Increasing Rural Incomes: An Evaluation of Three Rural Sector Projects in Samoa

Quality Assurance Series
No. 19 July 2000

AusAID
The Australian Government's Overseas Aid Program

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ISBN 0 642 44875 2

ISSN 1442 - 7176

Further information on this publication can be obtained from the Performance Information and Assessment Section, AusAID, GPO Box 887, Canberra ACT 2601. The report is available on the Internet at www.ausaid.gov.au

Designed by Spectrum Graphics *www.sg.com.au*

Printed by CPP Instant Printing

Cover photograph: Taro: the Samoan national food.
Photographed by Jon Cook

CONTENTS

LIST OF FIGURES AND TABLES

LIST OF BOXES

ABBREVIATIONS

FETP	Fisheries Extension and Training Project
FSP	Farming Systems Project
MAFF	Ministry of Agriculture, Forests and Fisheries (previously MAFFM including Meteorology)
PRA	Participatory Rural Appraisal
TPLSP	Training Personnel in Livestock Sector Project

CROPS AND DISEASES

taro	}		(*Colocasia esculenta*)
taro *palagi*	}	Pacific region root crops	(*Xanthosoma sagittifolium*)
taamu	}		(*Alocasia macrorrhiza*)
taro leaf blight		A fungal pathogen of taro	(*Phytopthora colocasiae*)

GENERAL INFORMATION

Notes

1. The fiscal year is from July 1 to June 30 and is referred to as eg, 1998/99. Calendar years are referred to as eg, 1999.
2. The government refers to the Samoan government.

Currency Equivalents

In this report, S$ refer to Samoan dollars, known as tala. Australian dollars are referred to as A$

Mid-rates

March 1994	S$1.64 = A$1.00	S$1.00 = A$0.610
March 2000	S$1.90 = A$1.00	S$1.00 = A$0.526

ACKNOWLEDGEMENTS

The evaluation team acknowledges with thanks the assistance given to the team by many agencies and individuals. In particular the staff of the three divisions of MAFF, Agriculture, Livestock and Fisheries, provided much support and advice. Agriculture Extension and Fisheries Divisions took the time and effort to arrange village meetings, which contributed substantially to our understanding of the issues facing rural Samoa. Villagers went to great lengths to assemble key people, were open in their responses and very hospitable.

EVALUATION TEAM

- Jon Cook - team leader/evaluation specialist
- Satish Chandra - agricultural specialist/AusAID task manager
- Peggy Fairbairn-Dunlop - gender specialist
- Maiava Peteru - social and institutional specialist

This study represents the views of the evaluation team and not necessarily those of the Australian or Samoan governments.

MAP OF SAMOA


Samoa
National capital
District boundary
Road
Administrative districts are used only in the operation of government services and have no capitals.
0 10 20 Kilometers
0 10 20 Miles
Lambert Conformal Conic Projection, SP 9 20S/14 40S
PAPUA NEW GUINEA
SOLOMON ISLANDS
KIRIBATI
TUVALU
SAMOA
Coral Sea
VANUATU
FIJI
TONGA
New Caledonia (FRANCE)
SOUTH PACIFIC OCEAN
AUSTRALIA
Tasman Sea
NEW ZEALAND
SOUTH PACIFIC OCEAN
SAMOA ISLANDS
Savai'i
Upolu
VAISIGANO
GAGAIFOMAUGA
GAGA EMAUGA
FA'ASALELEAGA
PALAULI
SATUPA'ITEA
TUAMASAGA
ATUA
A'ANA
Apolima Strait
SOUTH PACIFIC OCEAN

BASIC PROJECT DATA

All financial data in these datasheets are expressed in Australian dollars

FARMING SYSTEMS PROJECT

Counterpart Agency: MAFF

Managing Contractor: International Development Support Services Pty Ltd

	Phase 1	Phase 2	Total
Technical assistance (planned person-months):			
Long-term advisers	78	63	na
Short-term advisers	24	24	na
Project Costs (A$'000):			
Planned			
Govt of Australia	2892	2488	5936
Taro leaf blight component (added)	556		
Govt of Samoa	323	314	723
Taro leaf blight component (added)	116		
Actual			
Govt of Australia	3462	2400	5862
Govt of Samoa	439	314	753
Total project cost	3901	2714	6615
Key Dates:			
Feasibility Study / Design Document	September 1991	not undertaken	
Phase commencement	May 1992	October 1995	
Project Implementation Document	February 1993	September 1995	
Mid-term review	March 1995	June 1997	
Project Completion Report	na	September 1997	
Project Completion	May 1995	September 1997	

TRAINING PERSONNEL IN LIVESTOCK SECTOR PROJECT

Counterpart Agency: Livestock Division, MAFF

Managing Contractor: GRM International Pty Ltd

	Phase 1	Phase 2	Total
Technical assistance (actual person-months):			
Person-months			
Long-term advisers	0	30	30
Short-term advisers	8	17	25
Project Costs (A$'000):			
Planned			
Govt of Australia	1412	1641	3053
Govt of Samoa	na	260	>260
Actual			
Govt of Australia	862	1926	2788
Govt of Samoa	61	260	321
Key Dates:			
Feasibility Study / Design Document	August 1990	not undertaken	
Phase commencement	June 1991	May 1996	
Project Implementation Document	August 1991	April 1996	
Mid-term review	February 1995	na	
MOU signed	na	September 1996	
Project Completion Report	na	April 1999	
Project Completion	May 1996	May 1999	

FISHERIES EXTENSION AND TRAINING PROJECT

Counterpart Agency: Fisheries Division, MAFF

Managing Contractor: International Development Support Services Pty Ltd

	Phase 1	Phase 2	Total
Technical Assistance (actual person months):			
Person-months			
Long-term advisers	144	201	345
Short-term advisers	10	34	44
Project Costs (A$'000): Planned			
Govt of Australia	2669	3268	5937
Govt of Samoa	na	260	na
		2580[a/]	
Actual			
Govt of Australia	2470	na	
Govt of Samoa	na	na	
Key Dates:			
Feasibility Study / Design Document	July 1994	August 1998	
MOU signed	February 1995	July 1999	
Phase commencement	March 1995	February 1999	
Project Implementation Document	October 1995	na	
Mid-term review	October 1997	na	
Project Completion Reports	December 1997 / August 1998	na	
Project Completion	August 1998	January 2002	

a/ The Samoa Fisheries Project inception report indicates a counterpart funding amount of S$5.6 million but provides no details. The estimate from the project design document was A$260,000.

EXECUTIVE SUMMARY

EVALUATION OBJECTIVES

This study analyses three rural sector projects supported by AusAID in Samoa over the period 1991 to 1999, as follows:

- Farming Systems Project (FSP),
- Training Personnel in Livestock Sector Project (TPLSP), and
- Fisheries Extension and Training Project - Phase 1 (FETP).

The projects were implemented by Samoa's Ministry of Agriculture, Forests and Fisheries (MAFF). FSP was mainly implemented by Research, Extension and Crops Divisions, TPLSP through Livestock Division and FETP through Fisheries Division.

This evaluation presents the findings of a mission to Samoa in March / April 2000. It assesses the performance of the projects in achieving their income generation objectives and the sustainability of development outcomes. In all three projects, income generation was a 'high order objective', or in logframe terminology, was represented in the project goal. The study therefore focuses on project impact. Aspects such as project effectiveness, efficiency and management are only assessed to the extent that they affect incomes. The report structure has been streamlined from that of a cluster evaluation, which has chapters covering each of the projects in the cluster. A more thematic approach has been attempted in this report, although objectives and results are described for each project.

The evaluation is based on a review of project completion reports, other project documents, and discussions with AusAID staff and several Samoan government agencies. Field evaluation was undertaken in a total of 30 project and non-project villages.

Limited data were available from MAFF or project records to support the evaluation. None of the projects placed much emphasis on monitoring. This, combined with the recent completion of the projects made it difficult to assess income impacts objectively. Since these impacts are at the 'goal' level, they also are affected (either positively or negatively) by a range of other policies, programs and projects.

PROJECT GOALS

FSP was intended: *"to create increased rural opportunity and raise farm income in Samoa through improved and sustainable farm production and developing economically viable crops for production by farming communities within ecologically sustainable farming systems."* It was implemented in two phases from 1991 to 1997. In 1993, taro leaf blight resulted in an almost total loss of taro, Samoa's main cash crop. Taro exports fell from 200,000 cases worth S$9.5 million in 1993 to 2,000 cases and S$200,000 in 1994. Some larger producers lost around 75 per cent of their income. The resolution of this problem became the main focus of the project.

TPLSP was intended *"to promote livestock development on a sustainable basis through improving the skills of all MAFF staff working with livestock in order to provide additional livestock products for local consumption"*. Commencing in 1991, the project initially focused on overseas tertiary training. However, following a mid-term review, it was decided that this approach was not likely to achieve project objectives. A second phase was therefore proposed to develop the skills of livestock farmers and support staff, mainly through in-country short courses. The project was completed in 1999.

FETP's (long-term) goal was *"to achieve an improved standard of living for Samoan fishers and their families, and increase supplies of local seafood"*. This was to be achieved through the development of community-based management of lagoons and reefs. Phase 1 of the project was implemented between 1994 and 1998. Phase 2 is ongoing and is known as the Samoa Fisheries Project.

PROJECT OUTCOMES AND IMPACTS

Income generation impacts

Although the time since completion is short, the projects are considered to have good prospects of achieving their income-related objectives, provided the MAFF continues to provide resources at current levels, including recurrent cost financing.

In the cropping sector, farm incomes have recovered substantially from their low levels of 1992-95. FSP is expected to have a significant impact on household cash and non-cash incomes. The taro introduction, breeding and distribution program initiated with assistance from the project has had widespread impact, though not yet at a level sufficient for substantial exports to resume. Some recovery in both taro and banana incomes is already evident through wide acceptance of cultivars resistant to taro leaf blight and banana leaf streak disease. Households have diversified their income sources and diets following the loss of taro, and are growing more *taamu*, taro *palagi*, bananas, vegetables and *kava*. *Taamu* has replaced taro as the most important root crop in the diet of Samoans and exports provide significant income for some growers. The improved research / extension linkages, stronger and more participatory extension service and likelihood that new taro varieties will be released shortly are expected to enhance the project's long-term impact. The potential gain from achieving pre-1993 taro cash incomes for a major taro-exporting or selling household is estimated at S$3,000 - 6000 per year, depending on distance from Apia.

TPLSP has provided new skills and knowledge to Livestock Division staff and cattle owners, but the longer-term sustainability of these achievements is in some doubt. The larger cattle farmers are able to earn high incomes, due to the high demand for cattle for ceremonial purposes. Productivity is often constrained by poor husbandry and pasture management, with cattle often treated as a secondary enterprise to business or other farming activities. The impact on the majority of smallholders who own pigs, poultry or a few cattle was limited or non-existent.

FETP's main impact to date has been on conservation and the environment in both project villages and in the wider community. It has contributed to recovery of both the lagoon environment and fish stocks from destructive fishing practices and the cyclone damage of the early 1990s. Few data are available to estimate income impacts, since most production from the lagoons and reefs is for subsistence or local sale and data are not collected by MAFF. Recovery of potential yield to the levels of the 1980s is expected over the longer-term, though a major cyclone could set back the recovery.

Cross-cutting outcomes and impacts

The projects' main institutional outcomes relate to the strengthening of the extension services in the three divisions of MAFF. The divisions are now operating at a higher level of efficiency and adopting a client-focused systems approach, which recognises both the needs and the strengths of Samoa's smallholders. The projects have contributed to improvement in the status of MAFF in the eyes of its clients. From being an institution that was deemed largely irrelevant except for the provision of subsidised inputs, MAFF is now seen by many as providing a useful service. Villagers with regular contact with the extension service welcome the relationship, although in some areas, this support continues to depend on 'handouts'.

FSP and FETP have had a significant impact on the cost structures of MAFF, mainly through the growth in and increased mobility of the extension services. As the government moves to output-based budgeting and withdraws from commercial activities, it is expected that the effect of the projects on MAFF budgets will be manageable.

A number of gender-related issues were noted during evaluation:

- women are employed in all three extension services. They are competent and well-accepted by their clients, both male and female;
- many women felt that they did not have access to the agricultural information they needed to maintain or upgrade their agricultural activities; and
- the introduction of village fish reserves has made shellfish collection more difficult for some women (and also for older men) by restricting access.

Of the three projects, only FETP had specific environmental objectives. Its overall performance has been positive. Building on traditional management practices and providing village communities with the power to enforce regulations has resulted in a high level of ownership of the project, and a commitment to conservation in virtually all villages visited during field evaluation. The environmental improvements noted are not only due to the project. It is now eight years since the last major cyclone, and some degree of recovery would have occurred even without the project. The tilapia introductions supported by the project may have adverse environmental impacts in some areas.

Benefit attainment and sustainability

At the end of the projects, the recovery of agriculture and fisheries from the constraints they had faced in the 1990s was only partially complete. Food supplies in the villages appear to have returned to pre-cyclone and taro blight levels and diet is more varied in many areas. All families or groups interviewed indicated that their subsistence needs were now being met from their gardens and plantations. While many farmers had re-established farming systems that provided them with adequate cash incomes, no real replacement has been found for taro as a cash crop for local sale or export. The full benefit of the projects will take a number of years to emerge. In part, the rate of benefit attainment will depend on the ability of the MAFF extension services to target a higher proportion of villages.

Samoa's farmers have long adopted a systems approach to their farming operations. They have an understanding of risk and invariably fit their agricultural (or fishing) activities around a complex web of family and social obligations. As new (and proven) technology emerges, they adopt it rapidly provided that opportunities and resources are available. The increased understanding of the farming system by the extension officers and their adoption of a systems approach are likely to allow the gains made under the projects to be sustained and built on.

The 1990s were a period of rapid change in the Samoan public sector. In particular, budgetary and staffing constraints have affected project outcomes. However, MAFF has attempted to provide sufficient staff resources and recurrent budget to implement and follow-up all three projects. The greater efficiency which should result from public sector reform combined with the proposed withdrawal by MAFF from a number of activities (such as the ownership of livestock farms) should assist in allowing adequate funding for the extension services. The continuing growth in the economy and generally stable macro-economic conditions set Samoa apart from most Pacific island nations and result in optimism about both future national development and the long-term benefits to income from the three projects.

ISSUES

A number of issues have been identified which affect project performance and, more generally, the potential for rural sector projects to contribute to income generation or poverty reduction.

Project design and scope

Project experience confirms the conventional wisdom that the tighter and more clearly defined are the project objectives, the greater the prospects for success. Future projects in the natural resources sector in the Pacific should generally:

- have clear objectives in relation to income generation, poverty alleviation and benefit distribution;
- keep institutional strengthening distinct from technical objectives;

- avoid shortcut approaches to design, though it is appreciated that relatively small-scale projects cannot afford high design costs;
- include socio-cultural expertise on the team where a project seeks to influence smallholder or fisher behaviour (as in the case of FSP and FETP); and
- where they seek to promote export marketing of commodities, conduct careful risk analyses in relation to markets, prices, quality, comparative advantage and quarantine.

Training and institutional strengthening

The retention of trained staff remains an issue for MAFF and other government agencies. Low salary levels compared to the private sector and differentials for similar jobs between departments can lead to staff loss. All projects had institutional strengthening objectives and all identified that institutional development is a long-term process. Ideally, a long-term perspective should be adopted from the start and supported by training needs analysis, as undertaken at the start of FETP.

For both TPLSP and FETP, local short courses proved preferable to formal academic training. Overseas tertiary training may remove key staff from the implementing agency for extended periods and risk their resignation on return. However, distance education remains a potentially viable option for Pacific region institutional strengthening projects. It needs to be carefully planned, tailored to the needs of the student and the project and supported through (for example) work release and mentoring.

Benefit distribution

A number of issues are evident in relation to benefit distribution:

- lack of access to or knowledge of the extension services by non-targeted individuals (including women) or villages (particularly those which are smaller and more remote);
- slow expansion to a national program by all three services, due to lack of MAFF resources (FSP and TPLSP) or the relatively long process required (FETP). However, it is notable that some level of agricultural extension is now being provided in about half of Samoa's villages; and
- the relationship between affluence / power and access to project-related resources (such as offshore boats or livestock).

Participation

The implementation of FSP and particularly FETP was participatory. The move to farmer groups for extension under FSP and the use of participatory rural appraisal have led to a more inclusive and responsive extension system. FETP undertook one of the most

intensive participatory exercises attempted in fisheries management. The consultation process using village institutions has resulted in a high level of ownership and motivation by villagers. Fisheries and agriculture extension officers appear to have responded well to the participatory approach and to understand its implications. While group extension is effective, the process of forming groups can exclude farm households on the basis of religion, family ties, gender or other factors.

Adoption

Farmer and fisher adoption of agricultural and fishing technologies were long-term goals in FSP and FETP. Adoption depends on identified needs - the users must know what they want and the providers must know what to give them. Under FSP, this match occurred in taro and bananas, but not in ginger. Understanding farmers' and fishers' needs is central to technology dissemination in the rural sector. Successful technological developments were: (a) wanted by the farmers or fishers; (b) fitted-in with the social fabric and dynamics of the households and villages; (c) were promoted by project resources and MAFF support; and (d) considered acceptable risks by farmers and fishers.

The projects gave little weight to marketing and economics as opposed to technical and agronomic factors. In future, the extension service will need to develop a broader view of development than it has to date. It should be able to learn much from the private sector commercial growers, who keep abreast of market, financial and technical developments. Institutions such as the taro breeders club can assist all stakeholders, and consideration could be given to extending this approach to other crops with export potential, such as flowers and *kava*.

CONCLUSIONS

The three projects have contributed to the development of Samoa's rural sector over the past decade, and assisted recovery from a series of natural or human-induced disasters.

Farming Systems Project has assisted in the introduction of an improved extension system that is servicing a large number of clients using farm groups as the point of contact. Extension is now provided to almost 270 farm groups in 160 villages, though sometimes on a sporadic basis. Research and Extension divisions are working well together and are developing extension messages and distributing improved or new planting material to farm groups. The farming system has changed significantly since the twin threats of crop damage by cyclones and taro leaf blight. The development and operational effectiveness of the taro breeding and multiplication work have exceeded expectations, with over one million taro plants distributed to farmers in the last two years.

Training Personnel in Livestock Sector Project trained several Livestock Division staff during Phase 1 but effectiveness was limited by the subsequent loss of staff. The move to training days and short courses for farmers and MAFF staff under Phase 2 proved more successful and sustainable, and has had an impact on cattle production in Samoa. This fitted in well with government policy, but limited the distribution of benefits to relatively

few and generally larger cattle owners or intending owners. The reach of livestock extension remains limited.

Fisheries Extension and Training Project substantially exceeded its targets with respect to the establishment of village fishery management plans and small reserves. The conservation ethic appears to have been widely adopted in most of coastal Samoa, to which the project has made a significant contribution. A number of offshore boats are fishing up to or beyond the levels envisaged. The project's aquaculture subcomponents have been less successful to date and there are concerns about Fisheries Division's capacity to extend coastal fisheries management to a national level. Some of the tilapia introductions under the project may have negative environmental effects and introductions under phase 2 of the project have been halted pending further environmental assessment.

The main lessons which can be drawn from the projects are that:

- Increasing rural incomes in the Pacific is a complex process that a participatory systems approach is well-suited to assist.
- While specific approaches need to be tailored to the requirements of villagers, in general terms, smallholders and small-scale fishers are keen to work with change agents such as extension officers and are quick to adopt new technology once it is proven.
- Co-management (between resource owners and the government) has been demonstrated as a useful approach to inshore resource conservation.
- The ability of the projects to change in response to changing circumstances was notable. However, changes need to follow detailed analysis or, if necessary, trials.
- Beneficiary participation at all stages in the project cycle is highly desirable for projects that seek to influence the attitudes and behaviours of rural dwellers.
- The need for specific targeting, if benefits are to extend to lower socio-economic groups.
- Design teams require sufficient time in the field to be able to undertake a detailed participatory process involving all classes of stakeholder. Partner governments also need to make a commitment to supporting participatory processes.

1. INCOME GENERATION BACKGROUND

1.1 DEFINING AND ASSESSING INCOME GENERATION

This report discusses the findings of a thematic cluster evaluation. It assesses the extent to which the projects have succeeded or are likely to succeed in meeting their income generation objectives. Income generation relates to all activities that influence cash and non-cash incomes and other tangible benefits. Project components and activities that did relate directly or sometimes indirectly to short- or long-term income generation are assessed.

The key beneficiaries targeted by the projects were Samoa's farmers and fishers. In addition, the research and extension staff of MAFF benefited from increased knowledge and capacity through training. Most income-raising activities under the projects related to increasing the productivity of land (or sea), labour and capital. This is not to undervalue the less tangible social, gender and environmental gains made as a result of the projects. These can also affect household income, benefit distribution and sustainability and are also analysed where appropriate.

Income generation was a goal for all three projects. It can therefore be considered as a 'high order objective', and one that is also affected by a range of other projects and programs. In addition, TPLSP had been completed for less than 12 months at the date of evaluation, while the second phase of FETP is ongoing and is referred to as the Samoa Fisheries Project. FSP mainly worked with pilot villages and project impact will depend on the success of MAFF and other agencies in extending farming systems and knowledge to other districts and communities. Full assessment of impact will only be possible about five years after the completion of the projects, and the conclusions of this study therefore represent an initial assessment.

1.2 EVALUATION APPROACH

The evaluation was undertaken by a four-person team including a nominee from the Government of Samoa. Discussions were held with key government agencies and other stakeholders in Apia. Fieldwork was conducted in 30 villages, using a rapid appraisal approach, with individual and / or group interviews conducted in each village. The sample of villages reflected: (a) location, with villages selected from each region of both main islands and Manono; (b) involvement with project activities; (c) a control sample primarily comprising villages covered under one or two projects but not the other(s). The survey checklist related to villager perceptions of project activities, to extension and technology transfer. General questions related to changes in income over time and the factors affecting them, and the extent to which village incomes were affected by the projects and other factors.

The analysis of project impact depends largely on data availability. This proved to be a constraint to the evaluation, since none of the projects placed high priority on monitoring. Only FSP attempted a baseline survey and this was not written up. Some secondary data were available and are referred to in the report. An agricultural census has

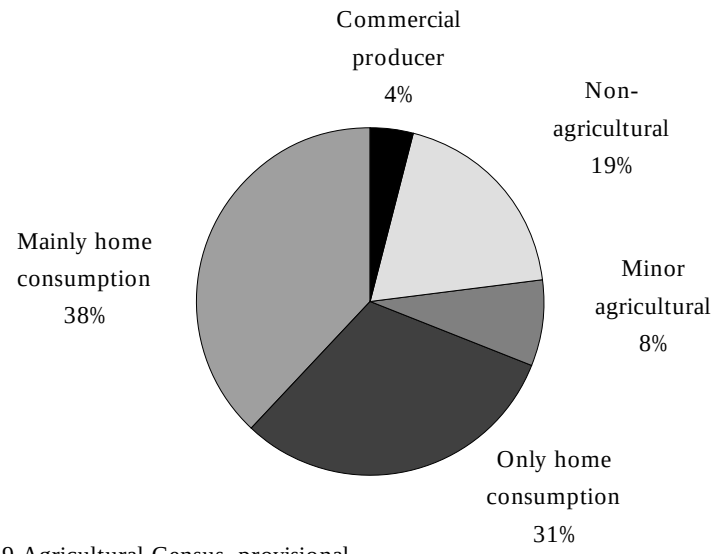
been completed and was being analysed during the evaluation mission. Limited tabulations were available for livestock but not for other sectors. When available, the census report will provide a useful comparison of the agricultural sector in 1989 and 1999.

Copies of the draft report were provided to the Samoan government and AusAID staff for review. Comments received were considered in finalising the report.

1.3 SAMOAN COUNTRY AND RURAL CONTEXT

Samoa is a small, open economy. It shares many of the physical, cultural, economic and social characteristics of other Pacific island states, including small size, isolation from trading partners, reliance on agriculture and fishing and vulnerability to natural disasters. The damage to national infrastructure due to cyclone Val (1991) was estimated at over S$500 million, excluding the costs to families whose houses and crops were destroyed.

Figure 1 Household distribution by class of agricultural production, 1999



Source: 1999 Agricultural Census, provisional

Agriculture contributes around 12 per cent to GDP (Table A.1, Annex A) and provides a livelihood for almost three-quarters of the population (Figure 1). Aggregate production is around S$70 million of which livestock contributes about one third (based on estimates made by TPLSP). Extended family units are the major producers, under the leadership of the family head. Mixed farming is practised on these smallholder units, often including poultry and pigs. An increasing number of households own a few cattle, which have gained importance as a cash reserve and an important part of ceremonial contributions. While there are traditional male / female roles in the production cycle, the agricultural workload is usually shared. The exception is fishing - where women and older men glean the lagoons and inner reefs while younger men fish the outer lagoons, reefs and sea. Most production is small-scale and labour intensive, involving the use of basic tools. Taro,

coconut, *taamu*, bananas and cocoa have been the major semi-subsistence crops. Diseases and pests such as taro leaf blight (which devastated the country's major cash crop in 1993), the African snail (which has recently spread to Savaii) and fruit-piercing moth also limit agricultural production. Deforestation and increased cropping in water catchments are contributing to erosion as well as affecting rivers, water supplies and lagoons. About 82 per cent of land is held under customary tenure, through the family head. Fringing lagoons and reefs are 'owned' by the state, though villages have a large measure of de facto control.

In Samoa's communal systems (the *faaSamoa*), families value products for home use (food security), use in *faalavelave* (reciprocal and ceremonial use) as well as for sale. Despite an increase in cash cropping, a family's main aim often remains to produce goods for family use and for exchanges, selling only the surplus. Cropping decisions involve assessment of the potential of each crop to meet these objectives. For example, taro, cattle and pigs are 'triple-use' items, while pigeon pea is a cash crop and less likely to be included in cropping systems. Product use involves the balancing of the social and economic values of the product at the time of harvest and for the foreseeable future.

Fishing has been a central feature of Samoan life since the islands were settled some 3,000 years ago. Samoa's inshore fishery continues to focus on gleaning in the lagoon, almost entirely by women, spearing in the lagoon and on the reef using elastic powered spears, often using torches at night, and more recently gillnetting. Over the last 20 years, the offshore fishery has expanded, with the Samoan aluminium catamaran (the *alia*) widely used for trolling, drop-lining and since the mid-1990s for tuna long-lining. The longline fishery now occupies about 150 *alias* and a number of larger vessels. It is Samoa's major export earner, with exports of 5,000 tonnes and revenues of S$35 million in 1998/99. Subsistence production amounts to an estimated 4,400 tonnes worth S$18 million, up from around 3,200 tonnes in 1990 according to Fisheries Division's 1998/99 report.

Each of Samoa's 360 villages and sub-villages is a semi-autonomous entity under the leadership of a council of chiefs (the *fono*). Other groups within the village often include the wives of titled men (the *faletua/tausi*), the women's committee (the *komiti*), the village untitled men (the *aumaga*) and the unmarried women and girls (the *aualuma*). Most village development projects proceed through one or more of these institutions or through more recent community groups which include church committees, farmer groups, sporting teams and groups affiliated to national NGOs such as the YMCA.

Most villages and some sub-villages elect a *pulenu'u* (government/village liaison officer). These were introduced in the 1920s, and over the period since 1978 have assumed more responsibility for village administration. They are paid by the government and are the key link between the government and the village, particularly since the *pulenu'u* executive committee was established in 1996, under the Ministry of Internal Affairs. The *pulenu'u* in each village is a *matai* (chief), elected by the village council for a term of three years. They have played a central role in the projects being evaluated.

1.4 PROJECT DESCRIPTIONS

The rationale for and main objectives of the three projects are described in the following sections. Their main outputs with relevance for income generation are also summarised. Project outcomes and impact are discussed in Chapter 2.

1.4.1 Farming Systems Project (FSP)

Project background and objectives

FSP was initially proposed by the government as a tree crop rehabilitation project for cofinancing with Germany. It was intended to rehabilitate coconut and other tree crops following the devastation caused by cyclone Ofa in early February 1990 and to strengthen the extension service. A design study was undertaken by AusAID's Pacific Regional Team in 1991, which focused on increasing the quantity and quality of tree crop production and marketing and strengthening the extension service, using a farming systems approach (see Box 1). The project was intended to build on the prior AusAID-funded Cocoa Project and complement ADB's Agricultural Development Program.

By the time the project commenced in May 1992, a second major cyclone (Val in December 1991) had caused further damage to Samoa's tree crops. This led to a decision by the project coordinating committee to redirect the project towards non-tree crops which were less prone to cyclone damage. The project implementation document was completed in February 1993 and defined the goal as being *"to create increased rural opportunity and raise farm income in Samoa through improved and sustainable farm production and developing economically viable crops for production by farming communities within ecologically sustainable farming systems."* The main project components were:

1. farming systems development, including research and extension sub-components;
2. institutional strengthening and human resource development;
3. production of improved planting materials;
4. improved processing and marketing; and
5. participation, involving target beneficiaries, the farm community and NGOs in agricultural development and project activities.

Project duration was planned as three years. However a review in March 1995 recommended a two-year extension in order to consolidate and extend the gains made under the first phase. Phase 1 was extended by four months to September 1995 to allow preparation of the Phase 2 implementation document. The project was made more focused, dropping components (3) and (5) and redirecting component (4) to providing limited support to MAFF's Quarantine Division.

Box 1 Farming Systems Development - a holistic approach to farm development

FSP was based on the concept of farming systems development (FSD). This is intended to develop farm household systems and rural communities in an equitable, sustainable and participatory way (FAO 1997). In a development sense, this is achieved through activities which are directed towards:

- assisting farm households to meet their basic needs;
- improving the welfare of farm households through increasing farm productivity and farm incomes (both cash and non-cash);
- enhancing the ability of farm households to manage their own development; and
- ensuring that the development changes introduced are sustainable.

The farm household is the central focus of FSD. The approach differs from the traditional 'top down' model of development. It treats the farm and farm household in a holistic way, and adopts a systems approach rather than one based on individual commodities or crops. It also treats farm family members as the main stakeholders in development and seeks to draw to the greatest possible extent on the farmer's own skills and knowledge.

The extent of adoption of appropriate technology by target households, and its replication in non-target households, is a good measure of FSD's success. The adopters and replicators under an FSD program should make sustainable net gains to their welfare and livelihood not possible in the without-project situation.

The project was expected to benefit about 8,000 (out of 14,000) farm households in both Upolu and Savaii, Samoa's main islands. Benefits were to be generated from increased agricultural productivity and through better understanding by farmers of their social, economic and physical farm environment, particularly in relation to crop diversification and plant diseases. The project was completed in September 1997 at a cost of about A$6.6 million of which Australia contributed A$5.9 million.

Achievements

An 'integrated extension system' was reported by the project completion report to have been implemented in around 15 villages in the three pilot districts. However, in practice, extension was limited to cropping. The scale of the participatory rural appraisal (PRA) exercises declined after the first two from a major effort involving the entire village and undertaken by a multi-disciplinary team including women. By project completion, a 'mini-PRA' approach was used due to the need to contain the requirement for resources and the difficulty of analysing the large amount of data produced by a full PRA. These involve a small team of extension staff usually meeting with a farmer group and undertaking a constraints and needs analysis.

Research on several crops was assisted in both phases, mainly through technical assistance. Much of the work under both Phases focused on taro leaf blight prevention or control. The tissue culture lab and greenhouse at MAFF's Nu'u Crop Development Station were provided with equipment and technical assistance and improved vehicle maintenance procedures implemented at the Nu'u workshop. The Economic Analysis and Planning Unit (EAPU) was supported with training, equipment and technical assistance in the production of improved economic and farm management data.

1.4.2 Training Personnel in Livestock Sector Project (TPLSP)

Project background and objectives

At project design in 1989, domestic production of meat contributed around 15 per cent of national consumption. High priority was placed by the government on increasing rural incomes and saving foreign exchange through increasing self-sufficiency in livestock products, particularly beef. A number of projects were assisting the livestock sector, including the AusAID-funded Beef Cattle Project. All had identified the low numbers of qualified staff as a constraint to the effectiveness of livestock extension and management. The problem was partly due to Livestock Division's difficulty in retaining graduates following their return to Samoa.

A brief (20-page) project design document was prepared by a consulting firm at the request of AusAID's Samoa desk. Project objectives were not clearly defined and no performance indicators were discussed apart from the number of staff to be trained. The goal of the project was *"improved and sustainable livestock productivity which will provide additional livestock products for local consumption"*. Phase 1 concentrated on overseas training for livestock staff.

Following a mid-term review in early 1995, it was decided that the international training approach was not likely to achieve project objectives. A second phase was therefore proposed, which would develop the skills of livestock farmers and support staff, mainly through in-country short courses. This reflected increased farmer interest in cattle production following the taro leaf blight epidemic.

The project's goal remained unchanged, but added the concept that livestock development should be *"environmentally positive and lead to improved socio-economic conditions of rural communities"*. Project objectives included: (a) strengthening MAFF's capability to manage technical and advisory services to livestock farmers; and (b) contributing to self-sufficiency in livestock products by increasing the on-farm adoption of proven technology. The project targeted MAFF's livestock and extension staff and livestock farmers. Project duration was eight years in two phases, from 1991 to 1999. Australia's contribution to the project was A$2.8 million out of a total project cost of A$3.1 million.

Achievements

Phase 1 focused on providing tertiary training to members of Livestock Division. Overall, 90 per cent of degree students and 70 per cent of diploma students successfully completed university courses. However, few of the 21 staff trained remained in the Division for long after their return, due to the lack of effective bonds and their greater employability following qualification. Many took up positions with banks, agricultural extension, other projects and NGOs or as agricultural teachers. Two later returned to the Division. Subsequent training (mainly in Phase 2) concentrated on in-country and overseas short courses and was more successful. Phase 2 (1996-99) moved towards community-based livestock training, including:

- working with existing and new farmer groups;
- community awareness programs for farmers, youth and women's groups;
- running on-farm demonstrations, training days and short courses in basic cattle husbandry and farming practices through to slaughtering and marketing; and
- the production and distribution of pamphlets and other materials.

Several approaches to training were adopted. The major objective was to impart knowledge and training skills to staff so that they could then conduct training for farmer groups in the field or at the Livestock Division. Key farmers were invited to these training programs to ensure that farmer input was available. These farmers were then expected to interact with other farmers in their own villages to create awareness and disseminate skills and information. In other cases, advisers assisted staff in training groups of farmers.

Some 60 farmer groups were established and 104 farmer field training days were held. Several courses were also run for women, NGOs and rural youth as well as for Livestock Division staff. Some courses included farmers and agricultural extension workers. Twenty-five training manuals were produced and distributed to Livestock Division, national library, university and college libraries and NGOs. A marketing study was prepared covering beef, dairy, pigs and poultry. Four paravets attended a six-week course in Australia on veterinary / animal husbandry techniques and two vets will complete tertiary training in the Philippines in 2001. A major achievement under the project was the setting up of a livestock support unit on Savaii. Previously all services and training were Apia-based.

1.4.3 Fisheries Extension and Training Project (FETP)

Project background and objectives

FETP was designed in the context of a highly degraded coastal environment. Fish stocks had been seriously depleted by overfishing, destructive fishing practices and by the cyclones of 1990 and 1991. As well as severely damaging most reefs, the cyclones destroyed many of the country's tree crops. The taro leaf blight epidemic in 1993 further reduced rural incomes and subsistence production, leading villagers to increase their

fishing effort and placing further pressure on coastal resources. The project goal was "*to achieve an improved standard of living for Samoan fishers and their families, and increase supplies of local seafood*". Project components included:

1. institutional strengthening of Fisheries Division;
2. improving the productivity and sustainability of inshore fisheries resources;
3. improving extension and communication within the fisheries sector; and
4. developing a sustainable and effective fisheries training program.

A fifth component was added during early implementation - alternative seafood development. This was intended to transfer fishing effort from over- to under-exploited areas and species and to introduce new techniques. This component had three outputs: (a) low technology village aquaculture; (b) the introduction of new aquaculture species; and (c) diversion of fishing effort to areas beyond the reef. An intermediate goal was also defined - "*to prevent further deterioration of Samoa's marine environment and inshore fisheries resources*".

Project design focused on giving fishing communities responsibility for managing their inshore resources under a 'co-management' regime with assistance from Fisheries Division. Phase 1 of the project commenced in 1994 and Phase 2 in February 1999, with a gap of around six months between the phases. Australia's contribution to Phase 1 was A$2.5 million. The second phase of FETP - the Samoa Fisheries Project - has shifted the focus of the project further towards commercial activities, particularly through the addition of a tuna longlining component. Aquaculture activities are also being expanded. Training and extension activities are being continued at a lower level.

Achievements

By the end of the first phase, the project had achieved or exceeded most of its physical targets. By August 1998, a total of 51 villages had management plans in place compared to a design target of 30. Of these, 46 had established village fish reserves compared to 3 pilot reserves envisaged. A further 9 villages had commenced negotiations, but had not proceeded with management plan establishment for a number of reasons. By the date of field evaluation, management plans had been developed for 60 villages (about one fifth of Samoa's coastal villages), of which 39 were in Upolu and 21 in Savaii. Almost all plans banned the use of dynamite and fish poisons and the crushing of coral. Most also banned rubbish dumping and introduced mesh size limits (Figure A.1 in Annex A).

Under the alternative seafood component, the project assisted in the design, trialing and distribution of 4.3 metre aluminium runabouts intended to fish on the outer reef slope. By the end of the Phase 1 extension, 30 vessels had been assembled by an Apia boat-building enterprise and sold to individuals and fishing groups in project villages for around S$10,000 (before a 65 per cent European Union micro-project subsidy). The second phase of the EU project commenced in September 1999 and boat numbers have now reached 34.

Two main species have been provided to villages under the aquaculture subcomponent - tilapia and giant clams. An average of 500 *Tilapia nilotica* fry and fingerlings have been distributed to 7 villages on Upolu and 7 on Savaii, increasing to 11 and 13 respectively by evaluation date. The project had distributed giant clams to 44 villages by Phase 1 completion in August 1998, increasing to 55 villages by April 2000. Both clams and tilapia have been distributed free, though villagers are required to develop and maintain facilities such as ponds or nurseries as well as looking after the stock.

2. PROJECT OUTCOMES AND IMPACTS

While the three projects had income generation objectives to a greater or lesser degree, the measurement of project impacts is difficult. FSP had explicit objectives in relation to income generation through the introduction of improved farming systems, but did not identify specific targets. TPLSP sought to achieve similar outcomes indirectly, through the training of MAFF staff and farmers. However, the links between TPLSP's outputs and income generation impacts are indirect and difficult to isolate. FETP's main project activities (strengthening extension and the improved management of inshore resources) would only be expected to influence fishers' incomes in the longer term. For all projects, income generation objectives were at the goal level, and thus interact with a range of other projects and programs. The projects had only recently been completed or were ongoing, meaning that only preliminary assessment could be made of project impact. Combined with a lack of baseline, implementation or impact survey data, the recent completion of the projects limited the ability of the study team to quantify project impacts.

The implementation of the projects coincided with a period of great difficulty for Samoa's rural industries. The loss of tree crops due to cyclones and of taro production due to leaf blight resulted in depression in farm incomes. Inshore fish resources had also been degraded by over-exploitation and cyclone damage. From this low base, it would have been expected that some recovery would have been achieved even in the absence of the three projects. This is exemplified by one village (Fagalii) which received no benefit under the FSP, where agricultural cash incomes were reported to have doubled in real terms since 1994/95.

2.1 PERFORMANCE OF MAJOR COMPONENTS

The outcomes of the main project components are discussed below. Project impacts on household income are assessed in Section 2.2.

2.1.1 Farming Systems Project

Generating technologies

The project is considered to have made a significant contribution to the ongoing development of appropriate technology. This has been primarily through the training provided to MAFF staff, through the farming systems oriented approach to setting research priorities and ensuring that research programs reflected farmers' needs.

The main research goal of FSP was to generate technologies for adoption and replication by farmers to raise income or increase food security. These technologies had to be appropriate to farm needs, financially viable and sustainable in the long-term. A number of husbandry packages were tried and tested, involving taro, bananas, *kava*, ginger, peanuts and vegetables. Technologies verified as acceptable were extended to farmers through the extension service. Successful technologies with potential for wide development impact are discussed below. Less successful approaches are also noted.

Taro leaf blight resistant cultivars. The most important income-generating technology developed during and after the project has been the leaf blight resistant cultivars of taro. When the blight outbreak occurred in 1993, the project quickly shifted resources towards taro breeding. This program has already made a substantial contribution to farmers' income through losses and costs avoided, eg, through the need to spray traditional Samoan taro. In the long term, the taro breeding program is expected to make an increasing contribution to farm incomes in most areas of rural Samoa, including the food security of poor subsistence and semi-subsistence households to whom taro is an essential food.

The taro breeding program initiated by MAFF and the project in 1996 (shortly before project completion in 1997), is now a collaborative effort between the Crop Development Station and the Alafua Campus of the University of the South Pacific near Apia. In summary, the program involves:

- import of blight-resistant cultivars from Philippines and Palau supplemented by collection of potentially resistant cultivars and wild lines from Samoa;
- breeding for blight resistance;
- screening for taste and yield;
- evaluation on farmers' fields; and
- release of acceptable varieties to farmers through the extension service.

From 10,000 progeny in 1996, 45 potentially resistant lines have been screened for further trials, for leaf blight resistance, taste and yield. Around 20 lines are now being multiplied at Nu'u of which around 8-10 show acceptable characteristics for final evaluation. Researchers are confident that a locally bred cultivar will be released to farmers within 12 months, an achievable target given the level of technical skills being applied to the program (see Box 2).

While the breeding program has been underway, several resistant cultivars of taro from Philippines and Palau have been released to farmers. The survey undertaken by the evaluation team confirms wide adoption of these varieties. Although some characteristics, such as cooking characteristics, were criticised by a few, most people spoke highly of them, and felt that they filled a niche left by the destruction of taro Samoa, the preferred variety before the outbreak of leaf blight (shown on the cover photo).

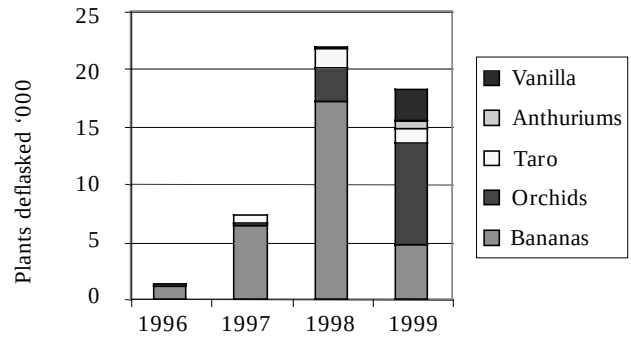
In addition to the extensive adoption of the new taro varieties, major impacts of the project reported by MAFF and observed during field evaluation included the widespread adoption of black leaf streak resistant goldfinger banana. This was supported by tissue culture multiplication of planting material. Limited use has been made to date of the disease-resistant *kava* and peanut varieties tested under the project and subsequently. However, the work will prove useful in the event of disease outbreaks in either crop.

Box 2 Taro - the Samoan national food

Taro is the most important staple food of Samoans. It has been grown in the Samoan islands for over 2,000 years. Over time taro has acquired an aura of a high status food and according to one Samoan author "is part of our heritage and a binding force for our tradition." During the 1980s, Samoa became a major exporter of taro for Pacific islanders living in New Zealand. Taro export earnings in 1993 reached S$9.5 million. In the same year leaf blight struck, destroying almost all taro in Samoa. Export earnings the following year fell to S$0.2 million. Supplies for local consumption were also devastated with Apia market throughput declining by 98 per cent. A taro breeding program to counteract the effects of leaf blight was therefore given top priority by the government. MAFF and the Alafua Campus of the University of the South Pacific are jointly working on a taro breeding program. This program, called Taro Genetic Resources: Conservation and Utilisation (TAROGEN), is being assisted by Australia. A taro breeders club of researchers, extension workers and farmers has been formed to promote effective technology transfer.

Some technologies that were extended proved unsuccessful, including the introduction of ginger and asparagus to farming systems without adequately identifying their markets. Ginger production failed to develop its intended export markets, primarily New Zealand. Economies of scale combined with quality of product, together with uncertain quarantine support and inability to secure market outlets, made it unlikely that Samoa could compete with established regional producers such as Fiji. Early experiences (1993-94) in promoting the crop were consequently unsuccessful. The domestic market became flooded with low quality ginger and returns to farmers were low. Ginger may still have potential as an export crop due to Samoa's long growing season, but will need further research to develop production systems that meet the needs of the export market. Asparagus promotion also failed, mainly due to dieback, fungal diseases and lack of interest by the 11 growers who had initially planted a total of 0.75 ha of the crop.

Figure 2 Tissue culture laboratory output, 1996-99



Source: Tissue Culture Laboratory

Tissue culture laboratory. The tissue culture lab at Nu'u, assisted under FSP, is central to the rapid multiplication of disease-resistant taro and banana varieties for field multiplication and transfer to farmers. In addition to several taro varieties, goldfinger banana and vanilla are also multiplied. Recently, flowers have been multiplied for the cut-flower industry. The lab has greatly increased its output since the end of FSP in 1997 (Figure 2). It is well-managed and has the capacity to make a continuing contribution, provided trained staff are retained and budget is available for inputs. The laboratory manager attributes about 50 per cent of its success to FSP.

Research-extension linkages

The research-extension linkage is fundamental to the adoption of new technology by farmers. FSP endeavoured to strengthen the research-extension linkages by several means, including:

- research and development of new technologies by staff from Nu'u Crop Development Station;
- promoting of these technologies to the extension staff;
- running courses for extension staff;
- training staff in farming systems development and placing them in key positions; and
- providing an umbrella under which the directors and staff of research and extension could collaborate.

Interviews with research and extension staff and field assessment indicate that the research / extension link remains at a high level, three years after project completion. The fact that the two divisions are located together at Nu'u has assisted in communication. This will be further enhanced by the current plan to combine research, extension and crop divisions, suggesting that MAFF has institutionalised the systems approach promoted by the project. A number of other initiatives also indicate that the research / extension link is effective, including:

- the establishment of the taro breeders club in 1999 (see Box 2);
- the continuing availability of simple leaflets for use by extension staff in getting messages to farmers; and
- the ongoing monthly workshops for research and extension staff at Nu'u, one of which was observed by the evaluation team.

Refresher courses are also given. Course topics are often suggested by extension staff as a result of discussion with their farm groups. The limited training budget prevents extension officers from Savaii from regularly participating in this training. However, the overall approach to training is sound, and compares favourably with practice in many South Pacific countries.

FSP supported degree studies for three current district extension officers and diploma studies for one. These officers have a good understanding of the farming systems approach, and are young and enthusiastic, leading to effective transfer of knowledge to farmers. In terms of sustainability of extension efforts, however, not all extension officer positions have been filled, with 10 vacancies at present out of 28 approved positions. Nine vacancies are in Upolu. Currently seven extension officers in Upolu are managing two districts each. The staffing shortfall is partly a function of public service employment restrictions and partly results from lack of suitable staff.

Overall, a positive project outcome is that the attitude of MAFF staff in relation to communication with farmers appears to have changed. The commodity-focused top-down approach which proved unsuccessful during the 1980s has been replaced by a more consultative and participatory approach, which is valued by farmers and farm groups.

Adoption and diffusion

Farm surveys carried out by MAFF in 1998 and 1999 indicated that farmers had established more than one million Philippines and Palau taro plants. Discussions with farmers and observation by the evaluation team confirmed extensive planting of new varieties of taro and banana in both Upolu and Savaii. This adoption is largely attributable to the transfer of knowledge and planting material by extension officers. Farmers interviewed were generally happy with the information and planting materials supplied and wanted more. However, the extension coverage of villages and farmers remains limited. Many villages visited were not being serviced regularly or at all by extension officers and had little access to technical information or planting materials.

The extent to which farmers have picked up technology from early adopters in the villages is less clear. MAFF staff state that Samoan farmers generally respond to price, taste, food security or perceived quality in relation to obligations. Replication of taro varieties and goldfinger banana has occurred, but is difficult to quantify. The group extension method in the villages has assisted adoption and diffusion, certainly more so than was common under the prior 'Training & Visit' method which targeted individual contact farmers who often failed to disseminate the knowledge.

It is likely that the anticipated locally bred cultivar of blight-resistant taro will be adopted quickly and widely replicated. This will raise the cash and non-cash income of farmers throughout Upolu and Savaii and assist customary exchanges. It also has the potential to allow exports to resume.

Varieties which succeed on the local market should also be marketable in New Zealand, since most potential buyers there are of Samoan and Pacific islander origin. A successful variety of taro in Samoa can thus capture a much wider and wealthier market in New Zealand, though it would have to compete with Fijian taro which filled the gap left by the loss of Samoan product. If taro exports reach 1993 levels, the incomes of taro farmers would be greatly improved. Potential annual benefits would be around S$5 million if 50

per cent of export returns are received by growers. This would average S$4,000 per taro exporting household if produced by the same number of export growers as in 1993. This would represent a significant increase in household income. The results of the taro breeding program thus have the potential for wide and sustainable long-term benefits.

Early adopters of a preferred taro variety released by MAFF are likely to be the larger commercial growers who are familiar with the breeding program. They will seek to create a market niche and make quick profits before most farmers are able to adopt or multiply a recommended variety. This was clearly demonstrated in case of a large-scale (20 ha) and knowledgeable farmer who has attended a number of taro breeding courses. From a standard quantity of planting material provided by the extension service, he quickly multiplied-up his plants and sold his production in American Samoa, where prices can be up to 200 per cent higher than in Apia. Despite freight, fares and the opportunity cost of time, he is making high profits. Commercial adopters can generate significant income.

TABLE 1 DISTRICTS, VILLAGES AND FARMER GROUPS, 2000

	Upolu	Savaii	Total
Districts	14	11	25
Villages serviced	88	71	159
Farmer groups	151	117	268
of which added in 1999/00	58	37	95

Source: Agriculture Division

In the case of ginger and asparagus there was little adoption or replication of the technologies. This was a clear response by farmers to market signals. A number of farmers lost money on the ventures, though fortunately the areas planted were limited. In both cases, it appears that the crops were promoted without sufficient knowledge of agronomic, quality or marketing requirements.

A total of 268 farm groups are currently visited more or less frequently by the agricultural extension service (Table 1). Because of logistics and staff shortages the desirable monthly visit to each farmer group is not being met. Instead, each farmer group is being visited three-monthly on average. The reduced number of visits is affecting the training of farmers. Efficient training is further constrained by lack of resources such as knapsack sprayers (around S$280 for a 10 litre unit), pruning equipment or transport to take farmers to demonstration sites.

Village interviews conducted by the evaluation team indicated that those farmers with access to extension were generally happy with the performance of the extension officers and MAFF. Several farmers spoke highly of the group approach to extension.

2.1.2 Training Personnel in Livestock Sector Project

When TPLSP began, government farms were major cattle producers. By the end of the project in 1999, almost all production was private. Cattle numbers reported by the 1999 agricultural census totalled 27,200, compared to 24,000 in 1988. The increase was due almost entirely to cattle imports.[1]

Training outcomes

Farmers and MAFF staff reported that the project trainers both taught basic skills effectively and encouraged problem-solving. They stressed the relevance of the training, the balance between theory and practice and the links between TPLSP and other livestock projects, including the UNDP / FAO pasture improvement project and the Australian cattle import scheme.

Training focused on larger-scale producers but was also provided to smallholders. Training opportunities were made available for Extension Division officers, but were seldom taken up, due to the demarcation between divisions and high workload of extension officers. In some areas, extension officers established cattle groups in response to farmers' needs and these were supported by Livestock Division. The training program is continuing, with 26 courses held in the 12 months since project completion.

Box 3 Training in cattle farm development and management

Cattle owners interviewed during field evaluation valued the training provided by TPLSP:

The training I received was the start for me. Before the training I just put my cattle out to graze. I didn't know about batiki and other grasses. They also gave some other grasses like koronivia for me to try. I tried them but found they were not so good on my land. So I use batiki more.

In Vanuatu we saw everything we had talked about... those farms became my goal. I am making my farm like that, so other farmers can come and see good pastures and stocking rates.

The slaughtering and marketing course was the best. We used to just cut down and sell all the meat at the same price - stewing steak and fillet. We learned how to cut the right way, and price our steaks. We are selling these in our shop and get much better prices - almost 30 per cent more for each animal.

Livestock technology

The project targeted livestock farmers or those with the capacity to commence livestock production. Training activities resulted in increased knowledge about pastures and stocking rates, breeding practices, record keeping, the use of salt blocks, feeding and

1 There have been three major importations, including 920 heifers and 45 bulls in 1994 / 95, distributed to 100 farmers, followed by 1,560 heifers and 110 bulls in 1995 / 96. Importation costs were paid by the government.

rations for pigs and poultry, animal health, stockmanship, animal housing and farrowing facilities, fencing and stockyards (see Box 3). Several farmers referred to record-keeping, and a number of meticulously kept record books were seen, noting every animal's class, history, weight and sales. The data generated have not yet been analysed. Although one farmer was unsure what would be done with the data from his farm or to whom they belonged, others have used their records in planning their production and turn-off cycles.

The support systems established during Phase 2 have continued after project completion. A number of farmer groups continue to operate with support from livestock officers. The Savaii Independent Farmers Group run their own training, conduct farm visits and give loans to assist poorer members to purchase stock. The Siumu Cattle Association is less dynamic. Some livestock farmers share their skills and knowledge through allowing the use of their farms for demonstrations and the propagation of pasture species.

The four paravets trained in Australia remain employed, highlighting the advantage of short-course training over formal academic training in relation to staff retention. They assist farmers with mustering, castrating, drenching and limited disease diagnosis. The paravets are now adopting more of a training role - teaching farmers how to perform the simpler tasks. However, the overall reach of livestock extension is limited. The farmers and farm groups interviewed in non-target villages had little if any interaction with Livestock Division and no idea how to access veterinary support. Few realised that there was any alternative to the slaughter of sick animals.

Pasture trials using grasses, legumes and forage trees were undertaken on Livestock Division farms. In the later stages of the project, local grasses were included into pasture management systems. However, pastures inspected during field evaluation were usually poor and often dominated by navua sedge, mintweed and woody weeds. This problem is partly due to overstocking, with many farmers seeking to maximise their cattle numbers to be able to contribute to social exchanges and thus increase their social status. The areas of improved pastures were limited, though most farms could identify small areas of productive pastures. Pasture establishment and management in the tropics is difficult, and particularly so in the steep and stony terrain that is typical of cattle farms in Samoa.

A livestock unit was established on Savaii under the project, comprising a livestock advisory officer, a trainer, two paravets and two casuals. It is functioning well given its small size. Farmers stressed the value of this unit - a contrast to earlier days when services and training were Apia-based. Its location in the MAFF compound at Salelologa is proving beneficial and allowing teamwork to develop among the MAFF staff based there.

TPLSP focused on cattle. Project management reports that this largely reflected demand from farmers for training in cattle and pasture management. While some of the courses would have helped in non-ruminant management, little assistance was provided to the majority of smallholders who own most of Samoa's 166,000 pigs and 400,000 poultry as well as many of the cattle. While poultry numbers continue to increase, pig numbers have fallen by around 10 per cent since the 1988 census. This highlights the need to provide

support to these sectors if animal protein production in Samoa is to be maintained or increased and imports limited.

The longer-term sustainability of the improved pasture establishment and management technology promoted by TPLSP is weak. Key problems include: (a) the low priority placed on intensive livestock management; and (b) the lack of integration between Livestock Division and the agricultural extension service.

2.1.3 Fisheries Extension and Training Project

Community-based management

The central focus of the project was on conservation and the establishment of village fish reserves and reduction of destructive fishing practices. This has been successful to date with 60 management plans in place and 55 reserves established by April 2000. A further 11 villages have expressed interest in joining the program. Almost all villages have banned dynamiting and fish poisoning, while some 80 per cent have banned smashing coral and rubbish dumping, promoted crown-of-thorns starfish removal and imposed net mesh size limits (see Figure A.1, Annex A).

With current resources, it is estimated that Extension Section will be able to bring around 10 new villages into the program each year. In order to service the new villages, the approach under Phase 2 is to 'graduate' those villages which are managing their resources effectively. Graduation means moving to a 3-monthly extension officer visit and annual assessment, from the normal monthly visit and 6-monthly assessment. At the same time, villages which do not show interest in implementing their management plans will be dropped from the program (though they will be encouraged to rejoin in future). In April 2000, it was expected that about 5 villages would be dropped. The net gain of villages over the next two years is thus likely to be between 5 and 10 per year. At this rate, it would take 20 to 30 years to bring all villages in Samoa under the community-based management regime.

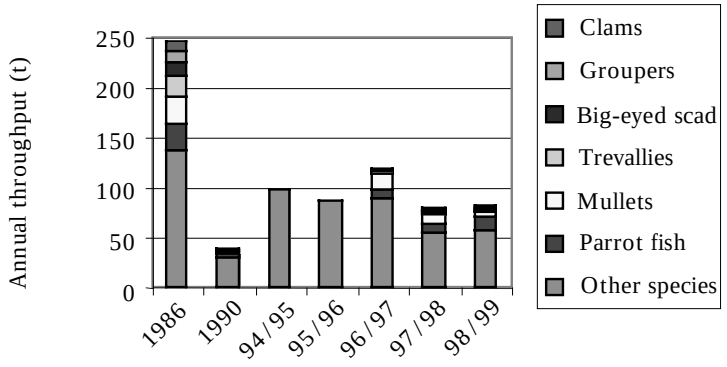
Interviews with fishers and fisheries management committees in 15 project villages indicated that:

- virtually all villages support the concept of conservation and the establishment of reserves; other coastal villages also wish to be included in the program;
- most villagers are proud of their reserves, and highlight their use as fish dormitories, with fish aggregating in the reserves to sleep and leaving to feed during the day, prompting some villagers to complain about 'their fish' leaving their waters to be caught by neighbouring villages; and
- many reserves have been effective in improving lagoon conditions.

Samoa has a long tradition of marine resource conservation, though this was breaking down in the last few decades of the 20th century. The conservation ethic has become even

more entrenched during the project period, and village support for fisheries regulations and for conservation in general is high. The use of destructive fishing methods is reported to have fallen to a low level, though fishing techniques which are potentially destructive such as mono-filament gillnetting and spearing fish and lobsters at night using torches continue to be used. This is a particular issue in relation to a few of the outer reef slope (referred to as offshore) boats supplied through the project.

Figure 3 Apia fish market throughput, 1986 - 1999



Source: Fisheries Division reports

Note: Discontinuous series.

The impact of the village fish reserves and improved management regime established by Fisheries Division with the assistance of the project will take time to develop. An indicator of the extent of recovery on Upolu is the level of sales of reef and lagoon fish through the Apia fish market (Figure 3). The marked decline in 1990 throughput to 39 tonnes was due to cyclone Ofa and followed a steady fall from 1986. It is evident that there has been recovery since 1990, but that this has been erratic and partial. The high throughput in 1996/97 reflects large reported volumes of mudcrabs and is likely to be anomalous. Overall, the extent of recovery to date as defined by Apia market throughput has been limited. However, Figure 3 probably understates the recovery since it reflects only the catch of the commercial and semi-commercial fishers and the extent by which production exceeds subsistence and village needs. The degree of recovery of parrotfish is encouraging as it mirrors the recovery of coral populations on reefs and in lagoons. Clam throughput has partly recovered, reaching an estimated 3 tonnes in 1998/99 or 30 per cent of 1986 volume.

In addition to the information available from Fisheries Division, the evaluation team sought the opinions of fishers and village fisheries management committees on the extent of recovery of the fishery. Virtually every respondent believed that quite substantial recovery had occurred, both within the lagoons and on the reefs. In the case of the Savaii villages visited, this recovery approached pre-Ofa levels. The contribution of the project to this recovery cannot be isolated, as some degree of natural recovery would have been expected

following the cyclones. However, the recovery would have been constrained in the absence of the project in many areas, due to the likely continuation of some destructive fishing techniques such as coral crushing and fish poisoning.

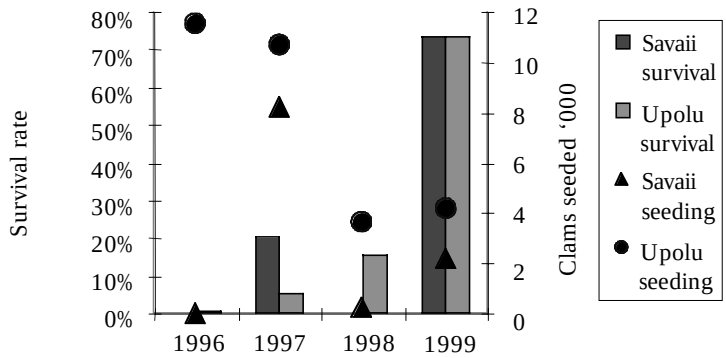
Aquaculture

The project implementation document target was to establish pilot aquaculture activities in three villages. Villagers have shown enthusiasm for aquaculture and a total of 24 tilapia enterprises and 55 giant clam nurseries have been established to date.

Several tilapia ventures have performed poorly, with losses due to floods, and difficulties in catching adult tilapia in village ponds. However, tilapia have become established in a number of waterways and ponds and should provide a valuable source of protein for participating villages. A taste testing study undertaken for FAO suggested that tilapia prepared in a traditional Samoan way was preferred to reef fish or tuna by a majority of tasters. There are a number of potential environmental concerns relating to tilapia introduction as discussed in Section 2.4.

Of the three villages surveyed during the evaluation in Upolu, and which had water bodies stocked with tilapia for up to two years, none had harvested any fish. This was reported to be due to the difficulty of catching larger fish particularly in natural and complex water bodies. It may also reflect lack of knowledge by villagers in relation to both harvesting methods and the desirability of harvesting to reduce population pressure. On Savaii, project-supplied tilapia were being harvested.

Figure 4 Giant clam survival in 2000 by stocking year



Source: Fisheries Division

Note: Upolu survival from 1996 seeding = 0.3 per cent

No clear objective can be identified in project documents for the giant clam component, though the project completion report states that the aim is to establish "undisturbed breeding populations". A total of 40,600 juvenile giant clams have been stocked in 55 village fish reserves to date. Almost all (98 per cent) have comprised the exotic *T derasa*. Several villages have looked after their giant clam nurseries effectively. However, 18

villages had none remaining at the latest count by Fisheries Division. Clam mortality rates in almost all villages have been high, with only 36 of the 11,500 clams stocked in 1996 surviving in 2000 as shown in Figure 4 and detailed in Table A.10, Annex A. The relatively high survival rates of the 1997 clams stocked in Savaii is notable. The reasons for the low survival include predation by snails and fish, heavy siltation, particularly in West Upolu, poor siting, mismanagement and theft. In one village, the last 30 clams (out of 1,600) were given to the pastors or consumed at a council meeting. Looking after the clams is demanding, with monitoring in most villages undertaken daily and cleaning weekly or fortnightly, by the younger men. In other villages, the fisheries management committee looks after the clams, with women often responsible for cleaning.

Despite the high mortalities experienced to date, most villagers are keen to receive more stock. However, it is too early to say whether viable breeding populations of clams will establish. *T derasa* is not indigenous, while the indigenous *T maxima* is reported by villagers to be recovering in several areas. The thin and brittle shell of *T derasa* means that it is prone to predation by a number of fish species (eg, puffer and porcupine fish) and octopus, restricting the number of sites where clams can grow to maturity. In Phase 2, the focus is on reintroduction of the locally extinct *Hippopus hippopus* and a number of local shellfish species in areas where they have been fished out or lost due to cyclone damage. Villagers interviewed do not have a clear understanding of what is intended for the clams. Fisheries Division will need to provide advice on whether villagers should: (a) keep them in an expanded nursery; (b) place them in the reserve or elsewhere in the lagoon; or (c) place them on or outside the reef. Overall, giant clam introduction under Phase 1 has not been successful. The move towards indigenous shellfish introductions under Phase 2 should have better prospects.

2.2 IMPACT ON HOUSEHOLD INCOMES

2.2.1 Farming Systems Project

FSP is having an increasing impact on household cash and non-cash incomes in Upolu and Savaii. Some recovery in taro and banana incomes is already occurring through wide acceptance of cultivars resistant to taro leaf blight and banana leaf streak disease. Village surveys indicate that leaf blight resulted in an almost total loss of taro Samoa. Some larger producers of taro for export or sale in Apia reported that about 75 per cent of their household cash income was lost due to leaf blight. Highest losses occurred in areas close to Apia, such as in Aleisa, Utualii, Siumu, and Saanapu villages, surveyed by the evaluation team. In addition, there were losses of non-cash income, with taro not being available for subsistence or customary exchange. Prior to the outbreak of leaf blight, local consumption of taro was estimated by MAFF at around 180 kg per person per year. The severity of decline in income from taro is highlighted by the export data in Table 2.

TABLE 2 TARO EXPORTS, 1991-98

	1991	1992	1993	1994	1995	1996	1997	1998
Volume (000 cases)	212	107	202	2	2	1	1	1
Value (S$'000)	6878	4696	9509	158	162	98	99	125
Unit value (S$)	32	44	47	64	67	92	98	98

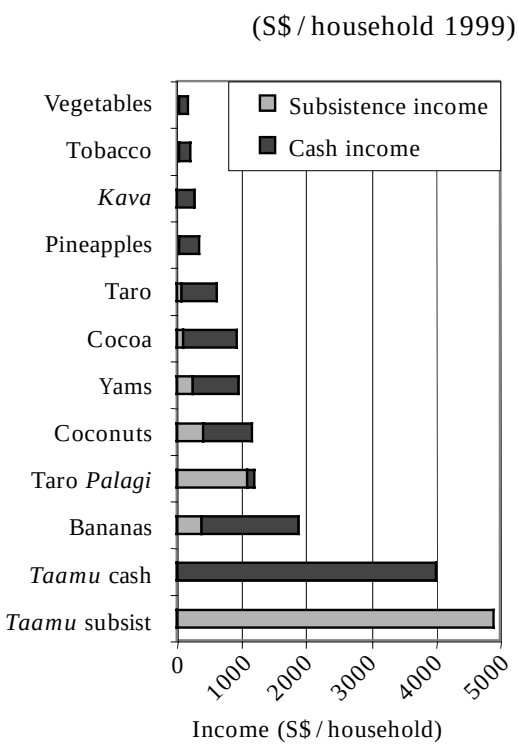
Source: Central Bank reports

Data from Samoa's largest market in Apia shows the volume and prices of major crops sold on Fridays for the period 1993-98 (Table A.5, Annex A). The volume of taro marketed fell by 98 per cent from 1993 to 1994. Over the five years to 1998, the price of taro more than doubled in real terms. *Taamu* and bananas replaced taro as the main carbohydrate food marketed, and their prices fell both in nominal and real terms. Prices of most vegetables increased marginally. Overall, the average retail prices of crops increased by around 3 per cent per year in real terms.

Field evaluation indicates: (a) some recovery in farm incomes due to distribution of leaf-blight resistant taro cultivars, commencing in 1995; and (b) the great potential for taro income generation exists in the long-term. The cash and non-cash income generation impact of taro recovery is shown in Figure 5 based on data from one household in each of two villages in Savaii. The households were reasonably typical of the eight villages surveyed in Savaii. By 1999 the farmgate value of taro production per household averaged around S$600 annually, a significant recovery compared to near zero output in 1994. Upolu households typically have generated greater income from taro recovery.

The potential gain from achieving pre-1993 taro cash incomes for a major taro-exporting or selling household close to Apia is estimated at S$5,000 - 6,000. In the more remote villages in Upolu, eg, in Aleipata district in East Upolu, the potential is around two-thirds of this level. In remoter villages, eg, in north or west Savaii, the potential would be of the order of S$2,500-3,000. These levels were estimated by the evaluation team, based on farmer interviews in villages on both islands.

Figure 5 Cash and non-cash income generation impact of taro recovery



Source: Farmer interviews and records

Assuming one third of taro produced in 1993 was exported, one third sold in local markets, and one third consumed by farm families or used in customary exchange, the potential income generation impact of the taro program in the long-term is estimated at around S$12 million per year. However, only part of this benefit could be attributed to the project. In the absence of the project and the breeding and extension work supported, blight resistant varieties would have been imported and distributed. Other projects and the farmers' own initiative and work will also make a major contribution to this (anticipated) outcome.

Taro producers are aware of the income gains that could be generated from the above potential. Even poor farmers will be able to improve their incomes to some extent - a difficult group to reach through development aid as shown in a recent evaluation study (AusAID 1999). MAFF cannot supply enough planting material and planting material is in short supply and expensive (S$2 / plant). Many farmers are quickly multiplying blight-resistant varieties to widen their production base.

The taro blight has caused farm families to diversify their income sources and diets. More *taamu*, taro *palagi*, bananas, vegetables and *kava* are now grown and compensate for the loss of taro which traditionally contributed around 20 per cent of carbohydrate intake.

Some coastal households have increased their fishing effort. *Taamu* has replaced taro as the most important root crop in the diet of Samoans. *Taamu* is as nutritious as taro but the leaves cannot be consumed. However, this has been more than compensated by filling the food gap, the resilience of the plant to diseases and pests, higher calorific production than taro per unit of land and labour input, and until recently a reasonable market price. One farm inspected was reported to be exporting 600 *taamu* per month to New Zealand at a contract price of S$10 each.

2.2.2 Training Personnel in Livestock Sector Project

Livestock Division and project staff found it difficult to obtain reliable information on farm incomes. However, it is evident that cattle farmers who manage their enterprises effectively and can achieve reasonable calving / weaning percentages (over say 80 / 75 per cent) can make reasonable incomes. A yearling steer sold to a butcher can realise about S$800. A similar animal sold for exchange / ceremonial purposes (*faalavelave*) can command around S$1,000 since beef has become a major item in such exchanges. A number of farmers sold weaners for S$400-600 per head but most were reluctant to sell young-stock due to a wish to build up their herds.

Farmers interviewed had increased their herds substantially since undertaking project training during 1996-99 (Table 3). Farmers keep livestock mainly for their own ceremonial purposes and for sale to other families or shops when money is needed for school fees or other purposes. One respondent, sold four beasts at Christmas to pay for his children's airfares and schooling in New Zealand. Farmer records show that a significant number of animals are gifted by farm families for ceremonial purposes.

TABLE 3 CATTLE FARM CASE STUDIES

Farm number	Herd size pre-training	Herd size March 2000	Sales			Relationship with extension service
			period	type	value (S$)	
1.	80	150	Dec 1999	4 cattle	5000	Supportive
2.	40	100	Year 1999	10 adults	10000	Supportive
				10weaners	4000	
3.	6	40	Dec 1999	4 (American Samoa)	3800	No contact
4.	4	75	Year 1999	Beef cattle	28000	Supportive
				Dairy cattle	1400	
5.	7	80	Year 1999	10 head	9000	Supportive
6.	0	17	nil			No contact
7.	0	15	Dec 1999	2 cattle	2190	Supportive

Source: Evaluation team interviews and farmer records

According to the project completion report, three quarters of cattle herds are between 1 and 10 head. The impact of the project on most of these farmers is considered to have been limited or non-existent. None of those interviewed in this group had attended training courses, and only one or two knew of the existence of government vets or paravets. Only if the extension and veterinary services can expand their coverage, eg, through the proposed paravet training program, will the project be deemed to have resulted in a significant contribution to smallholder incomes. Project benefits were mainly realised by the larger or more influential farmers who had better access to project training courses and extension services. Cattle farming went hand-in-hand with or opened up other cash earning options. Many of the larger livestock farmers interviewed also sold taro or other agricultural goods, owned a small shop or operated longline fishing vessels. One had commenced milk production, selling milk ice blocks "which cannot keep up with demand".

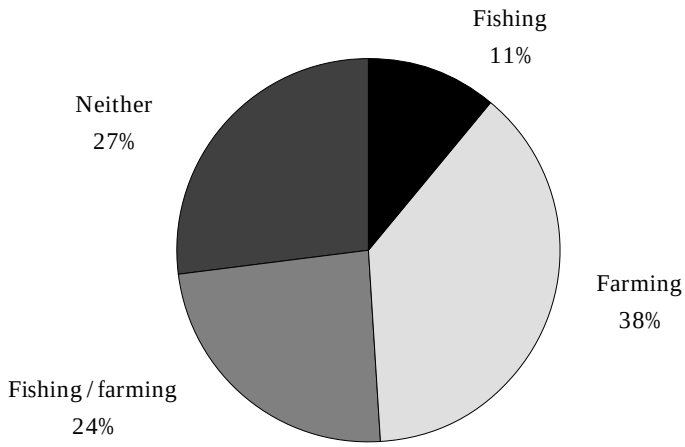
Larger producers have improved their husbandry, in part as a result of the project. However, the quality of cattle management remains below potential. Calving rates are low and most pastures inspected are dominated by broad-leafed and woody weeds. A farm manager interviewed by the team considered that poor stock and pasture management resulted from most cattle farmers viewing their cattle as secondary to their main occupations. However, most of Samoa has a long growing season, and even low level management of pastures and stocking rates can lead to a significant increase in livestock productivity.

2.2.3 Fisheries Extension and Training Project

The community-based management component of FETP will take time to affect fisher's incomes. The short-term effects are considered to have been either neutral or negative, particularly through the establishment of reserves which restrict fishing areas, and the banning of destructive but highly productive fishing techniques. While fish stocks are recovering, a residual effect of the low catch rates in most of the period since 1991 has been to limit the extent to which some villagers have resumed fishing. Others have changed their fishing techniques, and for example the shift of the catamarans to tuna longlining has opened up a niche for some boats in deep bottom-fishing on the outer reef slope. This opportunity has assisted some of the offshore boats promoted by the project.

The impact of the project on village incomes appears to be directly related to the distance of the village from Apia and on the relative importance of fishing in the village economy. In villages along the north coast of Upolu, fishing is largely a weekend occupation. Few villagers depend on fishing for their livelihood, although reef gleaning remains a valuable source of food and sometimes income for some families. In areas more remote from Apia - for example Manono Island and Aleipata district in eastern Upolu - fishing remains a major source of income for many families, though agriculture is important and provides most subsistence food needs for most households (Figure 6). Of the catch reported by the FAO/SAPA survey in 1999 (FAO 2000), two-thirds was home consumed, one quarter sold and 8 per cent given away.

Figure 6 Main income sources, Aleipata district, 1999



Source: FAO 2000

To date, FETP's aquaculture components have had little effect on village or household income. If the *T derasa* establish as a breeding population, they will have the potential to complement native clam species, and generate income for villages. There is also a possibility of export to New Zealand, where annual demand for clam meat exceeds 4,000 tonnes. Tilapia offer more immediate prospects for income generation, but this will require villages to develop catching methods, and possibly the introduction of fish pens or cages, as currently under consideration by Fisheries Division.

Offshore boats

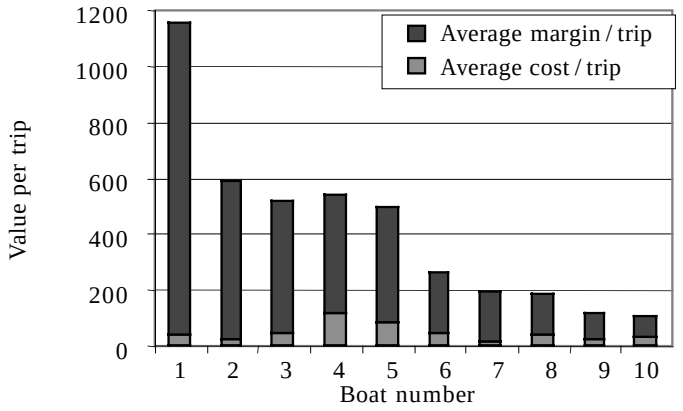
Component 5 of the project developed and tested a small runabout to assist villagers reduce pressure on their lagoons by fishing on the outer reef slope. The vessels were purchased by villagers through an EU micro-finance project, with assistance from FETP in the selection of beneficiaries. The boats have had a mixed history. A Fisheries Division review of the vessels in October 1999 indicated that, of the 34 vessels:

- 2 were being used as ferries;
- 5 vessels had been sold;
- 10 vessels were fishing between 4 and 20 trips per month; while
- 17 were not keeping records and information is not available on their fishing performance.

The offshore boats are mainly owned by individuals or families. Some are owned by groups such as the fishery management committees or church groups. One boat had been leased to a pastor for use by his church youth group and was reported by a local fisher to be mainly night torch fishing and gillnetting in the lagoon.

Figure 7 Costs and earnings - 10 offshore boats, 1999

(Average in S$ per trip)



Source: Samoa Fisheries Project (2nd phase of FETP)

The offshore boats are providing high levels of income for some of their owners. Analysis of data from 10 vessels which were fishing regularly and reporting their landings suggested that fishers were able to make an average net income of around S$100 - 400 per trip (Figure 7). Fuel, food and wages costs were generally S$20 - 50 per trip. Based on records supplied to Fisheries Division, the 10 vessels fish between 3 and 12 times per month. For a typical vessel fishing 8 trips per month, monthly cash and subsistence income would be around S$2,000 or about seven times higher than the unskilled labour cost of S$300 per month. The offshore vessels thus have the potential to be highly effective and profitable for their owners. However, there is concern that several of the vessels fish within the lagoon, gillnetting or night spearing. This can significantly increase fishing pressure in the lagoons where they operate, an opposite outcome to the one intended.

2.3 FINANCIAL AND ECONOMIC PERFORMANCE

None of the projects undertook any financial or economic analysis either at design or during implementation. Insofar as FSP and FETP were attempting to influence household incomes, at least some farm or fishing enterprise budget analysis would have been valuable. FSP undertook some basic budgetary analysis during implementation but this is restricted to individual crops (Table 4). Little information is available on whole farm performance.

TABLE 4 FARM BUDGET DATA

		Taro	Ginger	Banana Average 5 years	Peanuts	Kava Average 4 years
Yield	t / ha / year	8.0	25.0	19.0	1.4	4.9
Total Income	S$'000 / ha	32.0	65.0	10.8	6.8	6.4
Cash costs	S$'000 / ha	2.3	7.8	3.8	0.1	0.8
Gross margin	S$'000 / ha	29.7	57.2	7.0	6.7	5.7
Labour requirements	Person days / ha	500	1985	237	174	77
Total return / labour day	S$ / day	59	29	29	38	73

Source: MAFF crop profiles, summarised from Table A.6, Annex A.

The Samoa Fisheries Project has continued the analysis of offshore boat performance commenced under FETP (Annex A, Table A.11). The boats have the capacity to be highly profitable if well managed. A motivated fisher would be able to pay off the equity in the boat (S$3,400) in less than a year and in some cases in less than a month. The total cost of the boats could be repaid in less than two years by most owners if they fish regularly.

TPLSP and FETP included some aspects of small business development. In the case of TPLSP, business training was provided for livestock farmers to assist them in planning, budgeting and managing their cattle activities, in some cases linking with the Small Business and Enterprise Centre. Under FETP, limited business management training was provided to the owners of offshore boats as part of their introductory training package.

Project beneficiaries differ widely in their ability to manage a small business. One offshore boat owner with a government job assisted his son to operate the fishing business. Over two years of operation, he had saved S$3,500 as a reserve (to permit for example replacement of the outboard engine - costing S$5,000). He had been able to undertake repairs such as welding and engine repairs promptly and to maintain a supply of fishing lures. Some owners have been unable to continue fishing as soon as a major breakdown was experienced. Smallholders' and fishers' ability to save in order to develop or reinvest in a business is affected primarily by: (a) the availability of income-earning opportunities; and (b) by family obligations which can limit accumulation of working capital.

Even less information is available to support economic assessment (eg, the impact of the projects on the national economy). Overall however, the economic impacts of FSP and (in the long term) FETP are expected to be positive. In promoting alternative crops to taro and developing new taro cultivars, FSP is expected to generate high economic returns. However, it is difficult to isolate the effects of FSP from normal MAFF activity, from the effects of other projects such as FAO's Pacific Regional Agricultural Program and TAROGEN, and from the activities and risks of individual farmers.

The conservation ethic instilled through FETP should allow recovery in catches and enhance the potential for tourism in many areas. The economic impact of TPLSP is less certain due to the relatively poor performance of cattle in the tropics. However, cattle can play a part in the overall farming system, particularly in rotation with the higher value cash crops such as *taamu* and taro. The focus of training on the need to upgrade and maintain the genetic potential of cattle should show long-term economic benefits. Livestock Division has promoted the upgrading of Samoa's national herd to tropically adapted Droughtmaster and Brahman cross animals which do well in the tropics and which form the basis of Queensland's cattle industry.

2.4 OTHER OUTCOMES

Project outcomes need to be considered within the context of the Samoan institutional environment. The 1990s were a period of rapid change in the Samoan public sector. Reforms have been wide ranging, covering liberalisation of the financial system, privatisation and corporatisation, trade reform including tariff reduction, broadening the tax base (including the introduction of a goods and services tax), government budgetary processes and public sector institutional reforms. The main objectives of the reforms have been to reduce the proportion of GDP in the public sector and to shift the emphasis of the public service towards removing the constraints to private sector development. Heads of government-run corporations and departments are now employed on contract to achieve greater efficiency and accountability, based on a New Zealand model. Commencing in the early part of the decade, the government made efforts to reduce the size of the public service and to increase its effectiveness and efficiency. This took the form of a 'sinking lid', where staff resigning from the public service could not be replaced without the approval of the Public Service Commission.

2.4.1 Institutional development

MAFF has been strengthened as a result of the projects, through staff training and the introduction of new systems. A higher proportion of staff have degrees or diplomas, and many are highly skilled and motivated. Management systems have also improved in some areas, with better administration and work planning than existed prior to the projects. All four staff assisted with degree studies under FSP remain employed by MAFF, while only about 20 per cent of the 21 staff provided with formal training under TPLSP are currently working in Livestock Division. FETP has experienced some loss of staff from the trainees taken on, while others are undertaking further studies in Fiji.

The projects' main institutional impacts relate to the strengthening of the extension services in the three divisions of MAFF. All three are now operating at a higher level of efficiency and are adopting a client-focused systems approach, which recognises both the needs and the strengths of Samoa's smallholders. Interviews by the evaluation team indicated that the participatory approach to extension has been widely accepted.

The projects have contributed to improvement in the status of MAFF in the eyes of its clients. This has largely been due to the increased efficiency of the extension services and more frequent contacts with villagers. However, in some areas, villagers indicate that their level of support for MAFF continues to relate to the availability of subsidised or free inputs.

The co-location of MAFF's Research and Extension divisions at Nu'u has fostered collaboration between staff. The planned merger of the divisions should further strengthen linkages. However, FSP's objective of an integrated extension system was not feasible, given the independence of the three main extension services - crops, livestock and fisheries.

FSP provided substantial assistance to MAFF's Economic Analysis and Planning Unit in terms of training (also provided by TPLSP), systems development and equipment. MAFF management relies on the unit for a range of support services and it has recently been given a ministry-wide executive support function. However at present, its staff have few resources to monitor, assemble and analyse information on the rural sector. It does have the capacity to provide improved services to the line divisions, but requires further strengthening and perhaps redefinition of its role if it is to be effective.

The projects have interacted with village institutions. The most notable impact has been the establishment of enterprise committees in agriculture, livestock and fisheries. Under FETP, the establishment of the fishery management committees has proved to be a useful vehicle to ensure village-wide participation and consultation. The agriculture and livestock groups established under the projects and subsequently also ensure reasonably wide contacts with extension staff.

2.4.2 Recurrent cost financing

Post-project asset maintenance by partner governments strongly influences the long-term sustainability of projects. Assets may include physical infrastructure, equipment, systems and procedures, and human skills. A key indicator of asset maintenance is the extent to which recurrent cost financing is budgeted and allocated to maintain operations and maintenance of essential equipment and skills supplied by Australia. Budgets for operation and maintenance of vehicles, further training of new staff, on-going laboratory upkeep, further development of systems and procedures are critical to harnessing the long-term benefits from projects. An AusAID study of recurrent cost financing concluded that "If aid assets are not maintained and operated efficiently then aid funds are not being used effectively" (AusAID 1999).

An assessment of the recurrent cost financing arrangements relating to post-project activities was undertaken. Appropriation and expenditure budgets for 1996/97, 1997/98 and 1998/99 show that operating and capital expenditure has increased by around 15-20 per cent since project completion though the proportion attributable to the projects could not be defined. The upgrading of the Nu'u workshop through provision of training and tools under FSP has assisted in vehicle maintenance.

MAFF's budget staff stated that part of the increase in operating budgets was to meet the recurrent cost financing requirements for post-project operation and maintenance of the vehicles and other resources supplied by the projects. However, project designs could have given more emphasis to the post-project inputs and costs required from the government.

Current reforms in the public sector will improve operational procedures for recurrent cost financing arrangements in future projects. These include the move to output based budgeting and increased accountability among public servants. These changes should build on the progress of the last few years, which has seen the Samoan economy grow steadily (if slowly) in real terms. The government has demonstrated sound fiscal management and is making real efforts to ensure efficiency and effectiveness in its departments. If MAFF proceeds with full implementation of its corporate plan and privatises a number of its assets, there are good prospects for the maintenance of budget allocations to research and extension, as required for the sustainability of the services which commenced under the three projects.

2.4.3 Social and cultural impacts

The projects were all influenced by socio-cultural factors. Village organisation in Samoa is generally a positive force, which FETP was able to tap, generating widespread support for its conservation approach. FSP farm groups are often working effectively, promoting knowledge distribution and providing support for their weaker members. Restricted access to groups can be a problem since many are formed along family or religious lines. The traditional preference for gender groupings has also limited women's access to agricultural information.

The *pulenu'us* have generally supported project activities and are a strength on which the projects sought to build. However, in some cases, the officer may (for example) attempt to retain project benefits for his own agricultural group and limit access by other farmers or groups.

In addition to demarcation issues within villages or among sub-villages, there are also issues relating to outsiders (eg, 'from Apia'). One village on Upolu had opened up its fish reserve. This was stated to have been due to the fact that, while local villagers generally obeyed the regulations, or paid their fines if they broke them, outsiders could not be controlled. The police were unable or unwilling to prosecute such offenders. Mechanisms will need to be sought to allow villages to police their reserves more effectively and control poaching by outsiders. In Savaii, the police have been more interested, and two people from a neighbouring village who used poison in one village's tilapia area received gaol terms of 6 months. The severity of these sentences will hopefully have a deterrent effect. The recent decision to allow fisheries officers to police the reserves should improve the situation, as long as it is applied with care, and village councils continue to exercise authority over their own villagers as defined under their management plans.

All three projects, but particularly FETP and FSP focused on establishing relationships with fishers and farmers. The participatory and two-way communication approaches used by fisheries and agricultural extension officers have been welcomed by villagers. The passing of responsibility for resource management to villages and (in most cases) their treatment as equal partners in the development process by government officials have greatly improved the relationship between MAFF and its clients. However, dependency remains a problem, with some villagers only prepared to participate in projects if early and tangible benefits are provided. Over the years, villagers have become accustomed to handouts, subsidies and bonus schemes. Extension workers are now faced with the challenge of convincing farmers, fishers and cattle owners of the value of the main benefits that are available - information and access to research and training.

FSP and FETP tried to work with NGOs. At the level of village organisation, this was successful. However, their relationships with national NGOs did not develop as planned. FSP was unable to maintain its relationship with the Women in Business Organisation or the YMCA due partly to their limited capacity. FETP planned to use the 'O le Siosiomaga Society' for village extension but this was not considered viable by Fisheries Division or project management. From the NGOs' perspective, Government departments continue to be territorial about their projects and will not share resources or workload, despite the fact that some NGOs are well-placed to work at the village level.

2.4.4 Gender and development

Gender and design

At the time of design, AusAID projects were required to ensure that women were involved in project activities and shared equitably in access to resources and benefits. Since that time, AusAID has revised its gender guidelines to an approach in which women's participation is viewed as a right, a means to increasing women's choices through mainstreaming development options to women and the recognition that women are co-workers and decision makers in family production systems.

Women's participation received little recognition in the FSP and TPLSP project designs. Women were targeted (and continue to be targeted) as a community institution alongside chiefs, youth groups and NGOs. Project reports, MAFF staff and village interviews suggest that women's agricultural training continues to be based on assumptions about women's roles and the belief that separate training is preferable. Agriculture staff usually meet with the three major village institutions separately, and only sometimes together. It was noticeable that when women and youth attended team meetings they tended to sit on the fringes of discussions (often outside the meeting place) in the traditional role of waiting to serve the chiefs. This reflects both extension officer attitudes about women's roles and extension officers' responses to perceived cultural preferences for segregated training. FETP employed a gender approach, recognising the relationship between male / female roles including shared roles and exchanges which mark the family production systems. The project also strove for gender balance in the recruitment and training of fisheries extension officers.

Women and agricultural policy

FSP began progressively, ensuring women's membership (through the Ministry of Women Affairs - MWA) in the integrated task force undertaking the participatory appraisals. FSP management considers that considerable efforts were made to include MWA in subsequent project activities, but that these invitations were seldom taken up. The Ministry's attitude now is that their links with MAFF need to be improved. FSP supported a *'Baseline survey of women and agriculture'*, and the preparation of a '*Women and agriculture policy'*, the latter intended for inclusion in national agricultural policy. Although this has not occurred, it has been taken up in Samoa's national women's policy.

FETP's community-based strategy included the formation of village fisheries management committees comprising three village elders, three women and three untitled men. This committee was a new concept recognising the roles and information needs of village women and youth and the effectiveness of using one channel for fisheries information exchange. A similar concept was outlined in the first phase of FSP but was not pursued. Fisheries extension officers report that the women on the committee are full participants and are generally effective in putting the viewpoint of women and of the village women's committee.

Access to information and technology

Women are playing a significant role in crop production and increasingly in livestock. Many have an intimate understanding of the family production unit from planting through to sales (local and market). Women are often in charge of selling and keep records of these transactions and the bank book.

The agriculture extension service delivers extension messages through farmer groups, the majority of whose members are male. Women's main access to agricultural education is still through women's group training. Training has focused on vegetables, flowers, peanuts, bananas and more recently on post-harvest technology for these products and other tree crops. Women interviewed expressed a keen interest in training, whether in livestock, crops or fishing. Women are included in most training courses run by Livestock Division. Of the 26 courses undertaken since project completion, 10 recorded attendance by gender, and had approximately equal numbers of male and female participants.

Two subprojects focused on women. FSP and a national NGO (Women in Business) piloted a materials multiplication nursery for 'women's goods' (for tapa and mat making, flowers and decorative plants). This was innovative, but group members had little understanding of the project purpose, while the anticipated market did not materialise. There was confusion and a lack of local ownership of the project. TPLSP ran legume planting workshops for women and a workshop on how to make cattle feed blocks. However, neither activity proved to be sustainable.

Impact of projects on women's work

While agricultural activities vary according to the family labour force, land and other resources, women said they were doing more farm work and that life is harder for them than in earlier times. In many households with insufficient cash, women were working hard for long hours. This could be linked to the decline in incomes due to the taro leaf blight and may be alleviated as new crops flourish.

The introduction of village fish reserves has made shellfish collection more difficult in some areas by restricting access. While recovery in shellfish numbers is reported by villagers, the time taken to collect sufficient shellfish for a family meal remains longer than before cyclone Ofa, double in the case of one village in northern Savaii. In villages where the reserve occupies a substantial proportion of the foreshore area, women (and older men) have to walk farther to reach their gleaning areas. In one extreme case, they only had access to a neighbouring villages' waters (though it is understood that this problem has now been addressed). The increased distance can reduce the frequency that women glean in the lagoon. Those relying heavily on lagoon resources to feed their families would be most affected. This group would include many single-head households and other low income families.

In all three sectors, women have been accepted as skilled and motivated extension agents. The female head of agricultural extension on Upolu (who has recently been transferred to head MAFF's Training Section) was considered to have made a major contribution to opening up MAFF training to women and including women's issues in training. A female livestock officer on Savaii is well-regarded. Under Phase 2 of FETP - 6 of the 11 fisheries extension officers are female and have made a valuable contribution. Female extension officers said that they had no problems in working with male farmers / fishers.

2.4.5 Environmental impacts

Improvements in lagoon management

Of the three projects, only FETP had specific environmental objectives, which primarily related to improvement in the management and conservation of inshore resources. Overall, the environmental impact of FETP is considered to be highly positive and the project is among the Pacific region's more successful projects from an environmental perspective. Building on traditional management practices and providing village communities with the power to enforce them has resulted in a high level of ownership of the project, and a real sense of commitment to conservation.

Interviews in 15 fishing villages suggested that the reserves improved lagoon environments and stock status at least within the reserves, if not yet in adjoining areas. In combination with a general recovery of reefs and lagoons from the destruction of the cyclones of the early 1990s, this has resulted in fish populations recovering some way towards their pre-cyclone levels. While bans on dynamiting and fish poisoning predated

FETP, they are now more rigidly enforced and there is greater environmental awareness among villagers both inside and outside the project. The relative impacts of the factors affecting recovery (reserves, change in fishing practices and natural regeneration) cannot be defined at this stage, since no data are available, eg, on recovery in areas with and without reserves. A subjective assessment would be that all three have the potential to make an approximately equal contribution. The limited effort made by FETP to monitor the extent of recovery was considered by a mid-term review team to have been a serious omission. Fisheries Division is attempting to correct this in Phase 2 through village surveys and underwater visual censuses.

The effect of the conservation measures on different species has been variable. While no detailed research has been undertaken, the extent of recovery (eg, in terms of catch rate per hour) was estimated by some villagers to have reached approximately 50 per cent of pre-cyclone levels in Upolu and close to 100 per cent in Savaii. In the lagoons, grey mullet (*anae*) are widely reported to have made a substantial recovery, perhaps due to a reduction in the number of fish fences and traps. Trevally, parrotfish and surgeonfish populations are also reported to have recovered, while milkfish numbers remain low. Red lipped mullet (*ia'eva*) were reported by fishers to have made an almost complete recovery in Pu'apu'a on Savaii (see Box 4). Little recovery of the species (or subspecies) was reported on Manono, probably due to continued gillnetting of spawning aggregations. Information from the evaluation team's village survey indicates recovering populations of giant clams (*Tridacna maxima* reported to be 'hand-sized' up to about 300mm) in most areas visited, including Aleipata, Manono and Savaii. Off Manono, undersize clams are reported to be harvested and bottled on the spot by people 'from outside the area', to reduce the risk of being caught by fisheries inspectors. Other shellfish have also recovered, to perhaps 30 per cent of pre-cyclone levels, including local trochus, turbo and cockles. Turtles are reported to be abundant in many areas, particularly in Aleipata and Savaii.

Box 4 Red-lipped mullet

Red-lipped mullet, referred to locally as *ia'eva*, were considered by the FETP design team as an indicator species for the health of the lagoon fishery: "for as long as any Samoan can remember, the *ia'eva*, gathered for several months each year in very large schools at Pu'apu'a on the east coast of Savaii and at Nu'ulopa island near Manono between Savaii and Upolu. Mullet aggregations have been a major source of food for villagers in these areas since anyone can remember. But dynamiting and gillnetting have greatly reduced the size of the schools at Nu'ulopa and the mullet run at Pu'apu'a has reportedly ceased" (FETP design document 1993).

The evaluation mission sought information on the current status of the species at Pu'apu'a. Fishers reported substantial recovery - to levels similar to the earlier days of the fishery. In the past, Pu'apu'a villagers had used a hand made barrier net in order to

encircle the school of fish when it came inshore to spawn. This traditional activity involved most of the families in the village, each of which would make around 10 or 20 metres of 1.5 metre deep net depending on family size. The last mullet net was used in the 1960s.

During the breeding season in October, a village elder would go daily to the reef to check the status of the mullet. When he believed they would enter the lagoon, he would call a meeting of a group (known as *aitu ole i'a*) comprising five of the village orators. The group decided whether to have a fish drive and advised the village families. At this time, no-one was allowed to enter the lagoon. Before dawn the next day, all of the 60 or so families would gather with their nets and scoops at the shore and join the pieces of net.

An elected 'fish-leader' is said to be the only person the fish will follow. If the mullet are present, he blows a shell horn to tell the villagers gathered further up the beach to set their net. He then paddles his canoe past the school using a particular flick of the paddle. The fish follow the canoe and enter the net which is then closed. Once encircled, the fish attempt to escape by jumping over the net, to be caught by the villagers using scoop nets. When the orators decide that enough fish have been caught to satisfy village needs, they end the fishing. The catch is placed on a flat rock and shared out. There is a ban in the village on the sale of the fish, though there is some distribution, notably to the pastor. In an average year, such group fishing activities would occur about five or six times, normally before the end of the year.

Pu'apu'a was having difficulty in finding materials to construct its nets. So the Australian High Commission undertook to find the netting materials and provided them to the village, partly funded under the Australian small grants scheme. The 'fish leader' is currently overseas, and villagers are awaiting his return to begin net-making.

The relationship of the Pu'apu'a fish with the wider mullet fisheries along the east coast of Savaii is not known. However, increasing fishing pressure in the lagoon is counter to FETP objectives and may have a damaging effect on mullet stocks. It would be useful if fisheries research staff could review the fishery, the biology of the *ia'eva* and any implications of the increased fishing effort.

The Village Fishery Management program is unique, at least in the Pacific. It has required a major change in the mindset of Fisheries Division staff, since it involves the Division relinquishing control of one of its traditional responsibilities. Building on traditional knowledge and establishment of community-based management systems have come to be seen as the only way in which inshore resources can be managed effectively in the small island states (and possibly also in larger developing nations). FETP has therefore attracted considerable international interest, with delegations visiting the project from Tonga, Fiji and American Samoa and a delegation from Tanzania expected in 2000.

It is expected that many countries and particularly the other Pacific island states will over time introduce their own community-based fisheries management systems. FETP's

environmental and conservation impact will thus be felt beyond Samoa and in the long-term, the experience gained under the project should assist a large number of coastal communities in the region, through providing a model for the establishment of community-based management. Knowledge of the project has been enhanced by the writing of several articles in the international press by the Assistant Director, Fisheries, other fisheries staff and the project manager.

While many of the reserves are small in area, in some villages they extend over a high proportion of the near-shore lagoon area. This restricts access for shellfish collection and other gleaning activities. In most cases the reserves only cover inshore lagoon areas, though one village visited (Saluafata on Upolu) had a well-maintained reserve, extending from the shore to the reef drop-off. The FETP mid-term review raised issues in relation to the effectiveness of the small reserves defined in most villages, suggesting that they may not be large enough to affect fish breeding and populations. It is expected that the underwater visual censuses will allow conclusions to be reached, and on whether any change in policy is required for existing or new reserves.

One significant outcome from the project is the selection of two areas of Samoa's coastline for the development of the World Bank-financed Marine Biodiversity Protection and Management Project (IUCN Project No 75738). Samoa was selected as the project location due to its long history of traditional management and conservation and the success of Phase 1 of FETP. The project introduced many of the approaches developed under FETP. It is located in the outer reef and offshore island areas of 11 Aleipata villages and 9 villages in the Safata area on the south coast of Upolu, several of which were assisted under FETP. It is expected that around 8,000 rural dwellers will benefit through assistance in developing income-generating activities as well as an improved and valuable conservation environment. The district-wide reserves will provide a useful comparison of the relative effectiveness of the small individual village reserves established under FETP.

Species introductions

FETP introduced several aquaculture species, mainly supporting ongoing Fisheries Division programs. The giant clam, *Tridacna derasa* was widely introduced under Phase 1 of the project, primarily due to its ready availability from hatcheries in American Samoa and Fiji. The introductions were not successful, with some village nurseries losing all of their clams due to damage by snails, siltation, high currents, wave damage and theft or consumption.

The tilapia introductions also appear to have been made with insufficient analysis of risks. In half of the eight villages visited which had been stocked, fish had escaped to the wild, particularly after a recent tropical storm. They have therefore entered external mangrove areas and other village ponds (for example in Sapapalii village in Savaii). It is quite likely that the escapees will find locations where they can adapt and breed and may cause adverse impacts on habitat and biodiversity. Given that most villagers interviewed are unsure how to catch the fish, it would seem necessary to undertake a detailed environmental impact and management assessment prior to making further introductions. The overall

environmental impact assessment could be followed up by lower level environmental effects analysis on a case-by-case basis, using parameters set in the overall assessment.

Rural impacts on lagoon water quality

In about eight project villages, siltation has been a problem for clam farming. All villages reporting problems of silting or poor visibility are on Upolu except for one on Manono Island. In part these problems are reported to have been due to poor siting of clam nurseries, for example near mangroves or too close to shore. However, erosion of agricultural areas is likely to have been a contributing factor. According to a Samoa Fisheries Project technical report "because of the high calcification and erosion rates of coral and algae, and the natural and human-induced terrestrial erosion, lagoons are very shallow from infilling. The shoaling is most advanced in the sheltered northern shelf area of Upolu, where the lagoon is up to 3 km in width but only 0.5 to 1.0 m deep" (SFP 2000).

Fortunately for the agricultural sector as well as for Samoa's lagoons, many of the country's volcanic soils are highly permeable, allowing a high proportion of rainfall to infiltrate. Thus soil loss measurement in an International Board for Soil Research and Management (IBSRAM) project extending over about four years in the 1990s, suggested a loss from farmers' fields of around 30-50 tonnes per km^2/year. The best of the experimental erosion control plots recorded about half this level. Even the higher level is less than five per cent of that experienced on undulating crop land in much of Australia. Nonetheless, cropping practices are a cause for concern from the point of view of the lagoon environment. As land pressure increases, forests are cut down and cropping is undertaken further up the slopes. Loss of fertility leads to increasing need for fertiliser, while increased runoff rates lead to more nutrients and agricultural chemicals reaching the lagoon.

Farming systems development

FSP promoted a more holistic and participatory approach to farm income improvement. It viewed the farm as an ecosystem within which inputs of land, labour, capital and skills generate desired outputs for home use and market. This was to be achieved in an environmentally sustainable way. An AusAID environmental audit in 1996 stated that the project "is doing much to help alleviate the negative impact of existing degrading practices within the agricultural sector (and other sectors) and is making a considerable positive impact in the field of agricultural sustainability in Samoa."

The use of taro leaf blight resistant cultivars is more environmentally acceptable than planting taro Samoa and using chemicals such as phosphoric acid to control blight. This involves spraying of fungicide every two weeks in the wet season when disease incidence is highest. There are environmental costs of wastes washing into streams and their impact on biodiversity. In addition, fungicides are expensive, costing S$2.80-6.80 per litre and are a potential health hazard. Most farmers spray without protecting their hands, feet and eyes. This also applies to the use of paraquat (S$28-34 per litre) to control weeds in taro and

other crops. This was identified as a serious risk to farmer health in a 1998 evaluation of one village in the FSP (Siufaga, Savaii) by Lincoln University. FSP's focus on reducing chemical usage suggests that overall environmental impact was positive. In addition, crop diversification, promoted under FSP, reduces the risk of environmental problems that can accompany mono-crop intensification.

2.5 BENEFIT ATTAINMENT AND SUSTAINABILITY

At the end of the projects, the recovery of agriculture and fisheries from the constraints they had faced in the 1990s was only partially complete. Food supplies in the villages appear to have returned to pre-cyclone and taro blight levels and in some areas diet is now more varied. All families and groups interviewed indicated that their subsistence needs could be met from their gardens and plantations. While in part this may reflect pride and a wish not to disclose to strangers that some community members faced difficulties, it is apparent that most rural villagers can grow sufficient food to meet their needs.

While many farmers have re-established farming systems that provide them with adequate cash incomes to meet their basic needs, no real replacement has been found for taro as a cash crop for local sale or export. Many farmers have re-established plantations, eg, of *kava*, bananas, *taamu* or blight-resistant taro, but *kava* plantations have not reached optimum production capacity, the banana market is over-supplied and taro production is too low to support significant exports, though prices on the local market remain high.

The full benefit of the projects will take at least a further five years to emerge. In part, the rate of benefit attainment will depend on the ability of extension to service more villages. While natural diffusion does take place, the speed of adoption (eg, of farming systems or a fisheries conservation approach) can be greatly increased through extension. Benefit attainment will thus largely depend on the ability of MAFF to support its extension services. Unless the level of resources to these services is increased, it will be difficult for them to extend their coverage to a national level. In this situation, other modes of extension delivery will need to be considered and developed, including the use of NGOs or existing village management structures, such as the village council/village liaison officer network.

In fisheries, it would appear that there is now widespread recognition of the need for conservation. In many cases this predated the project, but what the project has done is to formalise the ability of villages to manage their own resources and particularly to control fishing and the use of destructive practices by outsiders. It is expected that over time, most villages in Samoa will adopt such an approach, even if a proportion of villages do not formally introduce management plans.

Livestock Division is relatively limited in resources. It is unable to reach most of the medium-scale livestock producers (10 to 20 head of cattle) let alone the small producers. However, many of livestock owners trained under the project have applied some of the key principles promoted, and these benefits are sustainable. The issue for Livestock Division is how to extend the reach of its advisory service to smaller cattle owners as well

as to the owners of pigs and poultry that are the backbone of the village livestock economy. It will probably require Extension Division to take more responsibility for livestock extension with support from livestock officers as required.

2.6 OUTCOMES IN RELATION TO AusAID'S KEY RESULT AREAS

Although AusAID only introduced the concept of Key Result Areas (KRAs) late in the life of the projects, each of the projects reflected one or more KRAs to a greater or lesser degree, as outlined in the following matrix.

TABLE 5 PROJECT OUTCOMES IN RELATION TO AusAID KRAs

KRA	Objective	FSP	TPLSP	FETP
Improve Agriculture and Rural Development	increase food security	✓✓✓	✓	✓ long-term
	promote sustainable agricultural production and natural resource management	✓✓	✓	✓✓✓
	establish sustainable rural services	✓✓	✓✓	✓✓
Maximise Environmental Sustainability	incorporate strategies to address environmental sustainability	✓	✓	✓✓✓
	address environmental issues, including sustainable natural resource management	✓	✓	✓✓[2]

✓ = limited effect, ✓✓= moderate effect, ✓✓✓ = high effect

Source: Evaluation team estimates

2 / The concerns relating to the tilapia introductions result in this scoring below maximum.

3. KEY ISSUES

A number of issues have been identified which have had a major bearing on the performance of the projects. Several are also relevant to the potential for present and future rural sector projects to contribute to income generation and the alleviation of rural poverty.

3.1 PROJECT DESIGN

3.1.1 Project design and scope

The three projects differed in their approach to design. TPLSP was conceived as an overseas training project for MAFF. It adequately addressed the training needs of Livestock Division, but failed to identify the problems that would arise in relation to the loss of trained staff. It was not analytical and did not clearly define its objectives at the purpose (or goal) level. The redesign undertaken by the implementation team was better prepared. FETP was designed by a team of three consultants, recruited by AusAID. It had quite strong environmental and 'traditional management' skills and defined an innovative project. The lack of socio-cultural skills on the team resulted in a failure to address key issues in relation to village institutions and implementation approaches. These were identified by project management and corrected early in the project implementation period.

None of the projects applied a strong participatory approach to design. FSP's design relied heavily on information provided by the Agriculture Extension Division on farmers' needs and aspirations, and few village surveys or interviews were conducted. Farm budgets, labour-use patterns, resource inventories, marketing and sociological information would have been helpful in focusing research, development and extension efforts.

Project scope also varied greatly between the three projects. TPLSP commenced as a narrowly focused training program for MAFF staff, though it later broadened to focus on extensive farmer training. FETP was also narrow, aiming to strengthen extension and develop community-based management systems. FSP was a diffuse project which was attempting to bring about broad change in MAFF. Its second phase was narrower, and consequently more effective.

FETP concentrated on village fishery management, though its scope was broadened during early implementation. It is notable that the core activity has been highly successful, while the added aquaculture and offshore vessel activities have performed less well. The addition of these specific income earning activities was desirable to reduce pressure on the inshore fishery and provide visible 'incentives' to villagers. However, they appear to have been introduced with insufficient analysis and in practice have not yet made a major contribution to project objectives.

Overall, project experience confirms the conventional wisdom that the tighter and more clearly defined are the project objectives, the greater the prospects for success.

Future projects in the natural resources sector in the Pacific should generally:

- *have clear objectives in relation to income generation, poverty alleviation and benefit distribution;*
- *keep institutional strengthening distinct from technical objectives - thus a project with a clear goal of improving farming systems should not be used as a convenient vehicle to strengthen the overall institution;*
- *adopt a participatory approach, involving all key stakeholders. This would require long periods in the field and increase the cost of design, though it is appreciated that small-scale projects cannot afford high design costs; and*
- *where projects in the Pacific islands seek to influence smallholder or fisher behaviour (as in the case of FSP and FETP), it is desirable that socio-cultural expertise is included in the design team.*

The TPLSP design in particular was short-cut. It identified training needs but contained little sectoral or policy analysis which could be used to guide training. In practice, the project came to be dominated by cattle, reflecting government policy and demand from those who were in a position to benefit from the importation of Australian stock. However, this direction was contrary to the recommendations of a review of the livestock sector (AusAID 1988), which stated that "a concentration on cattle projects has resulted in inadequate attention to other livestock species and enhancement or introduction of marginal industries". It recommended that "there should be more emphasis on pigs and poultry in the South Pacific, and less emphasis on cattle, particularly on smallholdings".

As required in AusGUIDE "Design teams must consult AusAID's lessons database" and take due note of the experience gained through previous projects.

Future projects in the livestock sector in the Pacific should primarily focus on non-ruminants, adopt a farming systems approach and ensure that access to benefits is equitable and in line with AusAID's current focus on poverty alleviation.

3.1.2 Project monitoring

Of the three projects, only FSP attempted a baseline survey. However, the survey report was not completed. A census of livestock farms was undertaken through the village liaison officers under TPLSP in 1996 at the start of the second phase of the project. The design of FETP was based on the limited information then available and a rapid appraisal survey. Virtually no data were available on the village fisheries. It is notable that the logframes of all three projects lacked specific indicators of income or performance at the farm or village level.

For projects with income generation as a short- or long-term goal, information should be assembled on the target population to assist in project design and implementation and allow project management and the implementing agency to assess whether the project is achieving its objectives.

It is difficult to measure village fishing effort and fish landings. It is nonetheless unfortunate that Fisheries Division has so far been unable to develop a monitoring program which would provide some information on inshore production and incomes from fishing. However, underwater visual censuses are being conducted in many villages, and should provide data on the extent of lagoon recovery. A trial survey was undertaken in September 1999 in 12 villages in Aleipata of which about half have been supported by the project. The survey compared conventional recall survey techniques and daily enumeration by secondary school children. It has provided some information on the local fishery as well as ideas on village fishery data collection methods.

The absence of data on farming and fishing activities and their physical and financial performance made objective evaluation of the three projects difficult. The five project phase completion reports primarily comprise a list of inputs and outputs. Although useful as a historical record of project implementation, they were of limited use for evaluation.

Participatory monitoring methodology has developed rapidly over the past five years. The introduction of participatory monitoring processes would fit in well with co-management and participatory development in both fisheries and agriculture.

3.1.3 Flexibility

FSP and FETP demonstrated flexibility in adjusting their objectives and activities to meet changing circumstances. TPLSP suffered major problems in its first phase, with the majority of trained staff leaving or failing to return to Livestock Division. It was not until the second phase that this problem was addressed, through concentration on the delivery of short courses in Samoa and appointment of a full-time in-country coordinator. This was far more effective than the formal overseas training of Phase 1. FETP correctly identified a need for alternative fishing activities, particularly given its unexpected success in relation to the establishment of village fish reserves.

FSP was required to respond to disease epidemics which destroyed taro plantations and eliminated a major subsistence crop and export earner. In applying a participatory rural appraisal approach to village program definition, FSP rapidly determined that full participatory appraisal would be resource intensive and difficult to analyse and follow up. It therefore adopted a short-cut approach which was more practical and allowed more villages to be targeted. However, it was not fully holistic, and possibly other approaches could have been considered. These could include giving farm groups more responsibility for internal and ongoing appraisal as attempted quite widely in South Asia and Africa.[3]

Rural sector projects targeting income generation need to respond rapidly to changing circumstances if they are to assist government agencies to deliver effective services to their clients. This is particularly true with research/extension projects, which need to alter their approach quite rapidly in response to experience gained and external shocks.

3 See for example Chambers 1992. With appropriate training and assistance, farm groups can provide useful information on their farming practices and performance, which can be of great use to research and extension staff.

While FETP's decision to introduce the alternative seafood component is considered to have been positive, it was not designed in detail. This has contributed to the difficulties experienced by all of the main sub-components. Under current AusAID systems, changes in scope during early implementation would be made through the initial annual plan.

Where components are added during implementation, sufficient analysis must be undertaken to minimise implementation problems.

3.2 INSTITUTIONAL STRENGTHENING AND TRAINING

All of the projects had institutional strengthening objectives and all identified that institutional change is essentially a long-term process. TPLSP and FSP were designed as single phase projects with durations of five and three years respectively. FETP was expected to last six years in two phases. Where projects have a significant focus on institutional strengthening, they should allow sufficient time for the changes in approach or staff capabilities to be fully operational and sustainable after the end of the assistance.

Two of the projects experienced difficulties in relation to training they provided. TPLSP staff almost all left Livestock Division within two years of their return from overseas while FETP trainees were mainly unable to complete their certificate courses by distance education. However, all four degree / diploma trainees under FSP have remained with Agriculture. For both TPLSP and FETP:

Local short courses proved preferable to formal academic training, with the latter removing key staff from the implementing agency for extended periods and risking staff loss following course completion.

Distance education is a potentially viable option for Pacific region institutional strengthening projects. However, it needs to be carefully planned, tailored to the needs of the student and the project and be supported through (eg,) work release and mentoring. This system has been used for some time for training through Massey University in New Zealand.

The requirement for students to undertake a full workload under FETP limited their capacity to complete courses.

For projects which seek to train though part-time distance learning: it is desirable to recruit more trainees than required for employment at the end of the course to compensate for students dropping out, as well as providing the ability to allow study time during the working week.

The mid-term review of FSP expressed concern with the technical assistance due to the large number of short-term technical experts who provided sometimes conflicting messages for MAFF extension staff. The short-term staff were felt to have spent too little time in-country on each visit, with the result that they usually had no time to follow through their recommendations or to work alongside their counterparts.

3.3 BENEFIT DISTRIBUTION

3.3.1 Outreach of extension

FSP and FETP have had a significant impact in the villages they targeted. While agricultural extension is now operating in around half of Samoa's villages, the coverage of livestock and fisheries extension is more limited. There is consequently a need to expand extension coverage to assist all farmers and fishers to improve their productivity. The present approach to agricultural extension can exclude families or groups, even within a village where the extension system operates. To overcome this problem would require the extension service to respond to requests for assistance from new groups within the village and to encourage the formation of groups by those currently excluded. If the service responds to specific requests, eg, on a particular crop, it would remove the need to continue to visit all groups monthly. Ways need to be found to increase the level of collaboration between the two divisions and to encourage agricultural extension officers to provide advice and assistance in livestock production.

3.3.2 Equity

TPLSP reflected the national focus on cattle, limiting its potential to affect smallholder farming systems and farm incomes. Breeding cattle are not well suited to smallholder ownership, since they are slow to produce income. In particular, mating is a problem in a village where most owners have less than five cows. Not only was it difficult for the project to reach these owners, but it provided no significant benefit to the many thousand Samoan smallholders who own pigs or poultry but no cattle. Although the second phase of TPLSP did widen the distribution of benefits through the increased numbers attending training, benefits were mainly limited to the larger cattle producers. The average smallholder saw little or no benefit. Project design did not address this issue, and missed an opportunity to influence MAFF policy and provide some assistance to smallholder agriculture.

With regard to access issues, some groups did not benefit as much as others from the three projects. For example, families in more isolated parts of Savaii and Upolu received planting materials and information about new taro varieties much later than families closer to Apia. Gender also influenced access to technology and training, with women gaining less access to most crop-related information than men. Socio-economic status was a significant factor, with larger, more affluent livestock producers were able to access and benefit from the project more than smaller producers. Targeting of a limited number of groups per village under FSP excluded those who did not belong to these groups.

In Samoan villages, the awarding of a traditional title carries quite extensive obligations, and this together with the extended family network provides relatively strong support to the less well-off. Despite this safety net, projects with income generation objectives need to target the more vulnerable people in society. Otherwise, such projects may increase income disparities.

Projects seeking to increase rural incomes need to consider mechanisms to promote equity in the distribution of benefits. Targeting specific groups should be considered where appropriate.

3.4 PARTICIPATION

Effective participation requires government agencies to relinquish some power and responsibility to villagers, farmers or fishers. Project designs should therefore attempt to ensure that there is a genuine commitment to participation on the part of the partner government and implementing agency. Where this is not possible, substantial effort may be required once the project commences. In the case of FETP, the acceptance of participation by MAFF increased rapidly during early implementation as Fisheries Division management came to accept its benefits. Advisers need to be carefully selected on the basis of their commitment to participatory processes.

Both FSP and particularly FETP were participatory. In its later stages, TPLSP also adopted a participatory approach. The move to the use of farmer groups for extension under FSP Phase 2 and the use of participatory rural appraisal have led to a more inclusive and responsive extension system. Agriculture extension officers met by the evaluation team appear to have responded well to the new approach and to understand the implications of participation. Knowledge of crop husbandry practices gained through groups was valued, especially by those with weaker initial knowledge and skills. Learning from others confronted with similar resource, production and marketing constraints is a powerful motivating factor in technology uptake. This was further assisted by the social organisation of the villages and the extended household farming systems. However, two factors have tended to reduce the effectiveness of participation in cropping and livestock:

- the process of forming groups which can exclude families on the basis of religion, family ties or other factors; and
- the streamlining of the initial consultation process, which is limited to a half-day (or shorter) meeting with a group, focusing on constraints and perceived needs. A full farming systems approach would require a more in-depth and extended consultative process.

The short-cut approach to participation has been dictated by a lack of resources during and after the project period. It has been necessary in order to increase the coverage of extension and is justified given MAFF's limited resources. Extension workers need to make efforts to ensure that the ongoing relationship with the group is participatory (ie, that it involves all or most members of the group and is not dominated by one or two leaders) and to spend sufficient time in the village for them to fully understand its farming systems and constraints. To fully develop trust and a two-way communication process can be time-consuming and requires considerable effort by the extension officer.

FETP has undertaken one of the most widespread and in-depth participatory exercises attempted in Pacific fisheries. The consultation process using village institutions has resulted in a high level of ownership and motivation by villagers. However, participation has stopped at the village boundary. Thus it does not appear that account was taken of the needs of inland villages that have traditionally fished in the waters of the coastal villages. The approach has been to draw up the fishery management plan in the village and demarcate the reserve and to publicise them over the radio.

In future, it is suggested that initial consultation identifies all of the traditional users of the lagoon and reef resources and that these users are included in the participatory process, or at least their needs taken into account.

Within the village, some groups benefit, while others may be disadvantaged. While the fishery management plans should benefit the whole village in the long term, in the short to medium term, the defining of reserves can disadvantage fishers and gleaners. They may have less area to fish, or have to travel further to reach fishing areas. Where the reserve occupies much of the foreshore, the fishing pressure in remaining areas can be high.

One of the great strengths of the village fishery management program is that the villagers themselves decide on the size and location of the reserve and the regulations they wish to enforce. The counter weight to that benefit is that sometimes they make decisions which may appear to be inequitable. Villages can be responsive to justifiable pressure, as in the case of Satoalepai on Savaii, which reduced its reserve substantially from its earlier level, to provide more grounds for its fishers and gleaners.

Where villages have determined that their reserves should occupy a large part of the foreshore and lagoon area, Fisheries Division may need to work with villagers to minimise adverse impacts on traditional users from the village or adjacent areas.

3.5 ADOPTION

Adoption relies on comprehensive and direct consultation with the beneficiaries - the farmers and fishers in the three projects. From the beneficiaries' viewpoint there has to be an incentive for adoption such as greater profits, increased subsistence food production, reduced risks, labour or costs or improving long-term conservation.

Successful adoptions are usually simple and appropriate technologies that can easily be assimilated by the target beneficiaries within their farming systems. Subsidies carry the risk of misallocation of resources and can limit sustainability.

In Samoa, MAFF has traditionally relied on subsidies to promote adoption. For example tree planting grants have been made to promote expansion of coconut and cocoa areas. Subsidised inputs were not widely used by the projects to create an incentive for farmers and fishers to adopt technologies. This has improved the chances of adopted technologies being sustainable, especially under FSP. An example is the sale by MAFF of Philippines taro planting material at the market price of S$2 each to farmers after the first 50 plants. Despite the relatively high price, farmers have been buying because of the perceived future income streams arising from taro production. By comparison, the 'free' clams and tilapia distributed to villages under FETP were effectively a subsidy and may have contributed to the relatively poor performance of these sub-components.

3.6 FARMING SYSTEMS, LABOUR AND RISK

The potential impact of rural income generation projects is related to an understanding of community needs, resources and risks. The challenge for the three projects was to

enable farmers and fishers to increase their income and food needs from their resources. Income generation was to occur through an improved and sustainable mix of land, labour, capital and human skills within acceptable risks.

FSP developed a reasonable understanding of overall farm resources. However it was unable to accumulate much information on seasonal labour requirements for various crops, the distribution between cash and subsistence crops or women's labour inputs, especially their role in marketing of crops. While land is not a constraint to expanding crop production in Samoa for most rural households, labour can be limiting. With the outbreak of taro leaf blight, farmers expended more labour growing *taamu*, bananas, Philippines taro, taro *palagi* and vegetables, the last of these mostly by women. A primary aim was to ensure household food security when Samoan taro failed. The switch of household labour to food crops was mainly at the expense of cash crops such as coconuts and cocoa.

Improving income generation in the rural sector of Samoa, and other countries of the South Pacific, should not neglect the household food security provided by traditional food crops. There is tendency for aid projects in the rural sector to concentrate on cash profit maximisation and not enough on subsistence food security.

Phase 1 of the FSP proposed several crops within farming systems approach that had high agronomic and market risks, such as ginger and vanilla. Vegetable growing was a response by the farmers, particularly women, to improve farm cash incomes and has now expanded in both Upolu and Savaii. *Kava* area has also increased.

Successful technological developments were based around several characteristics. They: (a) were wanted by the farmers or fishers; (b) fitted-in with the social fabric and dynamics of the households and villages; (c) were (mainly) promoted by project and MAFF resources; and (d) were considered acceptable risks by farmers and fishers. Those that failed did not meet at least one characteristic.

This evaluation has highlighted that income generation projects need to be sharply focused around the needs of the target beneficiaries. More emphasis in the three projects could have been given to: (a) better understanding of the farmers' / fishers' resources, production and labour-use patterns; (b) greater appreciation of the socio-economic situation of the households and their dynamics within the villages; and (c) better priority setting in terms of food and cash needs of beneficiaries.

4. CONCLUSIONS AND LESSONS LEARNED

4.1 OVERALL ASSESSMENT

The three projects evaluated have made a positive contribution to the development of Samoa's rural sector over the past decade, and helped recovery from a series of natural or human-induced disasters.

FSP has assisted in the introduction of an improved extension system that is servicing a far larger number of clients than its predecessor, 'Training & Visit' system, though it does retain many of the former system's better characteristics. The (soon to be merged) research and extension divisions are working well together and are developing extension messages and distributing improved or new planting material to farm groups. The farming system has changed significantly since the twin threats of cyclone damage to tree crops and taro leaf blight. The research, development and extension skills and other resources of MAFF are now better placed to confront any threats to agricultural production and to sustain new developments. The development and operational effectiveness of the taro breeding and multiplication programs are exceeding targets. Overall the project is classed as moderately successful.

TPLSP largely failed to strengthen MAFF during Phase 1 due to staff turnover. The move to short courses for farmer / staff training coordinated by an in-country adviser proved more successful and sustainable under Phase 2, and has had an impact on cattle production in Samoa. This fitted in well with the national policy of increasing beef production, but limited the distribution of benefits to relatively few and generally larger cattle owners. While the efficiency of extension has improved, eg, through the establishment of the Savaii-based service, its reach is limited. The project is classed as partly successful.

FETP has exceeded its targets with respect to the establishment of village fishery management plans and small reserves. The conservation ethic has been widely adopted in most of coastal Samoa, to which the project has made a significant contribution. Fish and shellfish stocks are recovering towards their pre-cyclone levels, though this has yet to be reflected in large increases in commercial sales of inshore species. Other project components such as the introduction of giant clams and tilapia were useful insofar as they provided tangible 'incentives' for villagers, but face a number of problems and have not been successful to date. These problems are being addressed under the Samoa Fisheries Project. Overall the project is classed as successful.

There are good prospects for sustainability in all three projects, provided that adequate budgetary and staff resources continue to be provided. Samoa's farmers have long adopted a systems approach to their own farming operations. They have an understanding of risk and invariably fit their agricultural (or fishing) activities around a complex web of family and social obligations. As new (and proven) technology emerges, they will adopt it rapidly. The increased understanding of the farming system by the extension officers, and the adoption of the systems approach is likely to ensure that the gains made under the project can be sustained and built on.

4.2 LESSONS LEARNED

The main lesson which can be drawn from the projects is that:

- increasing rural incomes in the Pacific is a complex process and one that a participatory systems approach is well-suited to assist. Specific approaches need to be tailored to the requirements of the villagers and the sector. However, in general terms, smallholders and small-scale fishers are keen to work with change agents such as extension officers and are quick to adopt new technology once it is proven.

Other key lessons include:

- The ability of the projects to change in response to changing environments was notable. However, such changes need to be accompanied by detailed analysis. The alternative seafood component of FETP was driven beyond its proposed pilot scale by strong demand from villages. In practice a more measured approach may have led to improved outcomes.
- Participation by beneficiaries at all stages in the project cycle is highly desirable for projects that seek to influence the attitudes and behaviours of rural dwellers. Thus while implementation of FSP and FETP was participatory (in varying degrees) this was not as true of TPLSP.
- The projects offer some lessons in relation to the determination of agricultural policy in the Pacific, in particular:
  - ➢ the benefits of locating research and extension functions in close geographic and organisational proximity to each other;
  - ➢ the advantages of participatory approaches which build on the strengths and knowledge of the smallholder community; and
  - ➢ the high returns possible from extension, when adequately resourced and supported by research.
- Many lessons have been learned in relation to the establishment of community based management in fisheries:
  - ➢ the need for government officers to fully assimilate the necessary participatory attitudes;
  - ➢ the benefits of employing young and motivated extension workers;
  - ➢ the benefits of building on traditional structures;
  - ➢ the need for the national Fisheries Act to include provision for villages to develop and enforce their own regulations (which should however, not conflict with national regulations);
  - ➢ village fish reserves (or marine protected areas) should where possible extend out to the reef; and

- reserves should be established to take account of traditional users from outside as well as inside the village, particularly where they are from inland villages.

In projects promoting village-based aquaculture in the Pacific, consideration needs to be given to a number of factors:

- the workload involved, and who will be required to maintain or operate the activity;
- existing stock status of the same or similar species. Stock enhancement is likely to have more chance of success where indigenous or previously indigenous species are used;
- where exotic species are to be introduced (or their distribution expanded), introductions should only follow detailed environmental assessment, as required under AusAID guidelines; and
- introductions of species prone to predation need to be accompanied by sound measures to reduce incidence.

The introduction of 'new' aquaculture species thus needs to be accompanied by analysis of biological, environmental, management and marketing factors. The follow-on Samoa Fisheries Project has already adopted a number of these lessons. The focus is now on indigenous species, and the new hatchery will largely be used to breed indigenous and / or locally extinct species. However, further distribution of tilapia may need to be halted until its environmental impacts are better understood.

4.3 FOLLOW-UP ACTIONS

Given the short period that the evaluation team was in-country the following suggestions are made on a tentative basis for consideration by MAFF and the Government of Samoa.

4.3.1 Extension

The efforts of the MAFF divisions to widen their extension coverage is commendable. However it will take many years before any of the three divisions can claim truly national coverage. In the meantime it is suggested that alternative modes of extension are considered, including radio, the use of NGOs and where appropriate, the closer involvement of the private sector. The use of farmer to farmer extension and the development of 'centres of excellence' are ideas worth consideration. While self-funding of extension services remains a remote prospect in Samoa, it may be worth examining methods for farmers to contribute to costs (eg, for travel to demonstration sites), and thus promote wider dissemination of extension messages.

Virtually all villagers interviewed indicated that they valued their contact with their extension officers. However, on Savaii, a number of fisheries management committees did not know the name of their extension officer, while attendance at their meetings could be by any one of three or four staff (including casuals). Further attention is required to work programs on

Savaii in particular, though the problem may be easier to address when the extension unit on the island is fully staffed.

The extension systems developed in fisheries, agriculture and to a lesser degree livestock are sound. However, further refinements to the system are desirable. Extension management needs to be improved, particularly given the shortage of reliable vehicles. Improved resourcing and where possible, the sharing of transport between members of the three divisions could reduce this problem. While a fully integrated extension system is probably not feasible, increased collaboration and coordination would be beneficial.

Consideration could also be given to making extension more of a demand driven system. The extension service could then respond to requests from the public, with appropriate advertising and notices, so the public would know what training and other services were available. This should permit any group, including eg, of women or poor households to request and receive specialised training or advice, and over time reduce the problem of access.

Part of the philosophy of FETP was to allow extension officers to specialise in extension. Officers should not be used as a convenient way to undertake non-extension work in the villages. Management of the three divisions should promote sound extension planning and avoid the temptation to use officers to undertake non-extension work, such as surveys, policing or subsidy determination.

The focus of TPLSP and Livestock Division has been on cattle. While replacing beef imports is a commendable objective, it should not be at the expense of pigs and poultry, which are important contributors to smallholder cash and non-cash incomes. Cattle are not easy to integrate into the smallholder farming system and are slow to produce revenue. Cattle farms visited have experienced major problems in developing and maintaining productive pastures, and in achieving adequate calving rates. In this situation, a shift in balance of Livestock Division's activities could be considered, with greater focus in future on improving the productivity of pigs and poultry. If subsidies on cattle sales by government cattle farms are ended, or the farms are privatised, there would be the potential to use the funds freed up to develop livestock extension into a more inclusive service.

Improved coastal zone management is required if many of the gains made in reef and lagoon conservation are not to be lost in the next few decades. Agricultural extension services need to take note of this and to promote agricultural practices and systems that minimise runoff and erosion.

The farm / fisher group approach to extension management may provide opportunities for improved data collection in a proportion of villages, through the use of participatory monitoring. In addition, it is suggested that MAFF's Economic Analysis and Planning Unit should continue to work to improve its database and data availability so that staff can readily access the information necessary for effective planning and evaluation of research and extension.

4.3.2 Monitoring

Monitoring was a major issue in relation to assessment of project impacts and the feedback of outcomes into MAFF policies. Participatory monitoring may have a major role to play in the cost-effective collection of smallholder and fisher performance.

Farm groups could be helped to establish a mechanism for recording cropping patterns and yields on member's farms. Fisheries management committees could develop processes (with project assistance) for recording fishing activities and landings. The logsheets that offshore boat owners are required to complete are a form of participatory monitoring.

The sustainability of participatory data collection exercises is likely to be greater if feedback is provided. This used to be undertaken by FETP but has lapsed and would be worth reinstating. The new and more sophisticated data management system should allow (for example) three-monthly reports of each boat compared to the fleet average to be provided promptly to each owner or captain.

4.3.3 Fisheries

The offshore vessels have proved well-suited to trolling, droplining for deepwater snapper, as well as for spearing and gillnetting. They are often subjected to quite harsh treatment, for example when crossing the reef passages to enter and leave lagoons. This may have contributed to leaks in some vessels along the keel. The extent to which this represents a design or construction fault could usefully be reviewed by Fisheries Division. If it is demonstrated that it represents a manufacturing fault, rather than 'normal' wear and tear, it will be useful if the manufacturer could be requested to correct the fault on both existing and new boats, since it potentially represents a safety hazard.

The approach to defining fish reserves could usefully be reviewed. It is accepted that villagers have responsibility for this and it would be undesirable for Fisheries Division to interfere. However, there are advantages in most cases from: (a) defining the reserve at a width that does not disadvantage gleaners or traditional users too greatly; and (b) which extends to the reef, though the difficulties of policing distant reefs are acknowledged.

4.3.4 Recurrent cost financing

Recurrent cost financing is an issue for all three projects. With the move to output budgeting and withdrawal by MAFF from a range of semi-commercial activities, there may be potential to fund the extension services at a level that allows close to national coverage to be achieved. It is suggested that MAFF and Treasury should review the needs of extension prior to drawing up the 2001/02 budget to ensure that, as far as possible, resources are provided to allow the benefits from the three projects to be maximised.

The critical issue that will influence the longer-term sustainability and development impact of the three projects, and most other development projects in Samoa, will be the availability of recurrent cost financing. All aid projects leave behind assets. Their ongoing

maintenance, including maintaining and improving the human skills already acquired, will affect project outcomes and impact. It is imperative that the government of Samoa and aid donors recognise this critical constraint and plan future projects bearing this in mind.

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ANNEX A STATISTICAL DATA

NATIONAL STATISTICS

TABLE A.1 ANNUAL REAL GDP AT CONSTANT 1994 PRICES

(S$ million)

	1995/96	1996/97	1997/98	1998/99
Agriculture	80	69	68	
Fishing	22	27	34	
Manufacturing & Construction	136	133	116	
Other	298	315	334	
Real GDP	536	544	552	
Agriculture as proportion of GDP	14.9%	12.7%	12.3%	
Fisheries as proportion of GDP	4.1%	4.9%	6.1%	
Source: Treasury Department				
Government Budget Expenditure				
Revenues				
Ordinary Revenues	194	218	235	248
External Grants	85	66	61	84
Stabex	3	4	0	1
Total Revenues & Grants	282	288	295	333
Less Current Expenditure				
Statutory Expenditure	19	24	29	30
Expenditure Programs	182	196	205	224
Total Expenditure	202	220	234	254
Less Development Expenditures	105	92	76	90
Overall Surplus (Deficit)	-24	-24	-15	-11
Financed by:				
Soft Loans to finance projects	16	22	16	5
Domestic borrowings	9	2		8
Cash Surplus (Deficit) after borrowing	0	1	1	2

Source: Central Bank of Samoa

TABLE A.2 NUMBER OF HOUSEHOLDS, BY LEVEL OF AGRICULTURAL ACTIVITY, BY REGION AND DISTRICT: 1999

(number of households)

	Non-agricultural	Minor agricultural	Only home consumption	Mainly home consumption	Commercial producer	Total
Apia Urban Area	2117	937	770	298	109	4231
North West Upolu	1462	669	2210	1347	304	5992
Rest of Upolu	154	45	1732	2589	247	4767
Savaii	169	61	1465	3321	168	5184
Samoa	3902	1712	6177	7555	828	20174

Source: 1999 Agriculture Census, preliminary results

TABLE A.3 OUTPUT FROM MAFF'S TISSUE CULTURE LABORATORY

(plantlets deflasked)

Plants Produced	1996	1997	1998	1999
Bananas	1065	6342	17094	4685
Orchids	162	235	2945	8750
Taro	0	682	1674	1291
Anthuriums	109	82	125	843
Vanilla	0	0	111	2639
Total	1336	7341	21949	18208

Source: MAFF Tissue Culture Laboratory

TABLE A.4 INDICATORS OF AGRICULTURAL PRODUCTION

Volume indices 1982 = 100

Description	Weights	1991	1992	1993	1994	1995	1996
Copra	0.40	0.2	4.2	0.0	0.2	36.2	39.2
Taro	0.29	191.3	179.8	190.2	61.3	70.5	63.5
Fish	0.12	17.6	44.2	51.3	55.1	60.9	172.1
Bananas	0.06	21.0	11.4	42.1	64.1	71.9	67.3
Cocoa	0.05	0.0	0.0	0.0	0.0	0.9	1.8
Beef	0.04	169.5	171.2	174.6	142.4	111.9	115.3
Pork	0.02	343.8	343.8	331.3	337.5	350.0	387.5
Passionfruit	0.01	0.0	0.0	0.0	0.0	0.0	0.0
Poultry	0.01	26.7	26.7	26.7	26.7	26.7	26.7
Weighted Index of Agric Production	1.00	73.4	73.8	77.7	41.0	58.3	71.5
% Change over the previous period		-13.7	0.6	5.3	-47.2	42.2	22.6
Production value (S$ million)		43.7	50.2	41.5	47.2	60.3	96.1
% Change over the previous period		-3.8	14.9	-17.4	13.8	27.8	59.4

Source: Central Bank of Samoa (based on Agricultural Survey Results)

TABLE A.5 FUGALEI MARKET SURVEY

Friday volume (tonnes)

	1993	1994	1995	1996	1997	1998
Taro	14.3	0.3	0.4	0.3	0.5	0.6
Banana	5.4	11.1	16.2	11.4	6.1	6.2
Taamu		2.6	5.3	8.8	5.5	7.7
Coconut		9.7	7.7	6.4	5.9	7.2
Head Cabbage		0.9	1.2	1.0	1.0	0.9
Tomatoes		0.4	0.7	0.6	0.7	0.3
Chinese Cabbage		0.5	0.4	0.4	0.4	0.3
Cucumber		0.9	1.6	1.4	1.4	1.0
Pumpkin		0.7	1.2	1.0	2.1	2.6
Weighted average prices (S$ / kg)						
Taro	0.90	3.17	3.61	4.45	6.26	6.28
Banana	0.62	0.96	0.37	0.57	0.99	0.90
Taamu		2.20	1.34	1.15	1.94	1.57
Coconut		0.33	0.26	0.35	0.31	0.26
Head Cabbage		3.23	3.04	3.04	3.90	3.68
Tomatoes		4.47	3.87	3.86	4.50	4.67
Chinese Cabbage		1.87	2.24	2.34	2.98	2.62
Cucumber		1.17	0.77	1.01	1.26	1.68
Pumpkin		1.76	1.45	1.61	1.63	1.37

Source: Central Bank of Samoa

TABLE A.6 CROP BUDGETS

(S$ / ha / year)

		Taro	Ginger	Banana (average 5 years)	Peanuts	*Kava* (average 4 years)
Plants / ha		10000		916		
Local price	S$ / kg		2.00	0.30	5.00	4.00
Export price	S$ / kg	4.00	3.00	1.00		7.00
Planting material	per plant	0.10		0.50		0.30
	per kg		1.00			
Income						
Yield (kg)		8000	25000	18970	1359	4940
Export market			15000	7588		3458
Local market			10000	3187		2964
Total Income		32000	65000	10775	6793	6422
Less Estimated Cash Costs						
Planting materials		1000	787	92	25	412
Weed control chemicals		298	43	128	43	
Disease control		593		2017		
Pest control			79	87		
Fertiliser			6249	287		226
Bags			125		49	
Other costs				129		
Transport to market		445	500	1087		124
Total Cost		2335	7783	3827	117	762
Gross margin		29665	57217	6948	6675	5660
Labour requirements	Person days	500	1985	237	174	77
Total return / labour day	S$	59	29	29	38	73

Source: MAFF Economic Analysis and Planning Unit

TABLE: A.7 SAMOA LIVESTOCK NUMBERS, 1989 AND 1999

('000 head)

	1989			1999		
	Household sector	Non-household sector	Total	Total	Upolu %	Savaii %
Cows	7.1	5.8	12.8			
Other cattle	6.4	4.9	11.3			
All cattle	13.4	10.7	24.1	27	64%	36%
Pigs	189.8	3.0	192.8	160	60%	40%
Chickens	310.0	58.0	368.0	406	70%	30%
Goats	1.1	na	1.1	2	90%	10%
Horses	3.1	na	3.1	2	60%	40%

Source: Report on the 1989 Census of Agriculture (1990) Samoa
Census of Agriculture (1999) Preliminary Report

TABLE A.8 EXPORT STATISTICS

(values in S$'000)

	1994	1995	1996	1997	1998
Coconut Oil					
Volume (tonnes)	0	6782	6489	5675	2770
Value	0	8042	6825	6761	4153
Unit Value (S$)	0	1186	1052	1011	1499
Coconut Cream					
Volume (tonnes)	1211	1380	1413	1343	1070
Value	4519	4843	4913	4772	3863
Unit Value (S$)	3732	3509	3477	3629	3610
Kava					
Volume (tonnes)	36	115	72	83	223
Value	124	1436	1120	1485	5526
Unit Value (S$)	3433	12487	15657	17902	24748
Copra Meal					
Volume (tonnes)	0	2624	4064	3205	1312
Value	0	364	622	542	215
Unit Value (S$)	0	139	153	169	164
Copra					
Volume (tonnes)	64	2502	4659	8433	6877
Value	58	2193	4078	7882	6078
Unit Value (S$)	906	876	875	935	884
Taro					
Volume (tonnes)	2.0	2.0	1.0	1.1	1.3
Value	158	162	98	99	125
Unit Value (S$)	64	67	92	98	98
Fish					
Volume (tonnes)	95	212	1180	2977	4408
Value	257	434	2287	12327	28401
Unit Value (S$)	2710	2050	1938	4141	6443
Other Exports (value)					
Banana	217	655	724	474	178
Other exports / re-exports	3569	3545	4160	3524	11600
Total export value	8902	21674	24827	37866	60139

Source: Central Bank of Samoa

TABLE A.9 CASH AND NON-CASH INCOME GENERATION IMPACT OF TARO RECOVERY

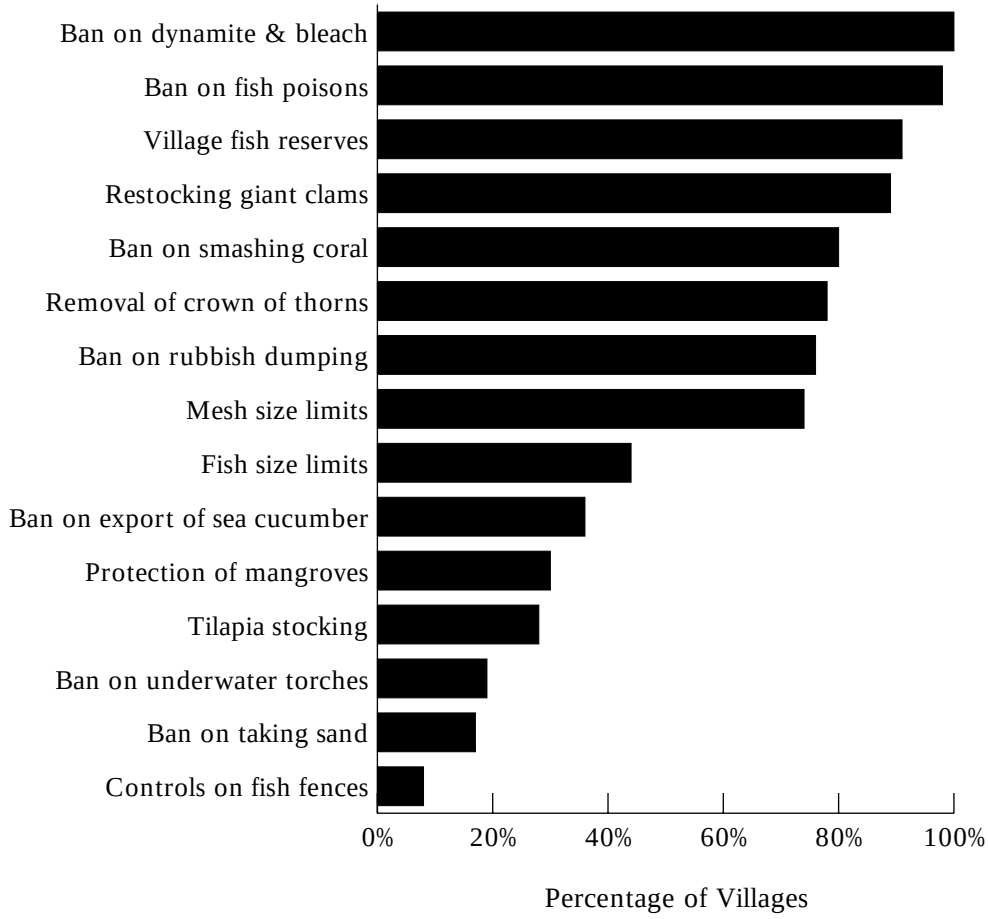
(average of two farms on Savaii)

(S$ / household 1999)

Farm Enterprise	Cash income	Subsistence income	Total income equivalent	% Sold
Taamu	4000	4890	8890	45%
Bananas	1500	380	1880	80%
Taro *palagi*	120	1080	1200	10%
Coconuts	750	400	1150	65%
Yams	725	245	970	75%
Cocoa	850	90	940	90%
Taro	550	60	610	90%
Pineapples	300	50	350	85%
Kava	250	10	260	95%
Tobacco	150	40	190	80%
Vegetables	120	50	170	70%
Total	9315	7295	16610	56%

Source: Farmer records / evaluation team interviews

FIGURE A.1 ACTIVITIES COVERED BY MANAGEMENT PLANS, MARCH 2000



Source: Samoa Fisheries Project

TABLE A.10 GIANT CLAM STOCKING BY YEAR AND SURVIVAL TO EARLY 2000

	Savaii			Upolu		
Year stocked	Stocked	Surviving	%	Stocked	Surviving	%
1996				11563	36	0%
1997	8200	1636	20%	10690	569	5%
1998	200	0	0%	3603	556	15%
1999	2200	1607	73%	4155	3046	73%
Total	10600	3243	31%	30011	4207	14%

Source: Samoa Fisheries Project

TABLE A.11 OFFSHORE BOAT PERFORMANCE 1999

Boat no.		1	2	3	4	5	6	7	8	9	10	Average
Total trips		16	26	23	36	10	11	9	58	41	42	27
Average hours fished	hours	3.3	4.1	4.9	6.2	5.2	3.9	9.2	5.5	8.0	9.6	6.0
Landings / year												
Pelagics (eg, tuna)	kg	12	54	0	242	370	481	13	1007	3565	944	669
Reef fish	kg	333	2744	813	7411	104	684	420	514	1643	3560	1823
Total	kg	345	2798	813	7654	474	1165	433	1521	5208	4503	2491
Total value of catch	S$	2104	15294	4477	41638	1836	5408	2358	6268	21217	22823	12342
Average value	S / kg	6.09	5.47	5.51	5.44	3.87	4.64	5.44	4.12	4.07	5.07	4.95
Average catch / trip	kg	22	108	35	213	47	106	48	26	127	107	92
Average value of catch	S$ / trip	117	588	195	1157	184	492	262	108	517	543	416
Average cost	S$ / trip	20	20	18	36	39	88	43	32	50	116	46
Average margin	S$ / trip	97	568	177	1121	145	404	219	76	468	428	370
Trips / month	trips	6.4	5.2	12.5	5.0	3.3	11.0	5.0	6.8	7.3	6.0	6.9

Source: Samoa Fisheries Project

Quality Assurance Series No. 19

Increasing Rural Incomes: An Evaluation of Three Rural Sector Projects in Samoa

The South Pacific countries are trying to raise rural incomes in their quest for social and economic development. The Australian Government's strategy for the rural development sector in the aid program is to focus on reducing rural poverty by increasing opportunities for the poor to generate income.

The evaluation assessed the performance of three rural sector projects in Samoa in achieving income generation objectives, and the sustainability of development outcomes and impact. The projects evaluated were the Farming Systems Project, the Training Personnel in Livestock Sector Project, and the Fisheries Extension and Training Project - Phase 1.

The evaluation found that the farming systems and the fisheries projects made significant contribution to the development of Samoa's rural sector. The key beneficiaries were large numbers of Samoa's farmers and fishers. They have good prospects for improving their incomes, provided the Ministry of Agriculture, Forests and Fisheries continues to provide resources at current levels, including recurrent cost financing. The livestock project benefited only few large cattle owners. The research and extension officers of the crops, livestock and fisheries divisions of the Ministry benefited from increased knowledge and capacity building through training.

This evaluation has highlighted that income generation projects need to be sharply focused around the needs of the target beneficiaries. More emphasis in future projects needs to be given to: better understanding of the farmers' and fishers' resources, production and labour-use patterns; greater appreciation of the socio-economic situation of the households and their dynamics within the villages; and better priority setting in terms of food and cash needs of beneficiaries.