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*National
Environment
and Development
Management
Strategies*



363.7099614
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Western Samoa

**National
Environment and Development
Management
Strategies**

USP Library Cataloguing-in-Publication data:

Western Samoa: National Environment and
Development Management Strategies NEMS / the
National Environmental Management Strategies
Task Team.—Apia [Western Samoa] : SPREP, 1993.

xxi, 100p. : 20cm

Bibliography:

ISBN 982-04-0002-3

1. Environmental policy—Western Samoa
2. Environmental protection—Western Samoa
3. Conservation of natural resources—Western Samoa
1. National Environment and Development Strategies
Task Team. II. South Pacific Regional Environment
Programme

HC79.E5N97 .S33.718'09614

Prepared for publication by the South Pacific
Regional Environment Programme,
Apia, Western Samoa

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an original design by Catherine Appleton

Cartographic material for this document
and its companion volume
Western Samoa: State of the Environment Report
prepared by Jacaranda Wiley Ltd, Brisbane, Australia

Typeset in New Baskerville and Gill Sans
Printed on 110 gsm Tudor R. P. (100% recycled)
by ABC Printing, Brisbane, Australia

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Produced with the financial assistance of the
United Nations Development Programme (UNDP)

Cover photograph: *Toko* at Apia village, Savaii
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Western Samoa

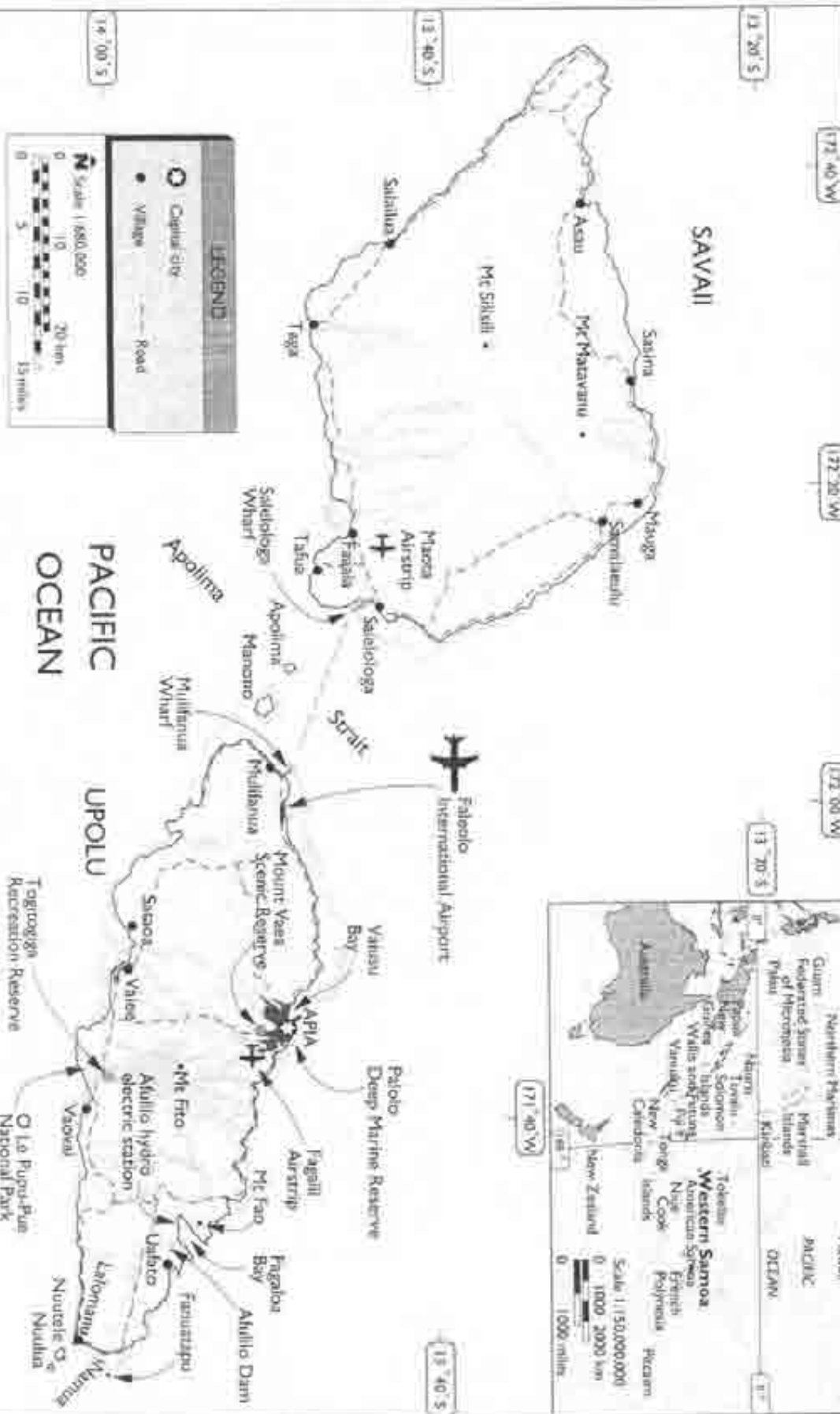
National Environment and Development Management Strategies

*Prepared by the
Western Samoa NEMS Task Team
in association with the
South Pacific Regional Environment
Programme (SPREP) 1993*

*Produced with financial assistance from the
United Nations Development Programme (UNDP)*



Western Samoa



LEGEND

- Capital city
- Village
- Road

Scale: 1:650,000

0 5 10 20 km
0 5 10 15 miles

Foreword

Western Samoa faces a challenging decade. It has become increasingly apparent that our natural resources are deteriorating due to the pressures we are placing upon them. As the resources deteriorate, other problems arise. For example, our forests are being cleared at a rapid rate for agricultural use and for their timber; among the consequences are loss of water quality and supply, and loss of biodiversity.

We also know that there is no miracle solution. Like many Pacific Island nations, we have no mineral or oil deposits that will provide the ready cash to repair environmental damage, or provide for increasing aspirations. The natural resources that are under threat are the same resources that we will need to provide for our future health, welfare and economic development.

The move towards sustainable development will require a commitment from all of us: as individuals, as members of communities, and as members of government and non-governmental agencies. It will require a fundamental change in our attitude to our environment — a realisation that there are limits to the seemingly abundant resources of our islands.

There are many things that need to be done. The Government of Western Samoa recognises that it has the responsibility to lead the way by reviewing its policies and legislation, and ensuring that its environmental efforts are soundly based and well coordinated. For this reason the Government supported the establishment of a National Environmental Management Strategies Task Team, and Cabinet was pleased to approve the National Environment and Development Management Strategies (NEMS), as set out in Part 2 of this publication, in February 1993.

Environmental problems often have complex causes and require interdisciplinary solutions. For

this reason Cabinet recommended that the membership of the NEMS Task Team include key government and non-governmental agencies. The Chairmanship and executive tasks were the responsibility of the newly formed Division of Environment and Conservation, Department of Lands, Surveys and Environment. The document produced as the result of the Task Team's deliberations was reviewed by a public meeting.

This document is just a beginning, a framework for the preparation of detailed policies and educational efforts that will guide the government and the Samoan people towards a more sustainable future.

The National Environment and Development Management Strategies could not have been completed without the financial assistance extended by the United Nations Development Programme and the collaborative assistance of the South Pacific Regional Environmental Programme (SPREP). The Government gratefully acknowledges the assistance of those organisations.

In embracing the concept of sustainable development, the Government is only too aware of the difficulties inherent in its implementation. It would therefore welcome the continuing support of its development partners in the international community as it pursues sustainable development through the implementation of the National Environment and Development Management Strategies.



Honourable Tofilau Eti Alesana
Prime Minister of Western Samoa

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Notes The units of currency of Western Samoa are the 'tala' (dollar) and the 'sene' (cent). All currency amounts in Parts 1 and 2 are in Western Samoan 'tala' unless otherwise specified. Currency amounts in Part 3 (Programme profiles) are in United States dollars (\$US).

A financial year spans the period 1 July to 30 June.

Acknowledgements

No document of this size and complexity can be completed without the assistance of many individuals.

In particular I wish to thank the Prime Minister of Western Samoa, the Honourable Tofilau Eti Alesana who strengthened the NEMS process and the NEMS Task Team through the high visibility he accorded NEMS at the Earth Summit, as well as providing his unswerving support to environmental concerns.

Without the financial assistance of the United Nations Development Programme (UNDP) through the South Pacific Regional Environment Programme (SPREP), this Project would not have been possible. The continued support of SPREP's Director, Dr Vili Fuavao, and in particular, SPREP's NEMS Team Leader, Neva Wendt, is therefore gratefully acknowledged.

Throughout the NEMS Project, Samuelu Sesega, Principal Environmental Officer of the Division of Environment and Conservation, was Executive Officer to the Task Team. His guidance and leadership is particularly acknowledged.

Over the two-year period from inception to completion of this document, many individuals served as members of the NEMS Task Team. Core members were:

- ◆ Tanielu Aiaki (Education Department)
- ◆ Malu Faalogo (Ministry of Transport)
- ◆ Malaki Iakopo (Department of Agriculture, Forests and Fisheries)
- ◆ Vaasili Moelagi Jackson (Faasao Savaii Society)
- ◆ Dr Le Mamea Mātatumua (Health Department)
- ◆ Mary Petaia (Ministry of Women Affairs)
- ◆ Clark Peteru (O le Siosiomaga Society)
- ◆ Sharon Potoi (Ministry of Foreign Affairs)

- ◆ Fualau Misiolo Sofe (Department of Trade, Industry and Commerce)
- ◆ Florence Saaga (Western Samoa Visitors Bureau)
- ◆ Dr Namulaula Kamuta Seuseu (Health Department)
- ◆ Dr Lemalu Toso (Family Health Association)
- ◆ Lonise Tanielu (Education Department)
- ◆ Anasi Tiotio (Treasury Department)
- ◆ Neva Wendt (SPREP)
- ◆ Roger Cornforth (Department of Lands, Surveys and Environment)
- ◆ Sailimalo Pati Liu (Department of Lands, Surveys and Environment)

I also note with gratitude the support of all departments whose representatives were members of the NEMS Task Team, and of the heads of these departments who made available time and other resources of their respective departments for NEMS meetings as well as for the compilation of departmental and sector reports. I would also like to record my thanks to the UNESCO office in Apia for providing their meeting facilities free of charge to the Task Team.

Tuuu Ieti Taulealo replaced Muliagatele Iosefatu Reu as the NEMS Consultant. He undertook the major task of developing the framework for NEMS and preparing this document with the valuable input of the Task Team. The document is testimony to his energy and skills, and to the commitment by him and the Task Team to the need for change to a more sustainable form of development. Tuuu Ieti Taulealo was ably assisted initially by Jennie Cary, and later by her replacement, Julia Haska.

In November 1992 a public meeting was held to discuss the first draft of this document. Over forty people from government and non-governmental

agencies attended and contributed to the discussions. Particular thanks go to the people of the discussion panel:

- ◆ Peter Groves (Western Samoa Water Authority)
- ◆ Francois Martel (Department of Agriculture, Forests and Fisheries)
- ◆ Muliagatele Iosefatu Reti
- ◆ Henrietta Winterstein (Department of Agriculture, Forests and Fisheries)
- ◆ Dr Semisi Toa (Department of Agriculture, Forests and Fisheries)

I would also like to thank the current and former directors of the Department of Lands, Surveys and Environment, respectively Faasootauloa Pati Tuimalealiifano and Fiu Mataese Elisara-Laulu, for their support for this Project.

Finally, many past and present staff of the Division of Environment and Conservation assisted with the organisational and administrative needs of the Project: Steve Brown, Tapa Suaesi, Bronwyn Leupolu, Easter Chu Shing, Netty Keresoma and Niu Malak).

Faasootauloa Pati
Minister of Lands, Surveys and Environment



The preparation of the National Environment and Development Management Strategies (NEMS) for Western Samoa is part of an ongoing process of community awareness raising, policy making and planning for environmental protection which is a necessary component of the country's future economic development activities. The process of developing NEMS has been an important one involving review of existing administrative, institutional and legislative mechanisms together with determination of detailed programmes for implementation of the tasks identified under each of the Strategies. Valuable financial assistance which has enabled this process to continue smoothly has been provided by the United Nations Development Programme (UNDP). For their technical expertise in preparation of this important information we would like to thank Mr Clark Peteru, Mr Kosinuki Latu, Ms Elizabeth Harding,

Mr Iosefa Maiava, Mr Tuuu Ieti Taulealo, the staff of the Division of Environment and Conservation, Department of Lands, Surveys and Environment, especially Mr Samuelu Sesega, the Executive Officer to the Task Team and, for her valuable and continuing input, Ms Julia Haska.

Neva Wendt
Team Leader
National Environmental
Management Strategies (NEMS)
South Pacific Regional Environment Programme

Message from UNDP

UNDP's Environmental Strategy and Action Plan focuses on supporting governments in integrating environmental considerations into their development plans. As part of its effort to aid governments in their pursuit of sustainable development, UNDP provides environmental management guidelines that can be applied to all programmes and project cycles.

In this regard, UNDP is proud to be associated with the preparation of National Environmental Management Strategies (NEMS) in seven Pacific Island countries. This was carried out through an institutional-building project designed to enhance the capacity of the South Pacific Regional Environment Programme (SPREP) to service its mandate from member governments of the South Pacific Commission for environmental assessment and management. Under this project, UNDP provided SPREP with legal and financial consultants to working groups charged with guiding SPREP to institutional independence, a strategy consultant to formulate its long-term corporate plan, and an environmental management specialist to oversee the development of NEMS in seven countries. UNDP further supported the UNCED process by providing funds not only for Pacific regional workshops, but also for airfares and subsistence allowances to enable participation by Pacific Island governments and NGOs in the UNCED Preparatory Committee meetings.

UNDP is also currently planning a follow-up programme which will focus on building capacity in fifteen countries of the Pacific region for the implementation and mainstreaming of the NEMS process in national development efforts.

Economic development strategies in any country must be compatible with environmental goals: the challenge is knowing how to do this. However, making choices and decisions that will eventually promote environmentally sound development requires understanding how the environment functions; identifying what needs to be done to protect, conserve, enhance and preserve it on a long-term basis; and linking national objectives with environmental management activities.

The National Environmental Management Strategies facilitate the making of such choices and decisions through a participatory process which brings together government departments, non-governmental organisations, and communities in a spirit of inclusiveness and social integration.

UNDP therefore applauds the timely publication of the National Environment and Development Management Strategies for Western Samoa. This document will undoubtedly provide a further stimulus to the integration of environmental considerations into the national process to ensure the planning and management of development in a sustainable manner.



Anthony R. Patten
Resident Representative
United Nations Development Programme

Message from SPREP

We Pacific Islanders share a common aspiration for economic development and improved living standards for our people. However, we are aware that this development cannot be at the cost of the environment. We have lived in close harmony with our island environment for thousands of years and we are well aware of its importance to our way of life. We face the complex challenge, in common with many other countries of the world, of achieving economic development in a way which will not significantly affect our environment. This major challenge must be addressed if our Pacific way of life is to survive.

The preparation of National Environmental Management Strategies (NEMS) in several Pacific Island countries has been a major tool in addressing these issues. This undertaking was made possible through the generous financial assistance of the United Nations Development Programme (UNDP). This assistance is gratefully acknowledged.

The Western Samoa National Environment and Development Management Strategies (NEMS) is a practical document which aims to identify the major environmental issues in Western Samoa and the priority environmental programmes which are

required to address them. The emphasis has been on ownership of NEMS by the government and the people of Western Samoa. The process which has resulted in the preparation of NEMS has involved many participants and has been directed by a National Task Team, comprising relevant government and non-governmental organisations in Western Samoa.

The NEMS process has proved a most useful vehicle for raising awareness of environmental issues. However, the success of the NEMS exercise will ultimately be judged by its implementation. If the NEMS document sits on a shelf and gathers dust, then the exercise has failed.

SPREP looks forward to working with Western Samoa and with other regional and international organisations in the implementation of NEMS.



Vili A. Fuavao
Director

South Pacific Regional Environment Programme

Acronyms

AIDAB	Australian International Development Assistance Bureau
AMA	Apia Municipal Authority
CBS	Central Bank of Samoa
DAFF	Department of Agriculture, Forests and Fisheries
DEC	Division of Environment and Conservation
DLSE	Department of Lands, Surveys and Environment
DOS	Department of Statistics
DP7	Western Samoa's Seventh Development Plan 1992-1994
DTCI	Department of Trade, Commerce and Industry
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EPC	Electric Power Corporation
FAO	Food and Agriculture Organization of the United Nations
GDP	Gross Domestic Product
GWS	Government of Western Samoa
MFAT	Ministry of Foreign Affairs and Trade (New Zealand), Wellington, New Zealand
NEMS	National Environment and Development Management Strategies
NLS	National University of Samoa
NGO	non-governmental organisation
PSC	Public Service Commission
PWD	Public Works Department
SPAHH	South Pacific Alliance of Family Health, Port Moresby, Papua New Guinea
SPREP	South Pacific Regional Environment Programme, Apia, Western Samoa
SOE	State of the Environment Report
SOPAC	South Pacific Applied Geoscience Commission, Suva, Fiji
TEC	Target Environmental Component
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNICEF	United Nations International Children's Emergency Fund
USP	University of the South Pacific
WSVB	Western Samoa Visitors Bureau
WSWA	Western Samoa Water Authority

Executive summary

The need for NEMS in Western Samoa

There is a growing concern in Western Samoa over environmental issues, and a growing understanding of the need for economic development to be properly planned in order to take environmental constraints into account. Such an integration of environment and development is generally referred to as sustainable development. It is a new thrust in the pursuit of an acceptable and dignified level of social well-being, and the primary focus of global development efforts today.

The concern about protecting the environment and conserving the use of natural resources is evident at all levels of Samoan society: individual; village; non-governmental and government organisation alike. Government commitment in this area is shown most notably in the establishment of the Division of Environment and Conservation (DEC).

Environmental degradation has complex causes and long-term adverse effects and consequences. One major example is the increasing demand on limited natural resources by a rapidly growing population. As elsewhere in the world, the inevitable result is resource depletion. There are also the projected effects of climate change and sea-level rise which, as in other Pacific islands, is likely to have serious adverse implications for Samoa's physical and economic environments.

NEMS is Western Samoa's attempt to provide a planned and systematic approach to the integration of development and environmental concerns. The implementation of NEMS will promote the use of a consistent and sound set of principles and guidelines that will guide and assist the development process along a sustainable pathway.

The main principles upon which NEMS is based

are adapted from those declared at the United Nations Conference on Environment and Development (UNCED) at Rio de Janeiro, 3-14 June 1992 (known as the Rio Declaration). These principles place the well-being of people first and foremost. At the same time, the principles also recognise that people and the environment are interrelated and inseparable: a clean and balanced physical environment is essential if societies are to achieve a condition of well-being that is acceptable and dignified for all citizens. As Western Samoa has already signed the Rio Declaration, the principles of NEMS already have the endorsement of its government.

Framework for NEMS

This document focuses on the critical environmental issues, or Target Environmental Components (TECs), facing Western Samoa rather than focusing on the issues facing different government sectors. The approach aims to reduce sectoral interests and increase cooperation between agencies. In this way it recognises the complex and interactive nature of environmental issues and problems.

The twelve TECs identified for priority consideration are the following:

- (1) Management of population dynamics and trends
- (2) Protection of the quality and supply of fresh water
- (3) Protection of the sea and marine resources
- (4) Management of waste
- (5) Combating deforestation
- (6) Development of appropriate land use practices
- (7) Conservation of biological diversity
- (8) Protection of the atmosphere

- (9) Planning for climate change
- (10) Preservation of traditional arts, culture and history
- (11) Development of human resources
- (12) Promoting sustainable economic growth

NEMS long-term goals are the improvement of the welfare of all Samoan citizens and the realisation of community expectations through sustainable development by means of:

- ◆ stabilising population;
- ◆ boosting efficiency;
- ◆ restraining consumption; and
- ◆ building a framework for change.

Much is expected from all citizens if these goals are to be realised. It is important that the necessary political commitment is provided through policies which create a proper climate for sustainable development.

This document recommends that the development of NEMS be carried out in three phases:

- ◆ Phase 1 establishes the framework and recommends guidelines for national policies. (This is the current document.)
- ◆ Phase 2 deals with the preparation and formulation of national policies.
- ◆ Phase 3 involves the implementation of the policies through their approved Action Plans.

The process of change

The most difficult task related to the achievement of NEMS goals is undoubtedly the mobilising of a process of change. Many of those changes will ultimately require commitment at the individual level, so the process will need full community support and participation if it is to succeed. It requires:

- (1) the public to be aware of environmental issues;
- (2) political leaders to provide sound policy guidelines for environment and development activities; and
- (3) the community to promote the necessary actions to achieve sustainable development.

These are the three *As of Change*:

Awareness + Agenda + Action → Change

Chapter 4 of this document discusses in detail some of the ways in which these key issues might be addressed.

Current status of the local environment

A summary of the state of the environment found in Chapter 5 shows an increased demand for resources, resulting in their rapid depletion and/or degradation. The population is now four times that at the turn of the century.

The impact of population growth on resources is most clearly manifested in the problem of deforestation. The Task Team identified this problem as the major concern which in turn causes other environmental problems such as fresh water depletion and pollution, marine environment degradation, loss of biodiversity and soil erosion.

Other environmental issues also need attention. There is a need to be better prepared for the adverse consequences of projected climate change and sea-level rise. Traditional arts and crafts need to be preserved through the development of appropriate cultural facilities. While attempts have been made to promote the sustainable development of human resources and economic growth, further effort is still required to ensure that these are well integrated into national environment and development planning.

A supplementary document, *Western Samoa: State of the Environment Report*, has also been prepared (Taulealo 1993).

National environmental policies

Without clear policies for the identified Target Environmental Components (TECs), it is premature to recommend specific activities to address the TECs. National policies represent the Government's position, and are its statements or plans to show the direction and scope of actions for the TECs. Government endorsement for the framework for NEMS is therefore a prerequisite for the policy development of Phase 2.

NEMS implementation

Work on NEMS Phase 1 started in November 1991 with the first meeting of the Task Team. However, due to the effects of Cyclone Val in December the same year, work was delayed until July 1992. The proposed time frame for NEMS implementation is as follows.

- ◆ Phase 1 (Framework) (This document marks the end of Phase 1.)
- ◆ Phase 2 (Policy)
- ◆ Phase 3 (Activities)

It is proposed that a committee undertake the preparation of draft policies for each TEC. This document recommends that the TEC Policy Committees comprise the organisations and individuals which deal with or have interests in the respective TECs. The agencies most involved with or having authority for a TEC will become the Implementation Agencies and must assume the lead role in policy formulation. Chapter 7 provides further details of their structure.

When policies are approved, TEC Advisory Committees are formed to prepare Action Plans and to oversee policy implementation. One of the most important aspects of the implementation process is regular evaluation to assess the extent to which the goals have been met, and to recommend necessary changes.

Finally, it is recommended that a NEMS Advisory Committee which will be set up within the

Division of Environment and Conservation be responsible for the coordination of policy implementation. However, in the long term, a separate organisation is recommended for environment and planning. Such an organisation will be responsible for the coordination of all national environment and development planning, and for the management of other environmental services.

Specific programme profiles

As stated above, the primary function of this NEMS document is to establish a framework for the NEMS process in Western Samoa (Phase 1). Phase 2 will see the preparation of national policies which will include the formulation of specific objectives, activities and programmes.

It is important, however, that this document provides an indication of which programmes are seen by the Government of Western Samoa as having highest priority for funding at this stage of the NEMS process. These are the programme profiles in Part 3 of this document.



PART I
The Western Samoan
setting



The setting

A National Environmental Management Strategy (NEMS) must be formulated in the context of the overall natural, socio-economic, cultural and political environment. In Western Samoa the opportunity to prepare such a strategy coincided with an increase in concern for environmental issues. Western Samoa's natural resources have already been degraded and the pressure on them continues to mount.

Compared with many Pacific Island nations, Western Samoa has a range of environmental legislation and an extensive government infrastructure. In 1992 the Government incorporated environmental concerns into its long-term development planning tool, the Seventh National Development Plan, or DP7 (GWS 1992). The National Environmental Management Strategy, renamed the National Environment and Development Management Strategies (NEMS) in Western Samoa, is a further stage in integrating development and environmental issues.

This chapter provides a brief overview of Western Samoa in terms of its location and size, climate, land, sea and people. It is not the intention to reproduce here the information contained in *Western Samoa: State of the Environment Report* (SOE) (Taulaalo 1993), but merely to provide a background. The reader is referred to the Report itself for further details.

No survey of the status of the environment would be complete without mention of the impact of two recent cyclones. While tropical cyclones are a natural event, Western Samoa experienced two of the worst cyclones in recorded history in 1990 and in 1991. Cyclone Ofa caused an estimated \$300m in damages, and the five-day fury of Cyclone Val further devastated homes, infrastructure, agricultural and forestry enterprises, and natural areas. The cost of Cyclone Val to the economy has been

calculated as at least \$600m but the full impact of the cyclones on the natural environment will never be known. A general survey after Cyclone Val reported severe devastation of critical lowland sites, tree crops and forests, with profound impact on natural ecosystems and biological diversity (Park et al. 1992).

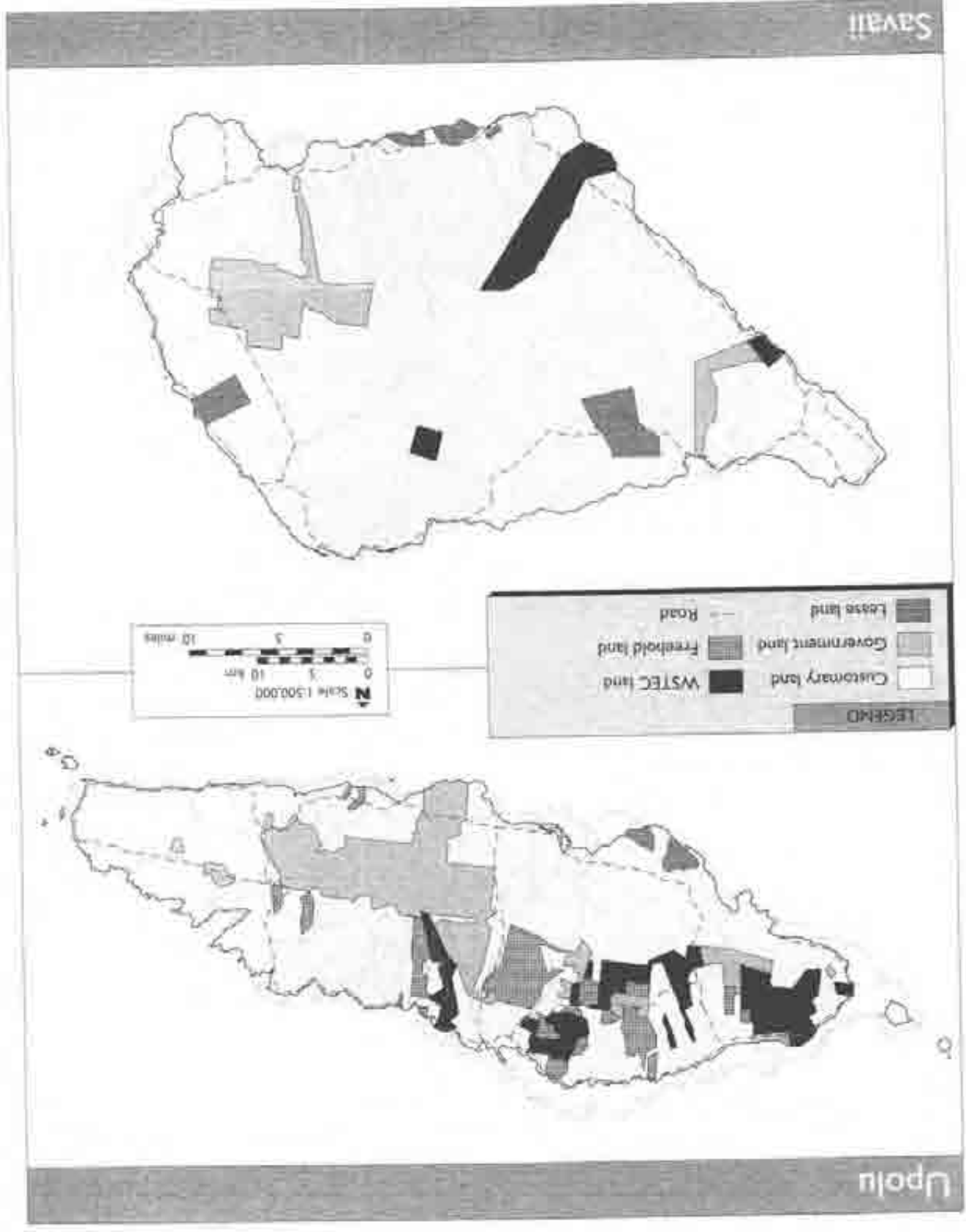
1.1 Location and size

Western Samoa lies in the south-west Pacific between latitudes 13° 25'S and 14° 05'S, and longitudes 171° 23'W and 172° 48'W. It comprises two main islands, seven smaller islands (two of which are inhabited), and islets and rocks. Upolu extends about 72 km from east to west and up to 24 km from north to south. Savaii is also about 72 km across, but about 35 km wide. The total land area is approximately 2,820 sq km, with the two main islands of Upolu and Savaii comprising 1,115 and 1,700 sq km respectively. The capital, Apia, is on Upolu and lies about 130 km from Pago, American Samoa, 3,000 km from Auckland, New Zealand and 4,500 km from Sydney, Australia.

Western Samoa is an oceanic volcanic archipelago formed in a westerly direction. The islands are still volcanically active, the last eruptions being on Savaii in 1760, 1902 and 1905-11, and earth tremors are frequent. The islands are still undergoing isostatic sinking to compensate for the large volume of volcanic material ejected onto the crust.

With the exception of areas of recent lava flows, both islands are mostly surrounded by shallow lagoons and a fringing reef. Both islands have coastal plains four to five km wide, then rise to central mountains. Savaii has a central core of volcanic peaks surrounded by a ring of lava-based plateaux, then lower hills and coastal plains. Upolu has a

Figure 1.1 Land ownership



Source: After GWS 1993

chain of volcanic peaks running from one end of the island to the other, with hills and coastal plains on either side. Savaii's mountains rise to over 1,500 m (Mount Silisili, the highest is 1,858 m), Upolu's mountains to 1,158 m.

Of the two main islands, Upolu, the smaller, is the more populous. More than half of the total area of Western Samoa is suitable for cultivation, and the majority of the population live on the coastal plain. While the pre-European landscape was primarily rainforest, large areas of rainforest are now to be found only in the central mountains.

Eighty-one per cent of land is owned by families or is under customary ownership (Figure 1.1), a system which guarantees access to land for subsistence purposes, and is an integral part of the Samoan way of life (ANZDEC 1990). However, there is an increasing trend towards individual ownership of customary land.

1.2 Climate

The climate is tropical, tempered by the ocean environment, and marked by a distinctive wet season (November–April) and a dry season (May–October). Temperatures range from 17°C to 34°C. The average annual temperature is 26.5°C in coastal areas, and the average relative humidity is 85 per cent in Apia. Rainfall varies from 2,500 mm in the north-westerly parts of the main islands, to over 6,000 mm in the highlands of Savaii. The predominant surface winds are south-easterly trades during both dry and wet seasons. These patterns result in high rainfall in eastern Upolu,

and rain-shadow areas in western Upolu and eastern, northern and western Savaii.

Storm patterns affecting Samoa originate from three main sources: tropical easterlies cause winds from the south-east; cold fronts from Australian systems cause cold air flows and rain; and storms from the south-west Pacific generate cyclones.

1.3 Land resources

1.3.1 Geology, geomorphology and land use

The Samoan islands are composed almost wholly of basic volcanic rocks, namely, olivine basalt, picrite basalt, olivine dolerite of the alkaline basalt suite (Kear & Wood 1959). Most of the soils are formed from basaltic volcanic flows and are generally clay in texture, free draining and relatively shallow.

The predominant land use, apart from indigenous forests, is agricultural. Flat, fertile land is now scarce in most parts of the country. This is already evident from the increased clearance of land on steeper slopes and higher altitudes that are of only marginal benefit for agriculture. The small proportion of holdings under fallow and bush is further indication of the pressure for land.

There is no mineral production in Western Samoa, except for quarrying for roads and limited landfill. An Australian exploration programme in 1990 found no useful mineral deposits except titanium which, despite its high concentrations, is not extractable at a commercially viable cost.



Savaii's central core of volcanic peaks is surrounded by a ring of low-based plateaux. View from the north-west. (photo: A.C. Robinson, reproduced courtesy of DSLE)

1.3.2 Water

Although the average rainfall of Western Samoa is relatively high, there are areas of rain-shadow, and the high porosity of the soil creates problems for supply and storage of water.

About 70 per cent of the population have access to water drawn from surface resources; 90-95 per cent of the population have access to a piped water supply. River flows provide the main source of supply and most catchments have been extensively developed. Water catchment is also a major source of hydroelectric power. With the recent commissioning of the Afulilo hydroelectric power scheme, 50 per cent of electricity production comes from hydroelectricity.

Savaii and Upolu have many coastal springs which are used as a source of water where there is limited piped water. There is some collection of rainwater in tanks. Groundwater supplies are close to sea level and sit on a layer of salt water; as a consequence, wells are not common.

The Samoan islands are small, and despite high rainfall some of the water resources dry up for 3-6 months of the year. At this time only three major rivers run and these have been almost fully developed for water catchment. In some areas water supplies are now insufficient to meet local demand, irregular (due to a number of factors), and occasionally polluted. The construction of the Afulilo Dam destroyed one mixed swamp forest and potentially threatens the only remaining example of this ecosystem (of which only two occurred in the world). In Apia there is a high level of usage and waste, and the volume and quality of the water supply are declining due to forest clearance and cyclone damage in the water catchment areas.

Overall, the major threats to an adequate water supply are the continuing clearance in water catchment areas for plantations, and cyclone damage to the water catchments. To minimise damage, watershed management has been introduced to the Vaisigano River Catchment near Apia, and the project is now expanding to other areas. The Western Samoa Water Authority was established in late 1993.

1.3.3 Flora

In common with other islands formed by volcanic activity, Western Samoa's vegetation is derived from seeds and spores which have drifted to the islands. Seeds and spores of potential dispersers, the vast majority of which originated in South-East Asia and



Littoral forest near cliff forest, coastal strip near Lefaga, Upolu. The native angiosperm flora (flowering plants) of Western Samoa is the most diverse in tropical Polynesia, with the exception of Hawaii (photo: Paddy Ryan, reproduced courtesy of MFAT)

Melanesia, are filtered out from island to island by the expanse of ocean. Subsequent evolution in the isolation of Samoa has led to a relatively high degree of endemism.

The native angiosperm flora (flowering plants) of Western Samoa is the most diverse flora in tropical Polynesia, except for Hawaii, and is relatively well documented, although information on current status is lacking for many species.

Pre-settlement, the vegetation of the Samoan islands was predominantly tropical rainforest, but the natural environment of Western Samoa has been greatly modified.

There are nearly 500 species of native flowering plants and about 200 species of ferns in Western Samoa. About 25 per cent of the plants are endemic to Western Samoa (Whittler 1992b). Hundreds of plants have been introduced to the islands since the first Samoans brought the coconut, taro and other species for cultivation about 3,000 years ago. Today,

exception of a few studies, the detailed ecological knowledge vital to ensuring the long-term survival of many of these species is lacking.

In the late 1800s and early 1900s a large amount of collection and taxonomic study was carried out on the insects of Samoa, but much of the work now needs updating. The other land invertebrate group that has been studied in some detail is the land snails. Little is known about the freshwater invertebrates. Brief surveys conducted as part of the Environmental Impact Assessment of the Apilio Hydroelectric Power Project (Winters et al. 1987, Waugh et al. 1991) noted a relatively sparse insect fauna with some very common crickets. Western Samoa has one species of freshwater shrimp (*Macbrathium lat*) which is of some importance in the subsistence diet. There has not been a detailed study of the native freshwater fish. The studies for the Apilio project referred to above also noted a relatively sparse fish fauna. Four species of freshwater fish have been introduced to Western Samoa.

Reptiles

Eight skinks, five geckos and one snake (the Pacific boa *Candia bitum*) have been recorded in Western Samoa. Most of the lizards appear reasonably abundant and only one (the Samoan skink *Emia samoensis*) is endemic to the Samoan Archipelago.

Birds

Thirty-five species of land birds and 21 sea and shore birds have been recorded for Western Samoa. Ten of the land birds are endemic at the species or sub-species level, while four species have been introduced. One native species, the 'puiua' or Samoan wood rail (*Ferdinandus pacificus*), is probably extinct. Further work is needed to determine the current status of many other species as 14 are listed as 'rare or endangered' (Dahl 1986). Pigeons are a traditional food source and play an important role in Samoan tradition and customs. Pigeon numbers have declined, primarily due to the destruction of habitat, and the decline has been significantly increased by the effects of the two recent cyclones. The government introduced a ban on hunting following the cyclones and in late 1993 extended it for a further five years.

Mammals

There are 13 species of terrestrial mammals in Western Samoa and of these only three, all bats, are native: two flying foxes (or fruit bats), 'pea yao' the

over half the species of plants in the country are endemic some of these are pests on agricultural lands and in pasture; others, like the twining vine mile-a-minute (*Mikania micrantha*), invade disturbed native forest hindering natural regeneration. Over 150 plants have been recorded as having traditional medicinal use, but this knowledge is disappearing.

A number of plant species, particularly ferns, have not been collected since the 1930s or even earlier. While there are no 'designated' endangered or threatened plant species in Western Samoa, Dahl (1986) lists 12 rare or endangered plant species while Whistler (1992b) proposes a list of 156 species that he considers potentially threatened or endangered.

The study of the vegetation of Western Samoa, although more recent than the study of flora, is well advanced. Whistler (1992a) has divided the vegetation into 19 plant communities in five broad categories: lateral vegetation, Wetland vegetation, Rainforest, Volcanic scrub and Disturbed vegetation.

Of the land area of Western Samoa 50 per cent is still covered with indigenous forests, but considerable differences exist between Savaii and Upolu: the total land area on Savaii and Upolu respectively. Lowland forests are specifically at risk.

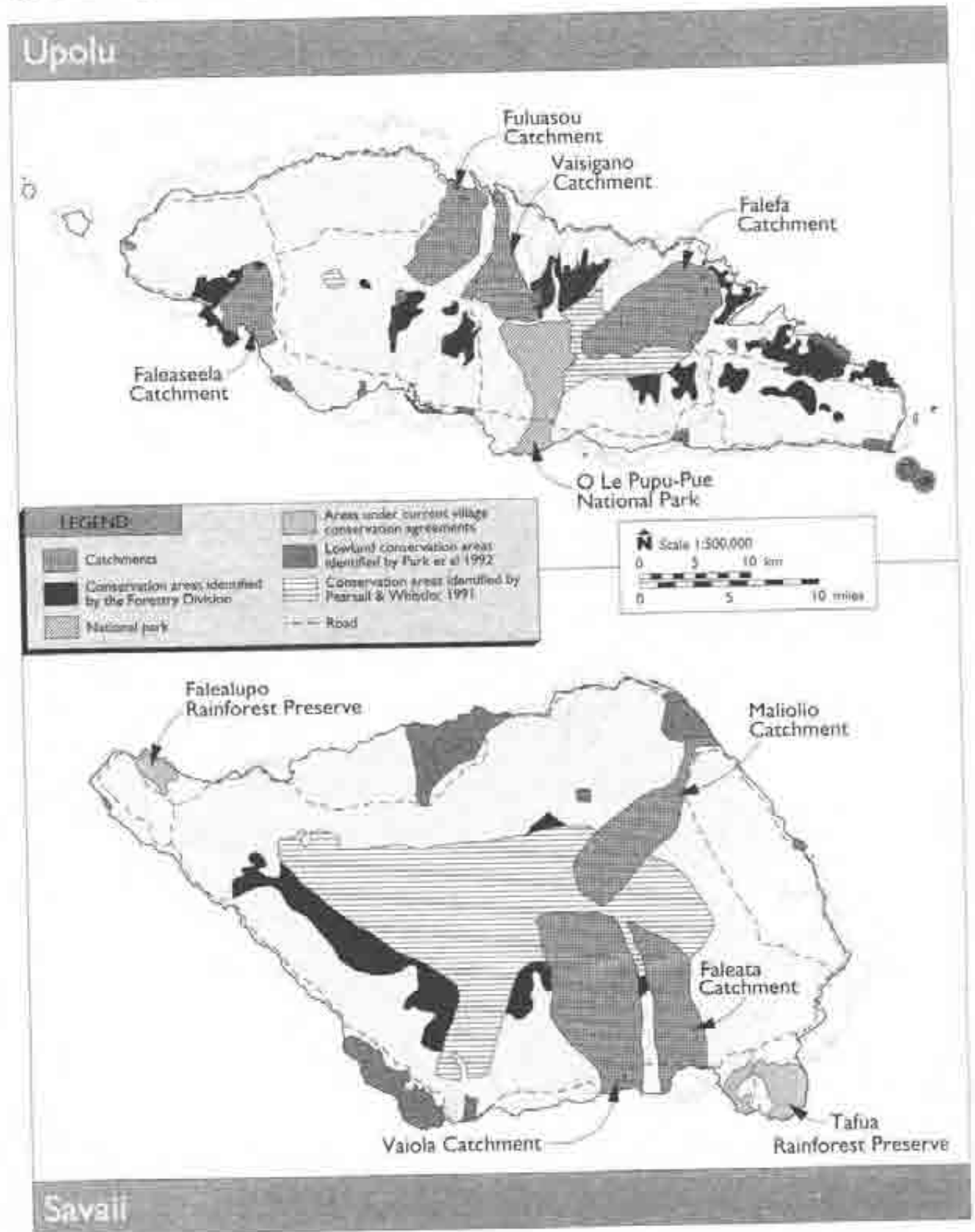
The current rate of forest depletion, about 3,000 ha per year, is one of the highest clearance rates in the world, and a cause for major concern. It could be considered the most serious environmental issue facing the country. The rates of depletion are similar on Savaii and Upolu, but 40 per cent of clearing on Savaii is due to logging while it is considerably less on Upolu.

The two cyclones in 1990 and 1991 also had a devastating impact. Damage to the natural forest varied, but included areas where up to 50 per cent of the forest was felled. Over large areas defoliation was estimated at 90 per cent. While tropical vegetation might be expected to be adapted to such conditions, mile-a-minute (*Mikania micrantha*) and other introduced tree and scrub species have now invaded large areas.

1.3.4 Fauna

The taxonomy of the native land mammals, birds and reptiles of Western Samoa is well known, and new species are unlikely to be found. No amphibians occur in Western Samoa. However, with the

Figure 1.2 Important conservation areas



Source: After GWS 1993

Samoaan flying fox (*Pteropus samoensis*) and 'pea fat taidaga', the Tongan flying fox (*P. tonganus*); and 'tagiti', the sheath-tailed bat (*Emballonura semicaudata*).

The flying foxes, like the pigeons, are a traditional food source and are also important for the long-term survival of the forest as they pollinate the flowers of many species and disperse seeds of eaten fruit. Populations suffered a substantial decline from 1981 to 1988 due to an export industry to Guam. Government regulation stopped this industry in 1989. Flying fox populations declined further after Cyclone Val and traditional hunting was then temporarily banned. In late 1993 the government extended this ban for a further five years.

Of the introduced species, the early Polynesian voyagers brought 'imoa', the Polynesian rat (*Rattus exulans*), pigs and dogs to the islands. Cattle, horses, goats, cats, two more species of rats (*Rattus norvegicus* and *R. rattus*) and the house mouse (*Mus musculus*) have arrived with the Europeans.

1.3.5 Conservation strategies

Recent efforts to conserve the biodiversity of Western Samoa have included the establishment of national parks and reserves by the government. Western Samoa was one of the first Pacific nations to establish a national park (O Le Pupu-Pue, in 1978) and a marine reserve (Palolo Deep, in 1979). Both are on Upolu. Private conservation covenants have also been developed for the Eifealupo Rainforest Preserve and the Tafua Rainforest Preserve on Savaii, and recently at Aopo, Savaii.

Recent surveys and reviews have identified numerous sites requiring conservation (Figure 1.2) if Western Samoa is to retain a representative selection of its biodiversity (Park et al. 1992; Peusall & Whittler 1991; Draft Forest Policy, GWS 1993).

1.4 Marine resources

The coastal lagoons and reefs of Western Samoa are a vital local resource. The latest listing of all known inshore and pelagic surface fish species lists 991 species, about 40 of which are found only in Samoa (Wass 1984). There is an unknown number of marine invertebrates.

Western Samoa is not well endowed with coral reefs. The coastline is characterised by a narrow fringing reef and a shallow lagoon, and the size of



Reefs and lagoons are an important source of local foods. However, both inshore and offshore catches have declined. (photo: Jennie Cory, reproduced courtesy of DLSE)

the fishery is small in comparison with other Pacific countries. While its Exclusive Economic Zone (EEZ) of 95,800 sq km is small, there has been limited exploitation of offshore resources. However, fish and reef and lagoon invertebrates are an important source of food. In 1989, 59 per cent of all families engaged in fishing and over 65 per cent of the catch was for local consumption (DOS/DAFF 1990).

Both inshore and offshore catches have declined, consumption of local fish is declining, and the consumption of imported, canned fish is on the increase. While it is not possible to make any valid estimates of the maximum sustainable yield for Western Samoa's varied and complex fishery stocks, it is evident from the reports of fishermen, available catch/effort data from different areas, and declines in market landings, that the maximum sustainable yield has been exceeded in most parts of Upolu (Zann 1991a). Zann has concluded that Western Samoa's reefs and lagoons are among

the most degraded in the Pacific (Zann 1991a, 1991b).

Zann (1991c) gives the possible reasons for inshore stock declines as:

- (1) over-fishing due to increased demand;
- (2) use of effective and modern, but non-selective, fishing techniques;
- (3) use of destructive techniques such as poisons and dynamite; and
- (4) loss of fish habitat through reclamation, coral sand mining and drainage.

Coastal lagoons are now also being subjected to industrial and domestic pollution. Deforestation has increased pollution of lagoons by both siltation and oversupply of nutrients. It is evident from the literature that this form of pollution is damaging the Western Samoan reef system, and contributing to the collapse of the inshore fisheries (Taylor 1991). Due to the shallowness of the lagoons, there is relatively little ocean exchange, and consequently a minimum capacity to dilute waste. The Department of Agriculture, Forests and Fisheries estimates that 90 per cent of coral reef around Apia is dead.

1.4.1 Mangroves

While mangrove scrub and forests occur on Upolu and Savaii, they are not a widespread community. Almost all sites have been disturbed to some extent by human impact. Where mangroves remain less disturbed, they provide local communities with food, house and boat construction material, and firewood.

The mangrove swamp in Vaiusu Bay is the largest in eastern Polynesia. These mangroves and wetlands are the main fish feeding and nursery habitats for Western Samoa. Until recently it was the site of the town rubbish dump and areas are still being reclaimed. The old dump is currently being rehabilitated.

1.4.2 Coral sands

Most of Western Samoa's sand reserves for construction purposes are coral sands, mined either directly from the beach or from offshore resources. Sand mining in Vaiusu Bay, the largest lagoon area in Samoa, is the main source of supplies for Apia. However, local communities throughout Samoa collect sand and coral rubble for road and house maintenance. Certain beaches close to the largest

demand have chronic erosion problems resulting from overmining. While data are needed on the rate of supply of the coral sands, licences for sand mining are now being issued, stipulating conditions which will reduce coastal erosion.

1.4.3 Subsistence fishing

As mentioned earlier, 59 per cent of agriculturally active households engage in fishing and reef glean-ing, and 67 per cent of households use all their catch for home consumption. Many marine invertebrates are local food sources; crabs, octopuses, sea slugs, clams and trochus shells. However, many species such as the giant clam are now rare in their natural habitat or, like the clam *Hippopus hippopus*, thought to be extinct due to over-exploitation. There are current aquaculture projects involving trochus shells, seaweeds and clams, but trochus and clam projects were severely affected by the cyclones.

1.4.4 Commercial fishing

About 1977 a new development took place in commercial fishing with the introduction of larger 'alia' (twin-hulled aluminium craft with outboard motors) under a FAO assistance programme. Fish aggregating devices were also installed. The catch from the 'alia' is primarily used in Western Samoa. Two species of tuna, 'atu' (skipjack *Katsuwonus pelamis*) and 'asiasi' (yellowfin *Thunnus albacores*), are harvested from their migrating populations.

1.4.5 Turtles

Two species of sea turtle occur in Western Samoan waters, the green turtle (*Chelonia mydas*) and the hawksbill (*Eretmochelys imbricata*). The latter is known to breed on the Aleipata Islands and elsewhere. The eggs and the adults are both traditional food sources, although the numbers of both species have declined. Turtles now rarely appear in local markets.

In conjunction with an educational campaign to conserve turtles, a turtle hatchery was established in 1971, but abandoned in 1983. A revised programme of turtle management, funded by the South Pacific Biodiversity Conservation Programme administered by SPREP (South Pacific Regional Environment Programme) is currently under way.

1.5 People

The preliminary results of the 1991 census according to the Department of Statistics show a total population of 161,298 people of whom 34,000 live in Apia, with the remainder in over 320 villages mainly around the coast. The overall population density is 56 persons per sq km, but as the central highlands of both islands are sparsely populated, coastal population densities in Apia reach 75 persons per sq km. Only 28 per cent of the population lives on Savaii.

While the total population grew by 41 per cent during the 1961-1991 period, growth declined during each successive intercensal period except the last. This decline is due mainly to a fall in fertility rate and the high rate of overseas migration. The high emigration rate in recent years has been a safety valve for the increasing pressure on resources, but threatens to be an unpredictable element in population planning. As well, many workers whose skills are needed in Samoa are among the emigrants.

There are strong indications that the number of emigrants may reduce, with the economic recession severely affecting the traditional destination countries for Samoans, namely Australia, New Zealand and the United States.

1.6 Culture, history and government

The indigenous population is Polynesian. They comprise the majority of the Western Samoan population, and speak one language which has similarities to the language of the Tokelau Group and Tonga.

Often called "the cradle of Polynesia", Western Samoa is among the most traditional of all Polynesian societies. Its ancestors are believed to have moved into the Pacific from the South-East Asian region. The earliest known site (about 1100 BC) is at Mutifanua on Upolu, a site associated with the Lapita people who made a distinctive pottery.

While traditional arts such as weaving, 'siapo' making (cloth made from hibiscus bark), wood-carving, dancing and singing are commonly practised, it is in the tradition of oratory that the Western Samoan arts reach their highest expression. This strong oral tradition is manifest in



The traditional art of oratory is still a major cultural activity. (photo: A.C. Robinson, reproduced courtesy of DLSE)

the many legends and the practice of citing an ancestry through tens of generations.

The Samoan way of life ('faa-Samoa') is based on its social institutions (family, village council, women's committee, church) which provide direction for individual or group behaviour and responsibilities as well as overall village organisation. The 'aiga', an extended family group, remains the single most significant social and economic unit. The head of the 'aiga', the 'matai', is responsible for the care of the family and its lands, although these traditional ways are changing.

Significant contact with the Western world did not occur until the 1830s. Then began a series of encounters with Britain, Germany and the United States which culminated in the imposition of colonial rule by Germany in 1899. At the outbreak of World War I, Western Samoa was annexed by a force of New Zealanders. The New Zealand military occupation continued until 1920 when New Zealand ruled Western Samoa under a League of Nations Mandate. After World War II, Western Samoa

became a trustee of the United Nations, administered by New Zealand, and preparations began for self-government. On 1 January 1962 Western Samoa became the first of the Pacific nations to become independent.

The Western Samoan form of parliamentary government combines Samoan and Western practices. While universal suffrage was approved in 1990, only 'matai' are eligible to be elected. The Legislative Assembly is comprised of 49 members including the Speaker. Forty-seven are elected by adult universal suffrage; two representatives are elected by people of non-Samoan ancestry. At the local level each 'matai' has a place in a village council or 'fono', the governing authority in each 'nuu' (parish). The village council has wider powers than the Western-style local government. The 'fono' elects a government representative, the 'pulenuu'.

1.7 Urban and rural issues

Western Samoa is beginning to experience problems related to the disposal of wastes and the need for urban planning. No planning legislation currently exists (although legislation is being prepared). Apia exhibits overcrowding, poor segregation of industries and dwellings, traffic congestion, and other symptoms of this lack of planning.

1.7.1 Waste management

Solid waste disposal is now a growing problem. It is estimated that approximately 17,000 cubic m or

3,000 t of waste were disposed of annually at the former rubbish disposal site in Vaiusu Bay. Leachate from the dump remains a potential threat to the marine environment and to the health of consumers of seafood from the adjoining bay and lagoon areas. A new landfill site was opened in early 1993. However, it is yet to be managed for effective recycling, although it has been established to cater for this and other more progressive methods of waste management.

Increasing industrial activity and its associated nutrient-loaded liquid effluent is cause for concern, as are disused facilities which are likely sources of unmonitored chemical pollution. The disposal of hospital waste at the national hospital and district hospitals is of particular concern. A recent positive development in Apia has been the emergence of private sector interest in recycling and waste management.

In the rural area the quantities of waste produced are small but nonetheless significant. While organic waste is not generally a problem, the non-biodegradable products of the Western consumer society are increasingly prevalent. Traditional disposal practices have not adjusted to the new realities, with burning of rubbish less common than simple disposal to heaps, often inappropriately sited.

The disposal of sewage is also a growing problem. With no public sewerage system in Western Samoa, private homes are served by on-site systems varying from septic tanks with soakage facilities to primitive toilets on drains or over the sea. It is evident in the low-lying areas of Apia that groundwater is being polluted by effluent from many of



Manono Island. Although not common, over-the-sea toilets are still used in some locations. (photo: A.C. Robinson, reproduced courtesy of DLSE)

the sewage disposal facilities (GWS 1992c). And in densely populated areas, polluted groundwater, assuaged by high percolation rates, is a likely contaminant of near-shore water. A study exploring options for a sewerage system for the Apia urban area was completed in late 1993.

There is also growing concern about the use and disposal of chemicals and agricultural pesticides. The high rate of suicides using weed killers shows the need for improved policies on the overall management of toxic chemicals. This issue is currently being addressed by the Pesticides Committee.

1.7.2 Climate change

Potential changes to the region's climate due to global warming are of concern to many Pacific countries including Western Samoa where the great majority of the population live within a kilometre of the coast. A research programme measuring sea-level change and other meteorological parameters is currently under way off Apia.

1.8 The economy

Like many of the small South Pacific Island nations, Western Samoa has endeavoured since independence to develop a modern economy from traditional village agriculture and primary products. Agricultural and related primary sector activities still support around 75 per cent of the population, including almost the entire rural population (Fairbairn 1993). The significance of the primary sector is indicated by the fact that related

activities account for 50 per cent of the Gross Domestic Product (GDP), 60 per cent of the workforce and about 80 per cent of export earnings (World Bank 1991).

Infrastructure development, including roads, airports, seaports and communications facilities, has been extensive. However, despite huge investments in agriculture, fisheries and forestry, there has been a continuing decline in the export of primary products. The percentage of exports to imports fell from 36 per cent in 1984 to 10 per cent in 1990 (GWS 1992a). According to the Central Bank of Samoa (CBS), the current account deficit during the first half of 1992 was more than double the level for the same period in 1991 (CBS 1992).

Tourism is of increasing importance, and the Government of Western Samoa has in recent years promoted the development of light manufacturing industries. The economy is also dominated by external aid and remittances from Samoans working overseas.

1.9 Conclusions

The state of the Western Samoan environment is cause for concern. The overall trend is one of progressive decline of a way of life that is sustainable and based on indigenous natural resources. The wastes of modern throw-away lifestyles are everywhere evident, and become additional to traditional waste. Accumulation of plastics, metals and special waste are a threat to the natural environment and to public health.

The local environmental issues mirror global



The wastes of modern throw-away lifestyles are becoming more prevalent. (Photo: Paddy Ryan, reproduced courtesy of MFAT)

trends, as a growing population with increased expectations and demand for economic growth competes for limited available resources. With limited funding for social services, the increase in population has affected the quality of education and health services. Many rural families seeking a better life have moved to the capital, Apia, further stretching the limited urban facilities and employment opportunities. As well, there have been indications in recent years that many Samoans affected by the economic recession overseas are returning home, thereby placing more strain on local resources. It also seems that while family planning has been official policy in Western Samoa since

1971, it is still not generally practised, due to strong religious beliefs and the perception that a large family is a socio-economic advantage.

However, in recent years and even during the period that the National Environment and Development Management Strategies document was being prepared, significant and positive activities to address such issues were undertaken by government, private and community agencies.

The challenge of the NEMS process is to respond appropriately to the environmental issues raised, decide on a national direction, and develop strategies to achieve it.



PART 2
*National Environment
and Development
Management Strategies*



Introduction

2.1 Local environmental progress

The Government of Western Samoa in recent years has been committed to the protection of the local environment. There also seems to be greater public awareness of environmental issues generally.

In 1989, the Division of Environment and Conservation (DEC) was established, and combined with the former Department of Lands and Surveys to form the new Department of Lands, Surveys and Environment (DLSE). Early in 1992, the SPREP office was relocated from Noumea, New Caledonia to Apia, Western Samoa, thus placing Western Samoa at the centre of regional environmental activities.

A delegation from Western Samoa led by the Prime Minister attended the United Nations Conference on Environment and Development (UNCED) at Rio de Janeiro, 3–14 June 1992. In his address to the conference, the Prime Minister stated, "For the purpose of addressing environmental issues comprehensively, my Government is in the process of formulating a National Environment Management Strategy" (Tofilau 1992).

In March 1992, Western Samoa's Seventh Development Plan 1992–1994 (DP7) was completed. In it, much is made of environmental protection and sustainable development. One of DP7's objectives is to achieve a Gross Domestic Product (GDP) growth rate exceeding the population growth rate; and to achieve it through sustainable development. The need to carry out Environmental Impact Assessment (EIA) is recommended for all major projects. In his foreword remarks, the Prime Minister states:

Underlying all our policies is the concept of sustainable development. It has become evident in recent years that much apparent development, especially in agriculture, has been achieved at the expense of the long-term health of the environment. We have,

in effect, been consuming our natural capital. This will stop (GWS 1992a).

Other recent local environmental measures include:

- ◆ establishment of private environmental groups such as O le Siosiomaga Society and Faasao Savaii Society;
- ◆ formulation of draft legislation for EIA;
- ◆ promotion of waste management strategies, including the development of a new landfill site for solid waste disposal to replace the former coastal site;
- ◆ establishment of the Western Samoa Water Authority (WSWA) to manage national water resources;
- ◆ establishment of a separate Ministry for Women Affairs;
- ◆ private agreements on rainforest conservation with the villages of Aopo, Falealupo and Tafua, Faaala and Salelologa;
- ◆ preparation of draft national policies on forestry and population.

The improvement of the urban environment is also a major concern. The Government of Western Samoa has proposed the establishment of the Apia Municipal Authority (AMA) to manage future development of the capital Apia, and plans are being considered for acquiring more land for Salelologa in Savaii. Specific development concepts for central Apia are proposed in the Western Samoa Tourist Development Plan 1992–2001 (GWS 1992c); and as directed by the Prime Minister at the Ground Breaking Ceremony for the new government office building, the Government will develop "plans to ensure that public services in Apia are upgraded, and amenity improved accordingly to enhance our urban physical environment" (Tofilau 1991).

2.2 The need for NEMS in Western Samoa

With increased local concern for the environment, it is important to provide a common national approach to environment and development issues. Therefore, NEMS is expected to provide the mechanism for an integrated approach to environmental management. It is expected that with better coordination, NEMS will promote a more consistent application of environmental education and delivery of information. In the DP7, there is an attempt for the first time to integrate environmental and economic issues to promote sustainable development. For the DP7 to succeed, however, it is important to develop consistent guidelines for project assessment and implementation. There is also a need to provide better costing for projects to reflect all the private and social inputs. This should lead to better distribution and use of available development capital.

At present, national policies on environmental issues are not well defined, which can lead to public confusion and uncertainty. NEMS will establish the Government's position on sustainable development, and promote clear policies to guide development programmes. NEMS will also facilitate sectoral cooperation, providing a more balanced approach to common environmental issues.

There is a need to coordinate research and data collection on local environmental issues, to ensure a systematic approach to the understanding and dissemination of information. For example, every year, a number of local students undertake research for university programmes; if given support

for their fieldwork by the Division of Environment and Conservation, many may choose environmental topics.

2.3 Principles for NEMS

As a comprehensive national approach to sustainable development, NEMS aims through community participation to preserve natural capital (air, water, land and other ecological 'goods'). This requires balancing human activities with nature's ability to renew itself. It also recognises that education and economic growth are necessary to eliminate ignorance and poverty, which lead to the waste and degradation of resources.

The underlying principles for NEMS have been adapted from the Rio Declaration of UNCED (UNCED 1992). These principles, which covered both local and international issues on sustainable development, were drafted, then deliberated upon by representatives of many nations of the world. The Government of Western Samoa has given its full support to the Rio Declaration.

NEMS principles for Western Samoa are as follows:

- (1) The Western Samoan citizens are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature.
- (2) The Government of Western Samoa has the sovereign right to exploit its own resources, pursuant to its environmental and developmental policies.
- (3) The right to development must be fulfilled



Village children near Salani, Upolu. Western Samoan citizens are the centre of government concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature. (photo: Paddy Ryan, reproduced courtesy of MFAT)

so as to equitably meet developmental and environmental needs of present and future generations.

- (4) In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it.
- (5) The Government of Western Samoa and all citizens (with support from other governments as deemed necessary) shall cooperate in the essential task of eradicating poverty as an indispensable requirement for sustainable development, in order to provide equitable standards of living and better meet community needs and aspirations.
- (6) To achieve sustainable development and a higher quality of life for all citizens, the Government of Western Samoa should intervene to reduce and eliminate unsustainable patterns of production and consumption, and promote appropriate demographic policies.
- (7) Environmental issues are best handled with the participation of all concerned citizens, at the relevant levels. The Government of Western Samoa shall provide easy access to publicly held information on the environment and development; encourage community participation in decision-making processes; and promote public awareness and participation by making information widely available.
- (8) The Government of Western Samoa shall enact effective environmental legislation, with environmental standards, management objectives and priorities which reflect the appropriate local context to which they apply.
- (9) The Government of Western Samoa shall develop national law regarding liability and compensation for the victims of pollution and other environmental damage caused by activities within its jurisdiction or control.
- (10) In order to protect the environment, the precautionary approach shall be widely used by the Government of Western Samoa according to its capabilities. Where there are threats of serious irreversible damage, lack of full scientific certainty shall not be



Women have a vital role in environmental management and development. The making of 'siapo', a traditional art, is also a sustainable industry. (photo: A.C. Robinson, reproduced courtesy of DLSE)

used as a reason for postponing cost-effective measures to prevent environmental degradation.

- (11) The Government of Western Samoa should endeavour to promote the internalisation of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment.
- (12) Environmental Impact Assessment (EIA), as a national planning instrument, shall be undertaken for development proposals, with due regard for the public interest and without distorting international trade and investment.
- (13) Women have a vital role in environmental management and development, and their full participation is essential to achieve sustainable development.
- (14) The creativity, ideals, and other attributes of youth should be mobilised to achieve sustainable development and ensure a better future for all.
- (15) Traditional arts and cultural practices should be recognised and supported as an

integral part of the sustainable development process.

- (16) Peace, development and environmental protection are interdependent and indivisible.
- (17) Where any environment or development activities affect or involve other countries, the Government of Western Samoa shall do all in its power to:
- ◆ Ensure that these activities do not cause damage to areas beyond the limits of its jurisdiction, in accordance with the Charter of the United Nations and the principles of international law;
 - ◆ Communicate its special needs in the field of environment and development, and those of similar regional nations, at international forums, and do whatever is possible to address the interests and needs of other countries;
 - ◆ Cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the earth's ecosystems; and to take responsibility for any pressures placed on the global environment through local factors;
 - ◆ Cooperate with other countries to strengthen internal structures for sustainable development by improving scientific understanding through exchanges of scientific and technological knowledge, and by enhancing the development, adaptation, diffusion and transfer of technologies, including new and innovative technologies;
 - ◆ Cooperate to promote a supportive and open international economic system which would lead to economic growth and sustainable development, and to better address the problems of environmental degradation;
 - ◆ Cooperate with other countries in an expeditious and more determined manner to develop further international law for liability and compensation for adverse effects of environmental damage caused by activities beyond their jurisdiction;
 - ◆ Cooperate effectively to discourage or prevent the relocation and transfer to

and from other countries, of any activities and substances that cause severe environmental degradation, or are found to be harmful to human health;

- ◆ Provide urgent notification and information to potentially affected countries in the event of any natural disasters or other emergencies that are likely to produce harmful effects on the environment of those countries; and
- ◆ Resolve its environmental disputes with other countries peacefully, and by appropriate means in accordance with the Charter of the United Nations.

2.4 Regional National Environmental Management Strategies (NEMS) Project

In early 1991, SPREP secured financial support from the United Nations Development Programme (UNDP) to provide an assistance programme to Pacific Island countries aimed at strengthening in-country environmental management capabilities. The National Environmental Management Strategies Project with associated technical support, institutional strengthening and in-country training is a major component. Additional assistance has been provided by the Australian International Development Assistance Bureau (AIDAB). Seven Pacific Island countries, including Western Samoa, will benefit from this SPREP/UNDP project which commenced in April 1991.

Generally, the Strategies form a statement of the country's environmental principles, with a detailed plan for the realisation of that country's long-term goals. Management strategies are developed through the participation of the public and private sectors, non-governmental organisations (NGOs) and individual citizens.

The planning component of the Project involves:

- (1) an assessment of the state of the environment, and identification of critical environmental problems;
- (2) a review of existing legislation, examining any problems in implementation;
- (3) a review of institutional capabilities

recommending any necessary institutional strengthening;

- (4) development of environmental management strategies which address the priority environmental problems and issues; and
- (5) recommendations on environmental programmes to support the National Environmental Management Strategies.

The training component involves:

- short-course training focusing on EIA and other training requirements identified by the Task Team; and
- on-the-job training aimed at government officials and members of NGOs.

Framework for NEMS



3.1 Approach

At the first meeting of the Task Team in November 1991, it was agreed that NEMS for Western Samoa should cover the "total environment". That is, the strategies should address all the issues related to the natural, physical, social and economic environments. There was general consensus that as environmental issues are interrelated, NEMS must deal with all environmental aspects if it is to provide a comprehensive, national approach to environmental management.

During the third meeting of the Task Team in September 1992, the NEMS approach adopted was one based on key environmental issues, rather than a sectoral approach. The latter tends to pursue sectoral interests and to treat their impacts on other sectors as side-effects. It was decided by the Task Team that Target Environmental Components (TECs) must be the NEMS focus, including setting goals and objectives to address the problems associated with them. The sectors that are related to and/or affected by each TEC will implement activities, and monitor progress to achieve the TEC objectives. These intersectoral connections will create patterns of environmental interdependence and cooperation which are vital to the success of NEMS.

The following TECs were identified and confirmed as the main issues to be addressed in NEMS.

- (1) Management of population dynamics and trends
- (2) Protection of the quality and supply of fresh water
- (3) Protection of the sea and marine resources
- (4) Management of waste
- (5) Combating deforestation

- (6) Development of appropriate land use practices
- (7) Conservation of biological diversity
- (8) Protection of the atmosphere
- (9) Planning for climate change
- (10) Preservation of traditional arts, culture and history
- (11) Development of human resources
- (12) Promoting sustainable economic growth

3.2 Goals

NEMS long-term goals are the improvement of the welfare of all Samoan citizens and the realisation of community expectations through sustainable development by means of:

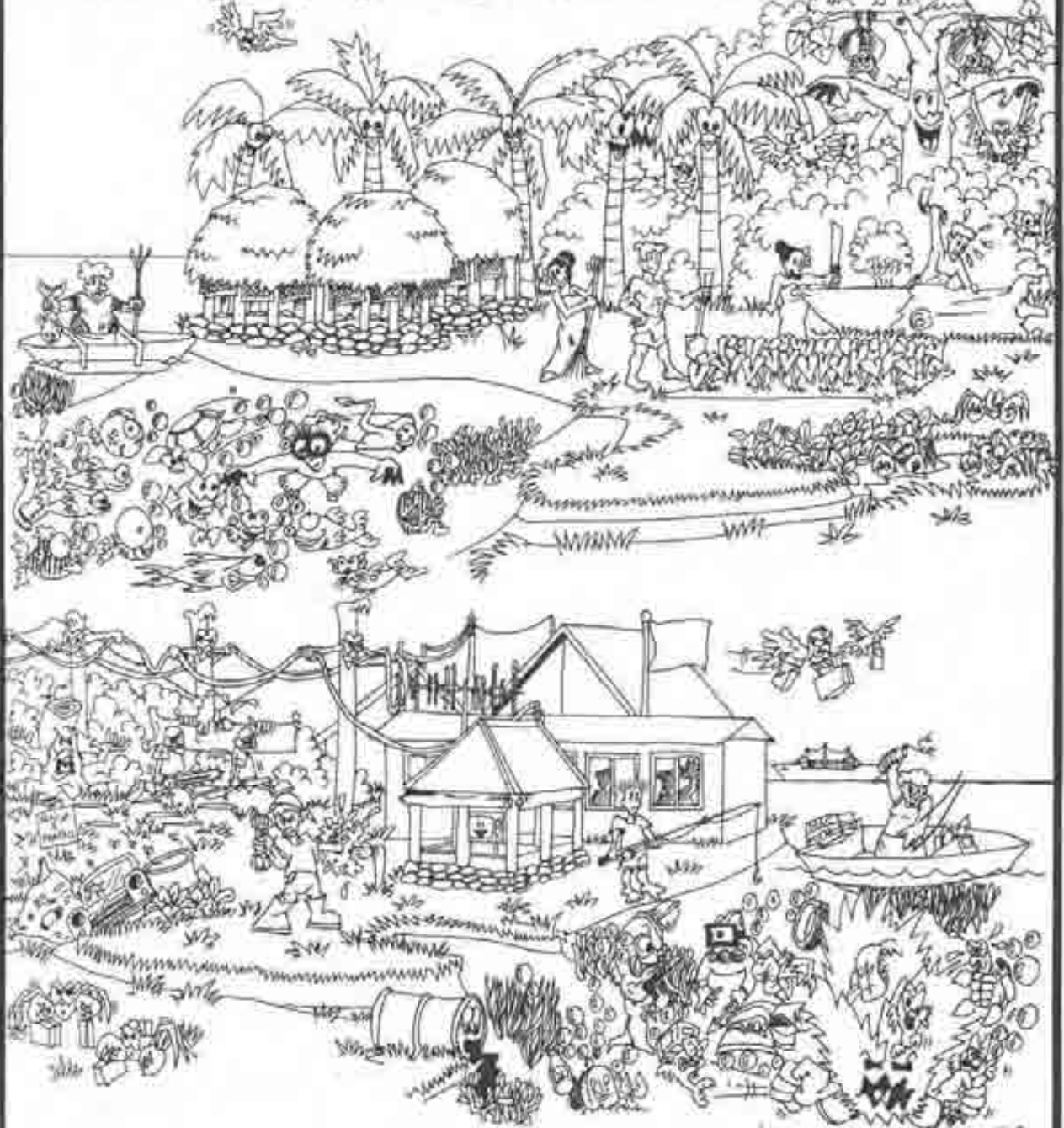
- ◆ stabilising population;
- ◆ boosting efficiency;
- ◆ restraining consumption; and
- ◆ building a framework for change.

Figure 3.1 Environmental awareness poster

Facing page: Public awareness is an important component of the National Environment and Development Management Strategies.

Entitled "SUSTAINABLE DEVELOPMENT: THE KEY TO YOUR FUTURE", this poster in the Samoan language promotes sustainable development — "To ensure that all Samoans, both now and in the future, have an acceptable and dignified way of life means that we must use our environment and our resources wisely" (artwork: Timo Pita Ataa, Leulumoega Fou School of Fine Arts, 1993, production funded through SPREP as part of the NEMS publicity campaign).

ATINAE GAFATA TAULIMA:KI ILOU LUMANAI.



ATINAE GAFATA TAULIMA.

INA IA MAITINIA LE MAUA E SAMOA
 UMA, NEI MA LE LUMANAI, SE OLAGA FOTAI
 MA LE TAIALOA E TATAU OIA TATOU
 FAALOGA LO TATOU SIOSIOMAGA MA ALAFO
 MA LE FOTO.



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Sustainable development allows progress and growth without risking constraints from overpopulation, resource depletion and ecological breakdown. It is defined as a process in which:

... the exploitation of resources, the direction of investment, the orientation of technological development and institutional change, are all in harmony and enhance both current and future potential to meet human needs and aspirations (World Commission on Environment and Development 1987).

Alternatively, it means:

... using, conserving, and enhancing the community's resources so that ecological processes on which life depends, are maintained, and the total quality of life now and in the future can be increased (Commonwealth Government of Australia 1990).

The demand for natural resources, and their subsequent depletion and/or degradation, is directly related to the number of people competing for those resources. Therefore, continued population growth will place tremendous pressures on limited available resources, and ultimately jeopardise the livelihood of all citizens. Stabilising population involves the improvement of community primary health care, standards of living, and the status of women. It also means making family planning and counselling services widely available to help lower birth rates and achieve sustainable population growth.

Boosting efficiency involves the adoption of practices and measures that will reduce the resources used, or pollution generated. These include less destructive agriculture; waste recycling; more efficient wood-burning cookers; renewable energy; and more efficient vehicles.

Restraining consumption involves developing lifestyles that lower the burden on the environment, and creating more realistic community expectations through public education and awareness programmes. It also scrutinises consumer goods more carefully, promotes 'green consumerism', and encourages self-reliance.

Building a framework for change is the main component of the sustainable development process. In less developed countries like Western Samoa, it is often very difficult to change entrenched attitudes and old habits. The majority of the population who live in rural areas seem more involved with survival from one day to the next than with long-term schemes which will provide no im-

mediate visible gains to them as individuals. Often, decision makers seem to lack the political will to promote long-term goals which may not provide immediate electoral advantages. But for NEMS to have any chance of success, it is important to articulate the mechanisms of a framework for change, and for the planning and implementation of NEMS to operate within that framework. Details of a NEMS framework for change are discussed in Chapter 4.

3.3 Scope

The requirements for SPREP's regional project, as discussed in Section 2.4, need to be considered in the local context. Because of Western Samoa's particular stage of environmental development, it is most important to provide a step-by-step framework so that the required 'ground rules' are set and approved from the very start. This will require substantial public awareness and understanding of the issues involved, and clear commitment by decision makers to any proposed environmental policies and/or activities.

For instance, on the question of the adequacy of existing legislation, there is a need first to define the issues to be legislated on, especially the end results that are expected to be achieved from such laws. This will involve a consideration of control, incentive, and trade-off options, seeking political approval, setting standards for compliance, and assessing the costs involved to monitor compliance. Likewise on the question of environmental management strategies, many different sectors must be consulted, each with different requirements for national strategies. In the absence of any integrated national policies on environmental issues, the above problems will be difficult, if not impossible, to address on a case-by-case basis.

Therefore, to provide for an orderly development of Western Samoa's NEMS, it is proposed that it be carried out in three phases.

Phase 1

This sets out the framework for NEMS. It provides the philosophy and future direction on environment and development, as well as guidelines for policy formulation and implementation. The provisions of Phase 1 should be approved by the government before Phase 2 can start.

Phase 2

This phase involves the formulation of national policies for each of the TECs given in Section 3.1. In the absence of specific environmental 'ground rules', it is paramount that related policies setting out national priorities and sectoral responsibilities are approved for each TEC. It is expected that for each TEC, the sectors involved or with interest in it will set up a Policy Committee to facilitate policy preparation. For example, those to be involved in a policy on water resources should include representatives from the Western Samoa Water Authority (WSWA), Health Department, Department of Agriculture, Forests and Fisheries (DAFF), Education Department, and the Department of Lands, Surveys and Environment.

As the national policies will guide future development on the TECs, it is most important to encourage and solicit wide public participation during policy formulation. As these policies will guide future public activities, the community must be part of this consultative process. The politicians should also be involved and well briefed in order to gain their support and endorsement.

The general format for the national policies is discussed in detail in Chapter 7, and is as follows:

- (1) Introduction
- (2) Policy goals
- (3) Objectives and activities
- (4) Implementation
- (5) Evaluation

(6) Conclusions

(7) References

(8) Attachments

Phase 3

This deals with policy implementation. With policy approval, Phase 3 will draw up action plans; implement activities to achieve objectives; monitor progress; and review performance. This is the continuing phase of NEMS, which is subject to regular evaluation and review, and should be flexible to accommodate new information and experience. The other important aspect of Phase 3 is the promotion of ongoing community education and the creation of improved public awareness.

3.4 Structure of the report

The rest of this report looks at the other requirements for Phase 1. Chapter 4 develops the concepts of change and suggests a framework in which it can develop. Chapter 5 discusses the current status of the various TECs, based on available information and local studies. Chapter 6 recommends for each TEC the main policy objectives, with activities to achieve those objectives. Chapter 7 looks at the implementation framework for NEMS, not only for each policy, but also for NEMS overall coordination and administration.



The process of change

4.1 General

As discussed in Section 3.2, the process of change is the key component for sustainable development. It is also the most difficult to address as it involves the attitudes, perceptions and personal prejudices of individuals, all of which are driven by their educational and life experiences. The understanding of change can be as diverse as the number of people in any society. It is also a political concept as it will influence decision making and promote the development of new power structures, on which the future of the nation depends.

For NEMS to succeed, the community must change from the wasteful practices now in common use, and adopt more efficient alternatives. For example, clearing forests on steeper slopes can lead to soil erosion and the loss of other environmental 'treasures'. But how can rural families necessarily manage when there is limited good land available? Or change when shifting agriculture is the only method of cultivation they know, and can afford to use? The process of change will obviously involve a change in social and economic attitudes and actions. It will require a change in people's lifestyles. The whole philosophy that guides their lives must therefore change.

Thus, the process of change must involve the whole community, and the three components of this process (the three As of Change) are Public Awareness, Agenda Setting and Community Action.

Awareness + Agenda + Action → Change

Public awareness and education, as mentioned earlier, are important functions in policy formulation and implementation. As will be seen in Chapter 6, each policy sets objectives and activities which, if approved by the government, will become

the environmental agendas for the country. Good agendas will remain good intentions only unless they are translated and put into practice through community action and participation.

4.2 Public awareness

For the majority of the general public, awareness of environmental issues cannot be taken for granted. It will have to be created through ongoing programmes, using both formal and informal avenues. For many of the people in the rural areas with limited educational background, it is a mammoth task to help them appreciate sustainable development issues, especially if there is a cost to them in the short term.

Public awareness is a key element in all TEC national policies. While standard means of communicating ideas are encouraged through the press, radio and public meetings, public awareness in the long term may be best achieved through formal environmental education. This will use the normal education and health systems by incorporating environmental programmes in school curricula and adult education, and by promoting sustainable development issues through primary health care activities.

Information should be presented in ways that are relevant to people's lives, with plenty of visual demonstrations and displays. For instance, family planning, while still a sensitive local issue, should be dealt with in terms of the number of people to feed and clothe, school fees to pay, and land required for agriculture and buildings. Water pollution should be interpreted in terms of lack of hygiene, sickness from drinking dirty water, and the shortage of supplies. Dynamiting fish should be presented not only as foolish, but as a serious



Environmental education is needed to change attitudes. School children in Apia carry a World Environment Day banner during Independence Day celebrations. (photo: Paddy Ryan, reproduced courtesy of MFAT)

criminal act. Dynamiting kills all nearby marine life and damages community fishing grounds. Public education should also be presented in such a way as to promote dialogue and discussion, rather than a lecture-like approach.

4.3 Agenda setting

Agenda setting in this context is a direct function of political leadership. It is impossible to underestimate the importance of quality leadership to provide better plans, muster sound arguments, and establish agendas for better policies and equitable community service. New programmes should be based on sound and convincing arguments, and increased public input be sought during the formulation and planning of national development programmes. Any significant community change will require quality leadership as its very foundation.

In NEMS, it is hoped that the nature and direction of government support for environmental protection will be reflected in the proposed national policies. This will involve a commitment to create

public awareness, improve knowledge and understanding, set standards for resource utilisation, and provide support for related activities to ensure their success.

Local conflicts regarding the impact of environmental policies already exist in Western Samoa. A good example is the question of land use. While the Department of Lands, Surveys and Environment and the Department of Agriculture, Forests and Fisheries are advocating less destructive agricultural practices, farmers believe that they should develop their own land in any way that suits them or they can afford. There is no government control over land use or forest clearance.

In such cases, the government must intervene to provide overall guidelines. This is the philosophy on which the whole principle of land use planning and environmental control is based. If each individual pursues his or her own interests only, the interests of other members of the public will be affected, since all will suffer the effects of water contamination, soil erosion and the pollution of lagoons.

4.4 Community action

In any democracy, real progress relies on lifting public expectations about what government and community action can achieve. The community must take charge of its environment to determine appropriate action. Every effort should be made to ensure that resources, especially public goods, are used efficiently. Government support for community activities (through controls and/or incentives) is most important as it provides official sanction and credibility, gives official recognition, and is likely to attract funding for private projects.

In NEMS, community action will be most reflected in the implementation phase (Phase 3), in the design of projects to achieve objectives. There is no better way to effect environmental action than through local community networks, and traditional implementation structures already exist which can be developed and/or strengthened. For example, there are the family units, churches, women's organisations, youth groups and the village councils. However, in planning projects it must also be remembered that Samoans are largely 'individualistic' with the extended family as their primary arena of interest. Their sense of community seems to emerge primarily in those areas where group involvement is advantageous to them and their families.

Community action will be based on the Samoan sense of fair play and give-and-take. This can be illustrated in village food distribution where the distributor must share the goods evenly or risk

ridicule and being branded as greedy. It will also be based on the Christian principle of 'doing unto others what you want others to do unto you'. Community action will also be based on clearly defined roles for different groups. In Samoan society this is another element which provides security, since individuals know exactly what their roles and functions are.

At present, there are many instances in which for one reason or another the community is unable to respond to critical environmental issues affecting their lives. For example, in some villages, everyone knows who is using explosives to catch fish, at a great risk to themselves and the marine environment. However, there is very little community outcry against the culprits. Likewise, some communities are well aware of landowners clearing land, planting crops and using pesticides in catchment areas above their water supply intakes. Yet there are few instances of community action against such people, although in effect they are systematically poisoning the community water supply source.

The community needs to be empowered to speak up and make a stand against such destructive actions that will ultimately affect everyone. The offenders should be confronted and held responsible for their actions. They should not be allowed to take public apathy as an endorsement of their irresponsible activities. The community must feel strongly that it is neither just nor fair for a few individuals to destroy their common heritage.



Current status of the local environment

5.1 Population issues

As mentioned earlier, the population of Western Samoa from the preliminary results of the 1991 Census of Population and Housing is 161,298 (DOS 1992). The most significant feature of the population structure as shown in previous census results is the high proportion of those under 15 years. In 1971 this was as high as 50 per cent (DOS 1981). However, as shown in Table 5.1, it fell during 1976–1986 from 48 to 41 per cent, due to a decline in fertility and high overseas migration.

Between 1906 and 1986, the population increased more than fourfold from 37,320 to 157,408, representing an average annual population growth rate of 4.0 per cent (DOS 1986). But, as shown in Table 5.2, for the intercensal period 1982–1986, the net out-migration rate increased from 16.7 per 1000 to 28.0. Therefore, despite the stable high birth rates and declining death rates, the high emigration rates resulted in a net decline in population growth rate during the same period.

There are strong indications that the number

of emigrants may be declining, with the economic recession badly affecting the traditional overseas destination countries for Samoans, namely Australia, New Zealand and the United States. Figure 5.1 shows population projections for three different annual growth rates. The first scenario is the annual growth rate of 0.6 per cent given by DOS; the second is the estimated growth rate of 1.06 per cent published by the South Pacific Alliance of Family Health (SPAFH 1991); and the third is the current estimated natural growth rate of approximately 2.0 per cent. According to the latter, if the safety valve of emigration is tightened, the 1986 population will double by the year 2021.

There are three main issues of concern to Western Samoa if the national population is allowed to grow at the current rates. These are identified in the Draft Population Policy as:

- (1) limited land resources;
- (2) depletion of other natural resources; and
- (3) strain on existing economic and social infrastructure (GWS 1992b).

Table 5.1 Population structure, 1976–1986

Age	1976		1981		1986	
	Total	% Pop.	Total	% Pop.	Total	% Pop.
0–4	24,646	16.2	22,866	14.6	21,859	13.9
5–9	24,973	16.4	22,848	14.6	21,023	13.4
10–14	23,627	15.6	23,525	15.0	21,713	13.8
15–19	18,552	12.9	20,896	13.4	21,135	13.5
20–44	39,081	25.7	43,700	28.0	48,271	30.7
45–64	15,607	10.2	16,880	10.8	17,761	11.3
65+	4,497	3.0	5,626	3.6	5,396	3.4
Total	150,983	100.0	156,341	100.0	157,158	100.0

Source: DOS 1986

Table 5.2 Population vital statistics for the intercensal period, 1982-1986

Year	Birth rate*	Death rate*	Net out-migration rate*	Annual population growth rate (%)
1982	31.0	7.4	16.7	6.9
1983	31.0	7.4	16.7	6.9
1984	30.5	6.3	28.0	-3.8
1985	30.0	5.2	24.3	0.5
1986	29.5	5.0	28.0	-3.5

* per 1,000 population

Source: DOS 1986

In order to maintain a high standard of living with all the amenities of civilisation, it is estimated (based on total available agricultural land and human needs) that the optimum population for Western Samoa is 130,000 people (Marshall 1950). The effects of reduced international migration and the likelihood of some unemployed Samoans returning home will exacerbate the local demand for limited resources.

The country's Fourth Five Year Development Plan recognised that family planning, though agreed to in 1971, was not integrated with eco-

nomie, environmental or social development objectives (GWS 1980). More than thirty years later it seems that the same is still true. Therefore, the main options related to population issues are (1) the integration of demographic dynamics into national development planning, and (2) the attainment of a national population growth rate that available resources can sustain.

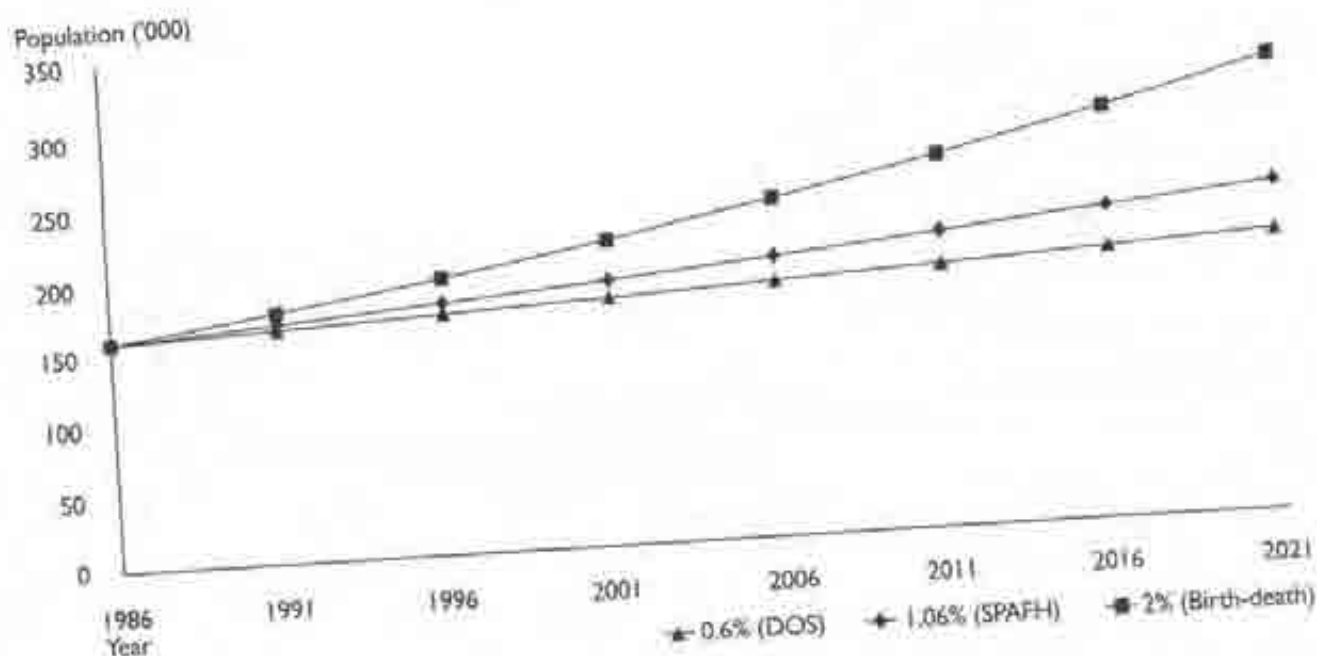
5.2 Water supply

Current strategies for the development of the water sector include measures to:

- (1) promote watershed management;
- (2) harvest rainwater;
- (3) develop a national master plan;
- (4) provide effective cost recovery;
- (5) develop the new water authority; and
- (6) create public awareness (GWS 1992d).

About two-thirds of the population now have access to water drawn from surface resources, the other third relying on borewater or rainwater. Samoans regard water as God's gift and therefore expect that it will be free. This has led to over-exploitation and inefficient use of existing supplies. For example, the normal requirement for

Figure 5.1 Population growth projections



Source: GWS 1992b



Sopoaga Falls, Upolu. Despite a high rainfall in parts of Samoa, only a few major rivers run all year round. Continuing land clearance is a major threat to the ability of the catchment areas to hold water. (Photo: A.C. Robinson, reproduced courtesy of DLSE)

water is 250 litres per person per day. In the Apia area, current use is 600 litres per person per day.

Except for a few major rivers that run all year round, all surface water sources dry up for three to six months. This is due largely to the high permeability of younger rock formations (Kear et al. 1979). However, cyclone damage and the continuing land clearing for agriculture are now the major threats to the ability of catchment areas to hold water. Despite government efforts to protect catchment areas, large parts of most catchments have already been cleared for plantations. To minimise damage to catchment areas, watershed management has been introduced to the Vaisigano River Catchment, and the government has agreed to take over all river catchment areas.

Table 5.3 shows the funding allocations for water supplies. Only about 10 per cent of local expenditure is recovered annually from consumers, which highlights the absence of appropri-

Table 5.3 Local funding for water supply (\$'000)

Item	1988	1989	1990
Expenditure			
Recurrent	1,294	1,025	1,780
Development	3,489	844	1,266
Total	4,783	1,869	3,046
Revenue	211	189	305

Source: PWD 1991

ate policies for effective cost recovery. Boreholes are expensive to develop, costing about \$1,000 per metre to drill, and 20–40 'sene' per cubic metre to operate, depending on the bore depth. However, water is supplied virtually free to local consumers at about one 'sene' per person per cubic metre, compared to 83 (US) cents per person in Hawaii, plus an initial fee of \$US 7,000 for every new connection.

While considerable funding has been allocated under European Community economic assistance (Lomé IV) for water supply development, this is subject to the completion of a national master plan. Such a plan will guide future development of the water sector, especially the effective management of available resources and including the impacts of hydroelectricity generation. Through the new water authority, the main issues for water resources are the protection of supplies and the sustainable provision of clean water to all consumers.

5.3 Fisheries

While it is not possible to make any valid estimates of the maximum sustainable yield for Western Samoa's varied and complex fishery stocks, it is evident from the reports of people who fish, available catch/effort data from different areas, and declines in market landings that the maximum sustainable yield has been exceeded in most parts of Upolu (Zann 1991a). A decline in fish stocks is probably responsible for the decline in inshore landings in Upolu.

Zann (1991c) gives the possible reasons for inshore stock declines as:

- (1) overfishing due to increased demand;
- (2) use of effective and modern, but non-selective, fishing techniques;



Land reclamation, Vaiala. The continuing reclamation of lagoons and mangroves is just one of the threats to the fisheries resources of Samoa. (photo: Jennie Cory, reproduced courtesy of DLSE)

- (3) use of destructive techniques such as poisons and dynamite; and
- (4) loss of fish habitat through reclamation, coral sand mining and drainage.

A good example of habitat depletion was the use, until recently, of the mangrove swamp at Varusu Bay as the town waste disposal site. This is the largest area of lagoon in Western Samoa, and contains the largest mangrove and wetlands area in eastern Polynesia.

Coastal lagoons are also being subjected to industrial and domestic pollution. Deforestation has increased the incidence of soil and nutrients being washed to the sea. These can result in eutrophication and changes to ecosystems, and sediments may even kill the reef (Warren & Sisarich 1992).

It is evident from the literature that sediment and nutrient pollution of lagoons is damaging the Western Samoan reef system, and contributing to the collapse of the inshore fisheries (Taylor 1991). Due to the shallowness of the lagoons, there is little ocean exchange, and thus a minimum capacity to dilute waste. The Department of Agriculture, Forests and Fisheries (DAFF) estimates that 90 per cent of the coral reef around Apia is dead.

The future options for local fisheries lie in (1) the protection and conservation of coastal lagoons and habitat, and (2) replenishment of stocks through the development of stock hatcheries. For example, the turtle hatchery project established at Aleipana in 1971 was an attempt by the Fisheries Division of DAFF to increase survivorship of young turtles (Zann 1991b). The hatchery was closed in 1983.

5.4 Waste management

Very little is known about the amount of solid waste being generated nationwide. This is because there is no public collection in the rural areas, and the collection in Apia only covers part of the urban area. It is estimated that approximately 17,000 cubic m or 3,000 t were disposed of annually at the former site at Vaiaus Bay which, as mentioned earlier, was located in the mangrove area west of Apia. The working face at the disposal site was about 270 m long and 30 m wide, and all rainfall runoff from the site still discharges directly into the bay. With no control over leachate or the types of waste being disposed of there, there are serious threats to both the marine environment and the health of consumers of seafood from the adjoining bay and lagoon areas. A new landfill site has now been opened for urban waste disposal.

The disposal of sewage is also a growing problem. With no public sewerage system in Western Samoa, private homes are served by on-site systems which can be classified into (1) septic tanks with soakage facilities; (2) pour-flush toilets; (3) pit latrines; and (4) primitive toilets on drains or over the sea. It is evident in the low-lying areas of Apia that groundwater is being polluted by effluent from many of the sewage disposal facilities (GWS 1992c). And in densely populated areas, polluted groundwater, assisted by high percolation rates, is a likely contaminant of near-shore water.

There is also growing public concern about the use and disposal of chemicals and agricultural pesticides. In 1989 during the Agricultural Census,

nearly 60 per cent of families reported using agricultural chemicals (DOS/DAFF 1990). The high rate of suicides using weed killers shows the need for improved policies on the overall management of toxic chemicals. Hospital waste disposal was of concern. The hospital sewage treatment plant was replaced in 1992 by a new and effective facility, although effluent quality has suffered from maintenance and management difficulties.

Future options for waste management include (1) to reduce, recycle and recover resources from solid waste; and (2) to provide proper treatment and disposal facilities for solid waste. In 1991, the government approved a new 40-hectare site for a sanitary landfill. The Department of Lands, Surveys and Environment is currently developing the new site. Plans are also being considered for the rehabilitation of the former site, particularly to improve the mangrove swamp areas, and to discourage any further degradation by nearby residents. Feasibility studies for a sewerage scheme for Apia have been undertaken, but funding for its construction appears remote.

5.5 Forestry

The total land area of Western Samoa is 698,941 acres or 282,852 ha. Of this, 37 per cent is covered

by remaining forest (36 per cent indigenous, 1 per cent plantation). Figure 5.2 shows the breakdown of forest areas between Upolu and Savaii. The remaining forest comprises 47 and 23 per cent of the total land areas on Savaii and Upolu respectively. DAFF (1992) estimates that of the remaining indigenous forest, only 5 per cent is merchantable while 31 per cent is non-merchantable.

The Department of Agriculture, Forests and Fisheries also estimates that the current rate of forest depletion is about 7,500 acres (3,000 ha) per year. The rates of depletion are similar on both Savaii and Upolu but 40 per cent of clearing on Savaii is due to logging while there is less logging on Upolu. Overall, 20 per cent of forest clearing is attributed to logging with the remaining 80 per cent resulting from agriculture and other activities (DAFF 1992).

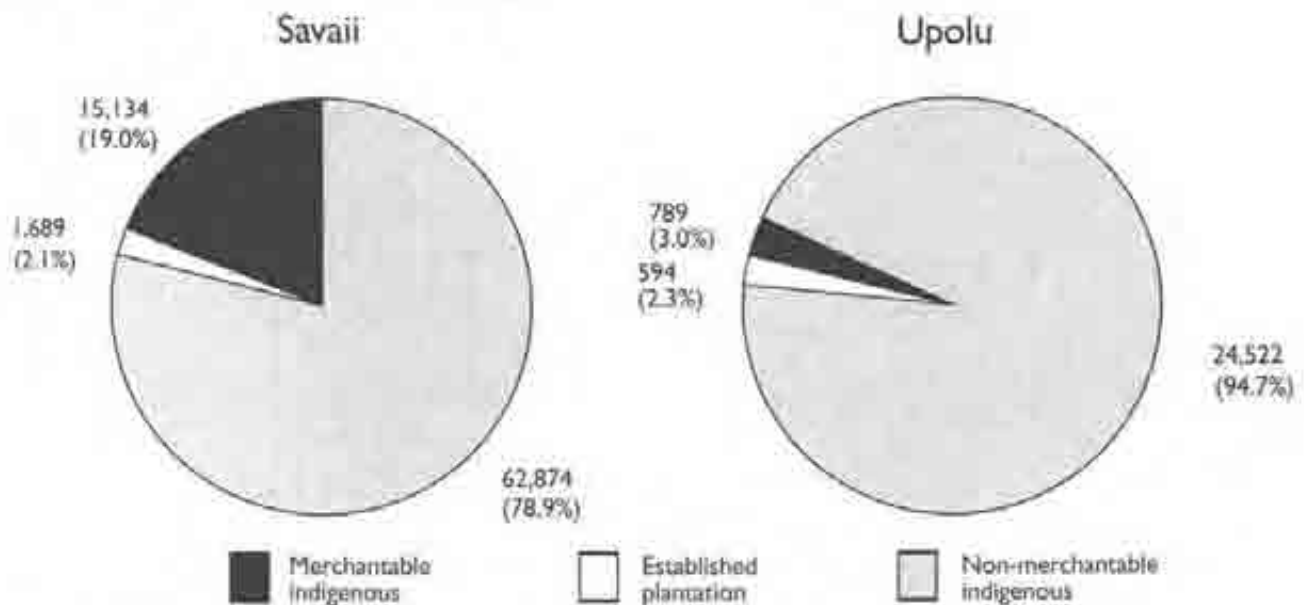
The most important functions of forest are:

- (1) to protect and conserve the environment (including soil, water and biodiversity resources);
- (2) to produce wood and other forest products; and
- (3) to provide recreation and tourism opportunities (GWS 1991b).

Paid employment in the forestry sector currently supports 10 per cent of the labour force.

With deforestation having wide ramifications

Figure 5.2 Remaining forest areas (ha)



Source: DAFF 1992



Almost eighty per cent of forest clearance is for agricultural purposes. Here, taro is being grown amongst felled logs. (photo: Paddy Ryan, reproduced courtesy of MFAT)

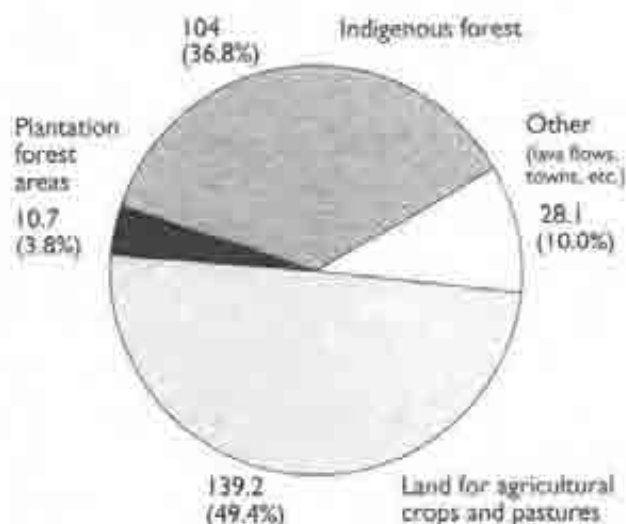
For most other aspects of the environment, sustainable forest management is seen as one of the most pressing issues in environmental protection. Two options are proposed (GWS 1991b) for future development of indigenous forest. One is for a perpetual log cut of 1,000 cubic m per year, and the other an annual cut of 10,000 cubic m per year until plantation forests become available in approximately the year 2010.

5.6 Land use

The majority of land is owned by families or is under customary ownership, as shown in Table 5.4. This system guarantees access to land for subsistence purposes, and is an integral part of the Samoan way of life. However, customary ownership of land can be a constraint for certain types of economic activity, and is seen by some as an impediment to development (Hardin & Associates 1989). For example, for extensive agricultural or forestry development with heavy investment in fixed assets, long-term security of tenure is necessary. However, Fairbairn (1985) concludes that the economic future of Western Samoa depends essentially on progress in the subsistence sector.

Apart from indigenous forests, the other most important land use in Western Samoa is cropping.

Figure 5.3 Estimate of land use, 1991 ('000 ha)



Source: GWS 1993

Table 5.4 Land ownership

Type	Upolu		Savaii		Total	
	ha	%	ha	%	ha	%
Customary	76,166	27	153,490	54	229,656	81
Government	19,758	7	10,626	4	30,384	11
WSTEC	9,499	3	4,476	2	13,975	5
Freehold	7,800	3	1,037	(a)	8,837	3
Total	113,223	40	169,629	60	282,852	100

Source: GWS 1991a

(a) Insignificant

as shown in Figure 5.3. The most important crop is coconuts followed by taro and cocoa. In livestock, cattle are most important with 14 per cent of families keeping them (DOS/DAFF 1990).

The appropriate utilisation of land resources according to their capabilities holds the key to future land use management (Table 5.5). At present, most cropping and livestock development takes place in areas suitable for agriculture, but it is estimated that over 30 per cent of total agricultural and forest activities takes place in areas with severe limitations. With plantation access roads opening up many inland areas, over 42 per cent of the indigenous forests in sensitive areas have been cleared for agriculture and forestry (ANZDEC 1990).

Table 5.5 Land use capability

Capability type	Proportion (%)
Land with few limitations to agriculture	14
Land with moderate limitations to agriculture and few limitations to forestry	43
Land with severe limitations to agriculture and moderate to severe limitations to forestry	21
Land unsuitable for agriculture or forestry	22

Source: After ANZDEC 1990

5.7 Biodiversity

In 1948 Graton reported Samoa as "a very fine field for the botanist and entomologist"; Samoan biodiversity in 1893–1895 was evidenced by "567 botanical genera and 1,244 species, and among these 142 were new". Of the 52 kinds of birds, 34 were land birds, and of the latter, 16 were found nowhere else in the world (Graton 1948). Jordan and Seale (1906) described the fish fauna of Samoa as the richest on the globe, and obtained specimens of 475 species, of which 92 were considered at the time to be new to science. The fauna is now known to contain 991 species, about 40 of which are found only in Samoa (Wass 1984).

More recently, Whistler (1992a) estimated that Western Samoa supports about 500 vascular plant and 245 fern species, of which 30 per cent are found nowhere else. Dahl (1986) identified 21 butterfly species of which one is found nowhere else. Gill (1993) identified 14 reptile species (eight skinks, five geckos and a snake), and three of the skinks are species restricted to Western Samoa and a few nearby islands. Pratt et al. (1987) recorded 37 resident land birds, ten of which are found nowhere else. However, increased demand for local resources is aggravating pressure on natural ecosystems, and threatening the survival of existing biodiversity.

A number of plant species, particularly ferns, have not been collected since the 1930s or even earlier. Whistler (1992b) has prepared a list of potentially endangered or threatened plants which includes 137 species. With the destruction of much of the natural environment, many species of plants and animals must be at the brink of extinction.

Vapu mixed swamp forest, Upolu, one of only two such ecosystems in the world. One was destroyed for the construction of the Afu'alu hydroelectricity dam, and this area is under threat despite its high biodiversity values. (photo: Paddy Ryan, reproduced courtesy of MFAT)



The main option for future action is to encourage and support community efforts for long-term conservation of those remaining areas supporting unique biodiversity. The linkages between various ecosystems and the requirements of different species should also be firmly established and understood so that the full potential of existing biodiversity can be protected and realised. To safeguard the basic range of natural ecological diversity, Park et al. (1992) identified fourteen key sites throughout the coastal lowlands (Figure 5.4) as the very minimum to protect:

- (1) Uafato–Tiavea coastal forest, Upolu.
- (2) Sataoa–Saanaapu coastal wetland (mangrove forest), Upolu.
- (3) Nuutele, Nuulua, Faniuatapu (Aleipata islands), Upolu.
- (4) Aopo–Letui–Sasina coastal forest, Savaii.
- (5) Vaoto lowland forest, Savaii.
- (6) Apolimafoa coastal wetland.
- (7) Saleapaga–Lalomanu coastal forest, Upolu.
- (8) Vaiee–Tafitoala peninsula, Upolu.
- (9) Vaipu swamp forest, Upolu.
- (10) Taga–Lata–Salailua lowland forest, Savaii.
- (11) Siuvao Point forest, Savaii.
- (12) Mulimuu–Tufutafoe coastal wetland, Savaii.
- (13) Mauga–Samalaenui lava flow succession and forest islands, Savaii.
- (14) Malifolio River forest, Savaii.

Pearsall and Whistler (1991) also identified key highland areas for conservation including:

- (1) Lona–Punataemoo forests, Upolu.
- (2) Fusiluaga forest, Upolu.

- (3) Highlands of Savaii.
- (4) Central Upolu uplands.
- (5) Eastern Upolu uplands.
- (6) Mt Fao rainforests, Upolu.

5.8 Atmosphere

Although Western Samoa is a party to international conventions to protect the atmosphere, there has been limited local response to this issue to date. The area of most concern is the emission of carbon dioxide and other ozone depleting gases from vehicles and industrial plants. Future actions should include: (1) improved standards for vehicle testing; (2) appropriate pricing for petroleum products; and (3) incentives to encourage the use of renewable forms of energy.

5.9 Climate change and greenhouse effect

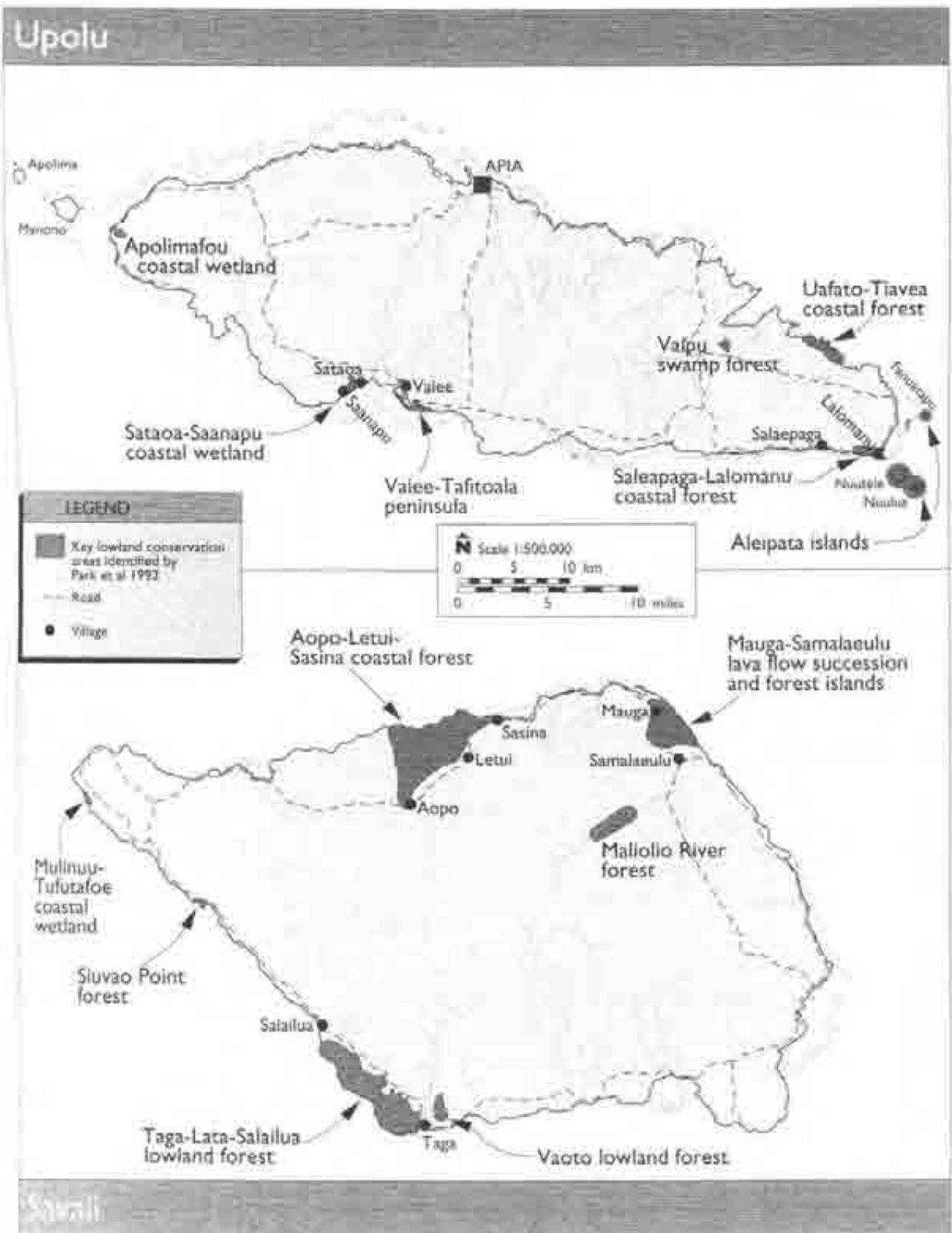
There has also been limited local response to the issues of climate change and the greenhouse effect. The main local risks from greenhouse warming include:

- (1) coastal inundation;
- (2) shoreline retreat;
- (3) more severe and frequent storm and wave conditions;
- (4) enhanced coastal sedimentation; and
- (5) threats to infrastructure and services (Bryant 1991).



Coastal communities are particularly vulnerable to the predicted impacts of sea-level rise. (photo: A.C. Robinson, reproduced courtesy of DLSE)

Figure 5.4 The fourteen key lowland conservation sites identified by Park et al.



Source: After Park et al. 1992



The 'ava' bowl, part of traditional ceremony and made from the 'ifeife' tree (now increasingly rare) is a sought-after artefact of Samoa. (photo: A.C. Robinson, reproduced courtesy of DLSE)

5.10 Samoan culture

Cultural identity gives people dignity (Brandt Commission 1980). The creative aspects of cultures are important because (1) they create a sense of identity, (2) they give pleasure and personal enrichment, and (3) they give meaning to life and the world (Tausie 1980). Preserving history maintains continuity of human identity and is essential for the evaluation of change (Young 1991). Heritage conservation contributes to the heightening of perceptions of our environment and the strengthening of our knowledge and understanding of history, and helps confirm our identity as people (Proudfoot 1991).

Since the late 1970s, Western Samoa has tried to promote the provision of national facilities for arts and culture. Two reports were prepared for the government: Specht (1978) provides the basic requirements for the development of a national cultural centre, while Neich (1987) documents a feasibility study for the development of a national museum and cultural centre. In fact, a national museum was set up in the early 1980s at Mulinu'u, but failed through lack of funds and public support.

Recently, the government has supported the classification of old German records that are still in Apia. A group of local people has formed an arts society, O Mea Sina Samoa, to promote local arts and culture. In early 1992, a workshop was conducted to revive the idea of a national museum and cultural centre. At this workshop, the wide functions of these facilities including their role in tour-

ism development were discussed (Fiame 1992), as well as the need to preserve traditional culture for the appreciation of future generations (Leleistiua 1992).

The cultural priorities are (1) to establish a policy on Samoan culture, and (2) to establish the cultural centre and museum facilities as the focus of efforts to preserve and develop Samoan culture.

5.11 Human resources

Education plays a important role in human resource development. Government emphasis in the Seventh Development Plan (DP7) is to prepare people for the economic opportunities which are available to them, through the upgrading of education resources. The government has also approved compulsory free education for primary schools. However, as shown in Table 5.6, the education budget has been virtually fixed at about 10 per cent of the national budget since 1981, and about 95 per cent of the total goes to fund recurrent expenditure.

A human resources plan for the public sector has been prepared by the Public Service Commission (PSC), and submitted to government for approval. The specific objectives of the plan include (1) better matching of skills with positions; (2) stronger incentives to acquire and upgrade skills; (3) more professional management; and (4) improved retention of qualified staff (PSC 1992). Miles et al. (1992) predict that unless strategies are put in place to promote a cash-oriented economy, Western Samoa with reduced out-migration will

Picnic area development at Sopoaga Falls, Upolu. Tourism is increasingly important for employment and as a foreign exchange earner. (photo A.C. Robinson, reproduced courtesy of DLSE)



face the common problems related to urban drift and high unemployment.

Table 5.6 Education Department budget, 1981-1989 (\$'000)

Year	Education budget	National budget	% Education/National
1981	4,630	55,500	8.3
1982	4,760	57,900	8.2
1983	6,700	70,500	9.5
1984	7,420	103,200	7.2
1985	8,400	101,700	8.3
1986	10,510	104,600	10.0
1987	10,780	121,000	8.9
1988	11,550	125,200	9.2
1989	13,150	132,500	9.9

Source: Taulealo 1990

The options for the future include (1) a human resource development plan based on a clear policy on economic development and direction; (2) development of school and vocational programmes in response to required workforce needs; and (3) assessment of national investment in human capital (Schultz 1961).

5.12 Economic growth

The current state of the Western Samoan economy is well documented in DP7. While the economy was 23

per cent larger in 1991 compared to 1987 in terms of GDP at current prices, it actually declined in real terms (taking inflation into account) during this period. (Cyclone Ofa in 1990 reduced GDP by about 5 per cent.) This is a disappointing performance since there was an average GDP growth of about 3 per cent per annum from 1982 to 1987 (GWS 1992a).

Like many of the small South Pacific Island nations, Western Samoa has endeavoured since independence to develop a modern economy from traditional village agriculture and primary products. The country has no known minerals, and an Exclusive Economic Zone which is among the smallest in the region. The main exports are agriculture based products which are subject to numerous natural and external factors beyond the country's control. With declining export earnings and dwindling foreign reserves, the government will continue for some time to rely on foreign assistance and overseas remittances to fund its development programmes (Fairbairn 1985).

Future options to achieve sustainable economic growth include:

- (1) creation of skilled and resource-based employment;
- (2) development of export-oriented and import-substitution activities;
- (3) identification of sources of growth;
- (4) improvement of land utilisation;
- (5) achievement of economic efficiency; and
- (6) promotion of local economic development.