4**	**4**	**10**	**22**	**22**	**25**	**33**	**39**	**44**	**50**	**253**

Average labour per annum **25** person days

Average annual gross margin per area (1.5 ha) **15,140 vt**

Average return for family day of labour **600 vt**

At a national level also, the economic returns from an investment in establishing a buying point on Malekula are likely to be substantial. Assume that the buying point led to only a 10 per cent increase (around 50 tonnes) in Grade 1 cocoa, and 20 per cent increase (around 80 tonnes) in Grade 2. The increase in revenue from upgrading 50 tonnes of grade 3 to grade 1 would be worth 2.1 million vt, and the upgrading of 80 tonnes from grade 3 to grade 2 would generate a further 1.2 million vt. Such an investment would be built on the strength of an established export crop and cropping system. It could be expected to be far more successful and beneficial than any amount of effort to promote fashionable but unrealistic produce exports, such as root crops, ginger, or fruit.

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[3] The location where taro Niue is grown can adversely effect its acceptability to the Samoan community. Taro Niue grown on Taveuni is highly regarded, while the same variety grown on Viti Levu (known in New Zealand market as mainland taro) is discounted as inferior taro.

[4] The large monoculture plantings on Fiji's main production area on the islands of Taveuni, with excessive use of weedicides, may not be sustainable and may be susceptible to an eventual outbreak of blight. However, it should be noted that taro leaf blight has only been a disaster in locations that are hot and wet for at least ten months a year (i.e. parts of PNG (Bougainville, Manus, most of New Britain, inland Sepik), Solomon Islands, and now Samoa (Mike Bourke: personal communication).

[5] In June/July 1999 AQIS finally requested confirmatory tests were undertaken at the Nadi HTFA facility. The protocol required by AQIS for these tests was far more demanding than that required by NZ MAFF and USDA/AQIS. However these standards were achieved and is now contemplated that Fiji will commence papaya exports to Australia early in 2000.

4 Recommendations

From the previous analysis, these recommendations are presented as ways to improve the linkages between market development and farming systems.

1. Greater attention needs to be given to the project planning and policy analysis capability in Departments of Agriculture. Mechanisms also need to be devised to more fully integrate policy analysis into the decision making process.

2. Governments and donors need to give greater priority to investing in appropriate infrastructure as a way to facilitate agricultural development.

3. Greater priority should be given to maintaining current agricultural census data.

4. Agricultural censuses in Pacific island countries need to be more production orientated and pay greater attention to measuring self-sufficiency food production.

5. Agricultural census data should be linked to the national accounts in order to provide a more accurate measure of the economic contribution of food crop production.

6. Departments of Agriculture should prepare up-to-date farm management manuals and systematically and regularly update them, with quality control provided from the farming community.

7. Farm management manuals should include budgets for small holder cropping systems and traditional crops for both sale and household consumption.

8. Extension officers should be trained to prepare and use farm budgets for traditional cropping systems and crops.

9. Sustainability and risk considerations should be incorporated into farm management manuals and cropping models.

10. Risk and sustainability issues should have a more central place in agricultural extension programs.

11. Increased labour productivity within existing farming systems should be promoted. Farm management budgets should be used as an extension tool to promote increased labour productivity.

12. A comparative regional study should be undertaken on the role of middlemen and traders in produce market development. The aim of this study would be to come up with practical recommendations to improve marketing linkages.

13. A comparative regional study should be undertaken on the impact of market regulations on domestic produce market development. The aim of this study would be to develop practical recommendations on the most appropriate regulatory environment to expand produce marketing, particularly in urban areas.

14. Promoting middlemen and produce traders should be an important component of any program to encourage small business and entrepreneurial development.

15. A co-ordinated effort should be mounted by Pacific island countries to have New Zealand non-host fruit fly host protocols accepted as the international standard.

16. Technical assistance should be provided in the preparation of submissions to quarantine authorities in importing countries. This would include the collection and presentation of quarantine risk assessment data.

17. Strategic investment in marketing infrastructure should be made to facilitate increased returns for improvements in quality.

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