

# PACIFIC ISLANDS ENVIRONMENT OUTLOOK



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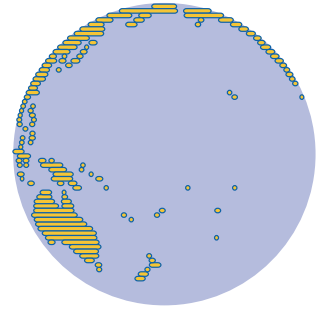
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# Pacific Islands Environment Outlook





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## Preface

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It is now over seven years since the Pacific region drew up a comprehensive SOE report and statement of policy for the 1992 Earth Summit in Rio. That document was based on an exhaustive regional and national process, culminating in the best available catalogue of development and environment issues affecting all countries and territories in the region. The 1992 reports have been used as a baseline in order to arrive at some reasonable assessment of the principal trends currently affecting the region, and to identify where those trends require special attention and analysis, either because of their adverse effect on the environment or because of the progress that has been achieved in the intervening years.

The *Pacific Islands Environment Outlook* (PIEO) report is part of a UNEP project to produce state of the environment assessments for the countries of the Caribbean, Western Indian Ocean and Pacific Islands. The report was co-ordinated by the South Pacific Regional Environment Programme (SPREP) on behalf of UNEP and with the financial assistance of the European Community (budget line B7-6200 Environment in Developing Countries, Project No. B7-6200/97-06/VIII/ENV.).

The objective of the PIEO is to provide information on the state of the environment in the Pacific Islands, help identify regional environmental concerns, and highlight policy priorities. The three reports will also contribute to the improvement of regional agenda-setting, sustainable development planning and resource allocation. The production of the Caribbean, Western Indian Ocean and Pacific Islands Environment Outlooks closely followed the process set up for the production of UNEP's *Global Environment Outlook* (GEO) publication. GEO uses a regional and global participatory

assessment and reporting process, the main components of which are the Collaborating Centres, regional policy consultations, international working groups and the UN System-wide Earthwatch (see Box 0.1).

As part of the ongoing Global Environment Outlook (GEO) process, the *Pacific Islands Environment Outlook* provides a policy-relevant assessment of this region's environment. It draws on published reports, expert opinion and interviews with a number of regional agencies working in the resource management field. National input has been provided through a regional workshop and circulation of the final draft for comment.

This report comes at a critical time for this region, and for island countries globally, as the international community reviews agreements reached in Barbados in 1994 concerning the Sustainable Development of Small Island Developing States (SIDS). The trends and emerging issues will also contribute to the ongoing negotiations between the European Community and the African, Caribbean and Pacific (ACP) States concerning the Lomé Convention.

The *Pacific Islands Environment Outlook* is an important step towards the better understanding and management of the islands and ocean resources of this region. It represents attempts by this region to implement Chapter 40 of *Agenda 21*, to report on the implementation of the Barbados Programme of Action and to fulfil our obligations to assess the state of the region's environment (*Agreement Establishing SPREP*). Most important of all, this Outlook represents the first in a series of regular reviews, linked to the GEO process, that will help guide decision-making in this region and ensure a sustainable future for Pacific island peoples.

### Box 0.1: The GEO process

The production of the Caribbean, Western Indian Ocean and Pacific Islands environment outlooks closely followed the process set up for the production of UNEP's *Global Environment Outlook* (GEO) publication. Both *GEO-1* (published in 1997) and *GEO-2000* (published in 1999) were produced using a regional and participatory process. This process was of crucial importance in ensuring that the assessment involved stakeholders and experts from all over the world and from every discipline relating to environmental and development issues. As with GEO, the Caribbean, Western Indian Ocean and Pacific Islands environment outlooks aim to incorporate regional views and perspectives and to build consensus on priority issues and actions through dialogue among policy-makers and scientists at both regional and global levels. The main components of the GEO process are:

- GEO Collaborating Centres
- Regional policy consultations
- International working groups
- UN System-wide Earthwatch

**GEO Collaborating Centres** are multi-disciplinary centres of excellence from all the regions which form a co-ordinated network for making policy-relevant assessments. The GEO-2000 network consists of some 25 such Collaborating Centres. The three Collaborating Centres chosen to help implement the UNEP/EC project were:

- the University of the West Indies, Centre for Environment and Development (UWI-CED), Kingston, Jamaica;
- the Indian Ocean Commission, Regional Environment Programme (IOC-REP), Quatre-Bornes, Mauritius, and
- the South Pacific Regional Environmental Programme (SPREP), Apia, Western Samoa.

**Regional policy consultations** were held in each of the subregions to ensure the participation of all the stakeholders, especially policy-makers, regional organizations and NGOs. Regional consultations not only provide a forum in which governments are able to provide inputs into the GEO process, but also stimulate dialogue between scientists and policy-makers – a crucial step in ensuring that assessments are geared towards policy formulation and action planning.

The regional consultations provided advice and feedback from governments and scientists on the early drafts of the reports. As with the regional consultations for the GEO reports, the consultations for the Caribbean, Western Indian Ocean and Pacific Islands environment outlooks provided inputs that resulted in substantial improvement to the respective documents.

**International working groups** on modelling, scenarios, data and policy provided technical support to the GEO process by developing and recommending methodologies for achieving harmonized and integrated assessments.

**United Nations System-wide Earthwatch** ensures the participation of UN agencies in the GEO process.

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The *Pacific Islands Environment Outlook* could not have been compiled without significant input and guidance from national focal points of SPREP member governments and experts that participated in the regional consultation process. Special thanks go to the following consultants and SPREP staff closely engaged in the compilation of the initial drafts, namely Ken Piddington, Neale Farmer, Sarah McCartney, Gerald Miles, Andrea Volentras, Andrew Munro, Suresh Raj, Iosefatu Reti, James Aston, Bismark Crawley and Seema Deo.

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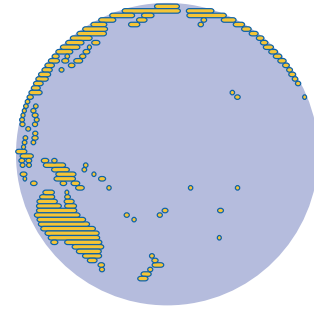
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Finally, we owe a special thanks to the participants of the Pacific Islands Regional Consultation, whose guidance enabled us to improve the document enormously. A full list of participants is included at the end of this report.



# Introduction



The Pacific islands region is unique, not because its geographical, biological, sociological and economic characteristics are found exclusively here, but because of the combination of these characteristics within the region. It occupies a vast 30 million km<sup>2</sup> of the Pacific Ocean, which is an area more than three times larger than the United States of America or China (SPREP 1992). This region is characterized by: small land masses dispersed over 5.8 per cent of the Earth's surface; a high degree of ecosystem and species diversity; an extraordinary level of endemism; a high degree of economic and cultural dependence on the natural environment; vulnerability to a wide range of natural and environmental disasters, and a diversity of cultures and languages, traditional practices and customs focused on the marine and coastal environment.

The 22 countries and territories of the Pacific islands region consist of approximately 550 000 km<sup>2</sup> of land with 7.5 million inhabitants. If Papua New Guinea is excluded, the figures drop to 87 587 km<sup>2</sup> of land and 2.7 million people (SPC 1998). Geographically, the region extends from Pitcairn in the east to Papua New Guinea in the west. The region is home to a variety of peoples and cultures, with three commonly recognized subregional constituents – Micronesia, Polynesia and Melanesia. More than 2 000 different languages are spoken across the region (Thistlethwaite and Votaw 1992).

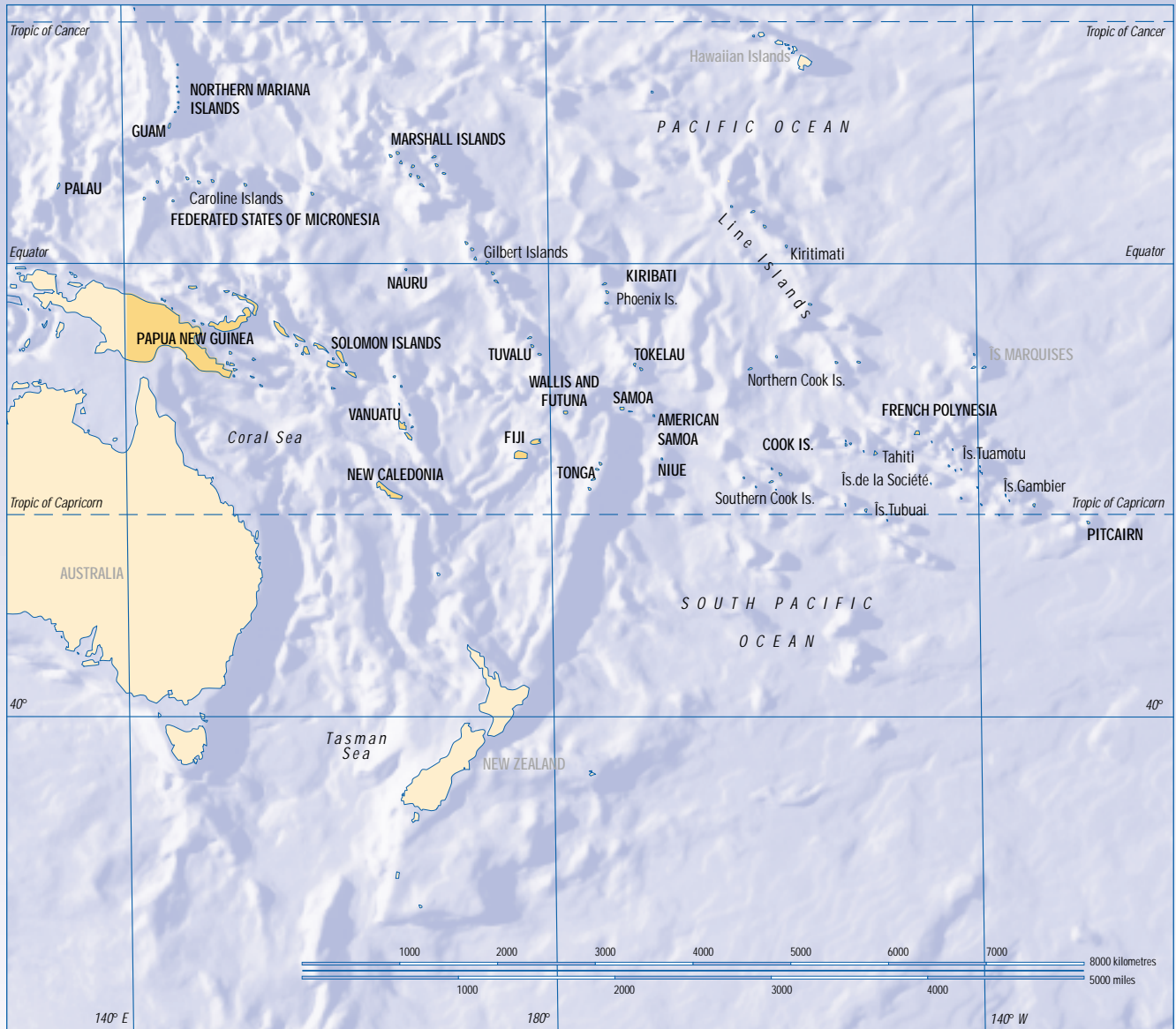
The countries and territories that make up the Pacific islands region are listed in Figure 0.1 on the following page.

Whilst the region is diverse in terms of the size and features of its member countries and territories, there are some common characteristic features (SPREP 1992; Thistlethwaite and Votaw 1992; SPREP/ESCAP 1996).

- *Geographical isolation:* The large volumes of water and small areas of land create an environment that is relatively isolated on a global scale. Whilst in the past this has had benefits from an ecological perspective, it also provides challenges; for example, travel both within member countries and on a regional level can be difficult.
- *Fragility of the environment:* Geographical and ecological isolation has led to the evolution of unique species and communities of plants and animals, many of which are indigenous to only one island or island group within the region. Changes to land use, population, consumption and other determinants of environmental well-being make the Pacific island habitats particularly vulnerable to destruction or damage.
- *Rapid population growth:* In the past century most Pacific island countries (PICs) have experienced rapid population growth. This population growth, along with the increasing commercialization of subsistence-based economies, has been associated with rapid increases in rates of natural resource exploitation, especially of land, forests and fisheries. While population growth throughout the region is beginning to slow, there is concern that populations

Figure 0.1: Countries and territories covered by the *Pacific Islands Environment Outlook*

American Samoa	Northern Mariana Islands
Cook Islands	Palau
Federated States of Micronesia (FSM)	Papua New Guinea (PNG)
Fiji	Pitcairn
French Polynesia	Samoa
Guam	Solomon Islands
Kiribati	Tokelau
Marshall Islands	Tonga
Nauru	Tuvalu
New Caledonia	Vanuatu
Niue	Wallis and Futuna



on many islands have exceeded the level that local resources can sustain.

- *Limited land resources:* Many Pacific islands are characterized by extremely limited land resources such as soil and forest. Limited land makes many terrestrial and nearshore resources very vulnerable to overexploitation and to pollution from poorly planned waste disposal.
- *Dependence on marine resources:* There is a traditional dependence on marine resources for daily needs, foods, tools, transport and waste disposal. This dependence remains in spite of new technologies and lifestyles (see National Environment Management Strategies 1992–94). The region's ocean resources contain the highest marine diversity in the world and represent almost the sole opportunity for substantial economic development for nations such as the Marshall Islands, Kiribati and Tuvalu.
- *Vulnerability:* The Pacific is often exposed to extremely damaging natural disasters and to external and global changes (for instance in climate, trade and capital markets), and has a heavy reliance on certain economic sectors (Thistlethwaite and Votaw 1992).

The priority environmental problems that are placing pressure on the natural resources, lifestyles and economic development of this region have been identified progressively over the last eight years as:

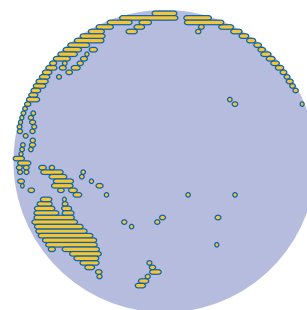
- loss of biological diversity;
- threats to freshwater resources;
- degradation of coastal environments;
- climate change and sea level rise;
- land and sea based pollution.

These priorities have been drawn from national state of the environment reports prepared between 1991 and 1994 for National Environmental Management Strategies, regional reviews of state of the environment reporting (Thistlethwaite 1996), the Strategic Action Programme for International Waters in the Pacific Island Region (1997) and the SPREP Action Plan (1997–2000). They are reflected in international agreements reached concerning the sustainable development of islands, notably the Global Programme of Action for the Sustainable Development of Small Island Developing States and related preparatory meetings (SPREP 1993c).

The priority problems are explored in Chapter One. They also provide the focus of attention for the range of national, regional and global policy initiatives that are

being implemented in the region. A review of the current policy responses is provided in Chapter Two, whilst alternative policy options for the future are addressed in Chapter Three. Chapter Four provides an analysis of emerging issues in the region.

# State of the Environment



## Background

This chapter summarizes the state of the Pacific environment. It indicates trends over the past hundred and previous ten years, as well as highlighting concerns for the next ten years. In general it notes trends that have continued since 1992 – the last comprehensive review. Where possible, patterns of improvement or deterioration since that date are described.

The 1992 review (SPREP 1992; Thistlethwaite and Votaw 1992) was based in part on completed country reviews and state of the environment reports that were being used at the time to develop National Environmental Management Strategies (NEMS). A total of 12 NEMS were produced between 1990 and 1994 and these publications form part of the baseline material. Two factors stand out. One is that the rapidly expanding demands on limited human resources throughout the region have meant that few attempts have been made to update these documents. This may have been influenced in part by a sense of disappointment on the part of governments over the lack of new funding post Rio, so that some activities that were listed as priorities nearly a decade ago remain to be funded.

The second factor is associated with the first, but is of a more technical nature. There is a general paucity of data sets at both the regional and country level. In most of the sectors reviewed, the pattern is one of ‘spot’ research and survey activity, which produces a reasonable quality of data at a given point in time, but

which is not followed up over a longer period. It follows that the quantity and quality of data sets available to reveal major trends at the local or regional level represent a major limitation.

Most experts in the region acknowledge that this is a problem they have to live with. The gaps in knowledge are to a significant degree offset by intimate local knowledge and a store of anecdotal evidence, for example on inshore fisheries and traditional sustainable sources of sand and gravel from beach and reef areas. Given the small relative size of communities throughout the Pacific (even in the main urban centres), this information is in most situations an adequate proxy for policy development and decision-making needs. In purely practical terms, the work required to maintain consistent data sets on the main environmental problems is unlikely to rate as a high priority for funding; nevertheless, improved data are an imperative for the region. As a start, some reinforcement of ‘local knowledge’ will be needed, and steps to initiate more systematic state of the environment (SOE) reporting would be justified. This is particularly the case in areas where local knowledge is not practicable as a proxy for information on resource assessment for policy formulation (e.g. oceanic fisheries).

## Social and economic background

Over the past 100 years, the Pacific has experienced far-reaching economic changes, which have led to environmental change and degradation. Lifestyles have

changed from subsistence to cash-driven societies reliant on budgetary assistance and remittances, although a traditional dependence on natural resources for daily needs, food, tools, transport and waste disposal remains in spite of new technologies and lifestyles.

During the past century, PICs have striven for the goal of improved standards of living. Accompanying this they have also experienced rapid rates of Westernization, urbanization and population increase and have gradually moved towards a consumer society. This transition has not been without adverse impacts, including land degradation, loss of biodiversity, loss and degradation of marine and forest resources, plus an increase in problems associated with environmental health and a sudden confrontation with the realities of waste and toxic/hazardous substances management.

In mid-1997, the region's total population stood at about 6.3 million. Its distribution ranges from Papua New Guinea's (PNG's) 3.6 million people to Pitcairn's 47 inhabitants. Over the past decade, the population of the Pacific island region has been growing steadily at around 2.2 per cent each year. Although population growth throughout most of the region has been much higher in urban than in rural areas, Pacific life is still primarily rural, with only about 25 per cent of people living in urban areas. The rapid population growth is readily apparent in countries' population structures, and all countries demonstrate youthful populations: about 40 per cent of the region's population is under 15 years

of age. Variations in population growth and composition illustrate the complex nature of population dynamics in the region: a result of distinct demographic processes such as fertility, mortality and migration, they will give rise to different developments in the future (SPC revised 1998).

Should the current trends continue (Figure 1.1), the Pacific islands' population will reach the 10 million mark in about 15 years' time, with the fastest growth occurring in towns and cities. Given the magnitude of population developments in the region and their social, economic and political implications, joint consideration of population and development will have to become an urgent area of public policy reform for Pacific island governments (SPC, revised 1998).

Rapid urban population growth reflects the nature of economic development across the region during the past decade. World market prices for agricultural commodities are declining, new investments are more visible in urban than in rural areas, and towns are perceived as important conduits for socio-economic, cultural and political innovation and change. The standard of living for the region's urban dwellers is relatively high when compared with those in other developing countries, largely the result of the continued support from traditional networks for and among people living in urban environments. However, there are some worrying trends. Although empirical data are usually sketchy, there are indications of: rising unemployment, particularly among young people; high drop-out rates from primary schools; low household cash incomes; and a growing incidence of substance abuse and crime (SPC 1998).

As discussed above, rapid growth in both urbanization and population contributes to environmental problems in many PICs. Table 1.1 provides data on both population growth rates and densities, illustrating the extent of these problems and the wide variation between PICs.

Most developing countries in the Pacific region have a two-tiered economic structure. While much of the population is employed in the subsistence sector, a less traditional commercial economy is growing rapidly. The subsistence economy, which includes important elements of trading, is expected to be a primary source of employment and income for many years. At the same time, much developmental attention is focused on newer activities, which promise a higher level of the material benefits to which people now aspire. PICs are becoming increasingly industrialized, with PNG, New Caledonia and Fiji having a medium industrial capacity based on mining,

Figure 1.1: Growth in total population for PICs, 1950–98



Source: United Nations Population Division (1996)



Table 1.1: Geographical data on PICs

Country	Land area (km <sup>2</sup> )	Total population	Annual growth rate (%)	Density (people/km <sup>2</sup> )	Urban population (%)
American Samoa	200	46 773	3.7	233	48
Cook Islands	197	19 000	0.4	237	59
Federated States of Micronesia	710	105 506	1.9	149	27
Fiji	18 333	772 655	0.8	39	46
French Polynesia	3 521	219 521	1.9	62	54
Guam	541	133 152	2.3	246	38
Kiribati	811	77 658	1.4	96	37
Marshall Islands	181	43 380	4.2	240	65
Nauru	21	9 919	2.9	472	100
New Caledonia	19 103	196 836	2.6	10	71
Niue	259	2 082	-1.3	8	32
Northern Mariana Islands	471	58 846	5.6	125	90
Palau	488	17 225	2.4	35	71
Papua New Guinea	462 243	3 607 954	2.3	8	15
Pitcairn	39	47	-	1	88
Samoa	2 935	161 298	0.5	55	21
Solomon Islands	28 370	285 176	3.4	10	13
Tokelau	12	1 507	-0.9	125	0
Tonga <sup>1</sup>	747	97 784	0.3	131	36
Tuvalu	26	9 043	1.7	348	42
Vanuatu	12 190	142 419	2.8	12	18
Wallis and Futuna	255	14 166	0.6	56	0

Source: SPC (1998 revised)

Notes: 1. Updated from Population Census, Government of Tonga

forestry and fishing-related activities and a variety of manufacturing industries ranging from small family-owned operations to large exporting facilities. Tokelau and Wallis and Futuna have essentially no industry at all. Other countries in the region have small industries related to food or beverage processing, clothing, and minor machinery assembly or repair.

The close connection between economic and environmental well-being is reflected in the continued importance of agriculture in all Pacific island developing countries (PIDCs). Agriculture remains the principal source of employment, and with rare exceptions is a major source of income and of earnings from exports (Thistlethwaite and Votaw 1992). Many crops are grown, and variety is the hallmark of both traditional and more commercially oriented systems of smallholder gardening. Tourism is one of the fastest-growing sectors of the economy in the Pacific, in particular for Fiji and Vanuatu. Guam reports a tripling of tourist numbers in 1986–96 to 1.3 million a year (Gawel 1998). This growth has led to the creation of additional employment, increased flow of foreign exchange and improvement of infrastructure in

resort areas. This increase in the service sector reflects the growth in government employment, trading activities and tourism.

Opportunities for economic development inevitably vary, partly reflecting differences in resource endowment, but some common themes emerge. All PICs command extensive ocean areas in their exclusive economic zones: over 500 000 km<sup>2</sup> in all but six cases and over 3 million km<sup>2</sup> in four instances. These vast areas are rich in fishing potential, which is not yet fully exploited but requires appropriate management and monitoring. Economically exploitable offshore petroleum deposits have been found in at least two cases, and other seabed minerals may prove valuable. Tourism has proved to be a viable way to provide employment, earn foreign exchange and preserve environmental values in several countries, and opportunities appear promising for further, sustainable exploitation of beaches, reefs, culture, climate, history and similar assets. Light industry (PNG, New Caledonia, Fiji, Samoa, Vanuatu) is also a growing source of employment in a few of the larger countries that have chosen to encourage it, despite the initial handicaps of

distance, poor transport services and small local markets.

For the period 1981–88 (World Bank 1995b), the average annual rate of growth of gross domestic product (GDP) was: Fiji 0.9 per cent; Kiribati 1.3 per cent; Solomon Islands 1.8 per cent; Tonga 1.4 per cent; Vanuatu 3.0 per cent; and Samoa 0.4 per cent. The annual rates of GDP growth in the Pacific are generally well below the average population growth rate of PICs (2.2 per cent), which indicates that GDP per capita has tended to decline during this period, suggesting increased poverty levels in the region. This is consistent with recent studies which point to a general decline in the standard of living (ESCAP 1999).

Poverty is an emerging issue in a number of PICs. Urbanization and the shift to a monetary economy are part of the problem, particularly in the resource-poor countries, accompanied by the threat to viable subsistence lifestyles and the rapid depletion of natural resources through over-exploitation. This should be understood and addressed against the background of traditional lifestyles and economic change. While conventional economic and social indicators demonstrate that a significant percentage of Pacific island populations are at poverty level, many communities still enjoy a high degree of subsistence affluence obtained from traditional resource management systems. For many of the people, health and general social indicators, not purely economic ones, tell the real story.

## Land

### Developments over the past 100 years

Most islands in the region have not been associated historically with the type of land degradation experienced in more populous areas of the world and in more marginal habitats. However, there is evidence that local land degradation problems did occur on some islands when population densities exceeded local resource carrying capacities, or where destructive land-clearing activities were used. Examples include the fernlands of Viti Levu in Fiji, and Wallis and Futuna, where excessive burning of land for agriculture has denuded soils to the extent that only ferns will grow (Nunn 1994). Population densities in the past, however, rarely reached the level at which widespread land degradation resulted.

Activities in the latter part of the last century have also led to the radioactive and chemical contamination of land. Notably, the Solomon Islands and Guam have expressed concern over the military materials (especially

from World War Two) remaining in their respective countries, and the risk of hazardous, polluting and explosive chemicals to people and the environment. Similarly, military nuclear testing has made some islands in the Marshalls permanently uninhabitable.

### Developments over the past 10 years

In recent years, land degradation has emerged as a serious problem in many PICs. In 1992, land degradation was listed as a problem by some 75 per cent of the countries in the region (ADB 1992). The responses suggested that rural land away from the coast was less of a problem than coastal land, which is everywhere under mounting pressures. Issues relating to land use overall, such as lack of clarity over title and customary rights, were also reported. Although some countries have introduced procedures to ensure that environmental constraints are considered when land-use decisions are taken, the problem is now affecting more countries, and also extending further into rural areas than at the beginning of the decade.

Few data are available at the national and regional level on the extent of land degradation, although recent studies on sedimentation and coastal erosion have been undertaken by the South Pacific Applied Geoscience Commission (SOPAC) (1998). According to the Global Assessment of Soil Degradation (GLASOD), the total area of degraded soil in the Pacific (including Australia and New Zealand) is around 103 million ha (UNEP/ISRIC 1991). Causes of land degradation in the Pacific have been estimated as: 80 per cent by overgrazing, 12 per cent by deforestation and 8 per cent by agriculture (ESCAP 1995). For small island countries the impacts of overgrazing are expected to be less significant. Most degraded land has resulted from water and wind erosion. The costs of erosion are hard to quantify in monetary terms although calculations have been attempted. For example, Fiji has estimated that the on-site cost from ginger farming was US\$0.4–1.2 million each year due to the loss of 27 000–81 000 tonnes of soil (ESCAP 1995).

For most Pacific societies, land resources are the basis for the majority of subsistence and commercial production. High population growth rates and the displacement of traditional land management systems by introduced agricultural systems, mining and forest utilization have placed serious stress on land resources and the communities that depend on them. Such trends are particularly serious on smaller islands, especially atolls with limited land, poor soils and few other land

resources. Land degradation is most evident where populations and economic activity are concentrated together, particularly around towns, and where resources such as timber and minerals are being overexploited. Demand on resources has risen not simply because there are more people, but also because their individual requirements have increased. In the agricultural sector, deforestation, accelerated soil erosion and the use of marginal lands for farming are the result not only of a growing population but also of inappropriate land use.

Traditional farming practices (swidden, forest-fallow) do not appear as yet to add to land requirements but the move to cash cropping has posed some problems. Village cash cropping is carried out in the same land use and tenure context as subsistence production but the land requirements for larger plantation ventures compete with those currently or potentially required for the expansion of food production. Land pressure is greatest where there is little or no room for expansion and population continues to increase rapidly. The effect of land pressure on such islands is to force development of some of the land traditionally retained for other purposes or to require crop production to expand into marginal land, which is more susceptible to soil erosion or has lower natural fertility levels. Soil erosion is a problem in some areas under both agroforestry and tillage systems, but is sometimes overestimated.

In countries such as Fiji and Samoa, where the availability of good arable land is already constrained, the agricultural systems have already passed to the expansion phase and subsistence gardening is being moved to increasingly marginal soil types and slopes. In other countries, such as PNG and Solomon Islands, where only a small proportion of land is currently used for agriculture, increased production comes mostly from intensively cropping within areas already in production. Such intensification results in land degradation under current farming systems, representing a major long-term environmental issue in the region.

Land resource development has focused on market-oriented cash cropping. Transnational corporations have been involved in capital-intensive developments such as logging, mining and plantation development. Urban infrastructure also contributes to land degradation, as experienced in Guam, where major road building on steep slopes has caused erosion and resulting sedimentation has killed coral colonies on fringing reefs (GEPA 1998). The clearance and construction associated with such activities results largely in localized environmental damage. Increased soil erosion

and compaction, loss of ecosystems and food security, and sedimentation of water systems are just some of the impacts of current land resource development in the region.

Onshore activities such as mining or deforestation can increase the sediment load of rivers, and in some countries the effects on the reef system have been extensive (for example, Smith 1993). On Upolu Island in Samoa, for instance, recorded declines in inshore fish catches have been linked to sedimentation of reefs as a result of deforestation and agricultural activities in watersheds (Zann 1992).

### Trends forecast to 2010

Agencies in the region have given a great deal of attention in recent years to the potential future threats related to global climate change and sea-level rise. Threats include the possible impacts on land stability, again with special emphasis on the coastal zone (SPREP 1993a, 1997a; SOPAC 1997). The effect of extreme events such as cyclones and storm surges can be devastating, and many human activities (such as beach mining) increase the threat. This will be an important future issue in all countries of the region – even without sea level rise.

Increased frequency of droughts may exacerbate land degradation in the future. PNG, Federated States of Micronesia (FSM), Marshall Islands and Fiji, in particular, suffered from the intensity of the 1997–98 El Niño event. Prolonged drought led to severe depletion of crop yields and, in some cases, famine. A recurrence of such events would bring the additional threat of serious erosion and loss of cultivable land. Recently established land-use patterns, including the production of crops such as sugar on an industrial scale, will have to be reviewed so that the impacts of recurrent drought can be mitigated. The influence of economic reform and development initiatives, specifically trade liberalization, is also expected to influence the type of land use.

As women are significant users of land and coastal resources and tend to take major responsibility for family health, their input should be sought specifically on land degradation issues and they will need to be equally involved in decision-making and training (as trainers and recipients) regarding waste management and land use (SPREP 1992; Forum Secretariat 1999a). The resolution of sustainable land management must deal with communal tenure systems, traditional land use practices and cultural values, and the integration of environmental and development decision-making. The importance of

local knowledge and management systems has been strongly stated by PIDCs and research that focuses on indigenous knowledge and natural resource management practices is received with growing enthusiasm in the Pacific.

### Conclusion

The extremely limited and vulnerable land resource base of most PICs means that the sustainable management of land will become an increasingly important issue in the region. In a 1992 survey, some 75 per cent of the region's countries mentioned degradation of land, in particular coastal land, as a major environmental concern.

High population growth rates, increased individual requirements for land, the displacement of traditional land management systems by new agricultural systems, mining and forest utilization have all placed serious stress on land resources and the communities that depend on them. Where good arable land is in short supply, as in Fiji and Samoa, subsistence gardening has been forced into increasingly marginal areas. Where only a small proportion of land is used for farming, as in PNG and Solomon Islands, there is intensive production within existing farmed areas.

The potential threat to the productivity of land resources posed by global climate change is expected to heighten further the need for sustainable land management in the years to come.

The fact that very few PICs have developed land-use policies and that even fewer countries are effectively implementing such policies is of considerable concern. It is essential that efforts to develop and implement sustainable land management policies are given the priority that the issue deserves.

## Forests

### Developments over the past 100 years

Forests are of ecological, social, cultural and commercial importance. In most PICs deforestation was not a serious issue until relatively recently. It is believed that prior to European contact, inhabitants on most islands did not cause substantial deforestation or forest degradation since populations were relatively small, commercial activities were absent and steel tools were unknown. However, following European colonization in the mid- to late 1800s, deforestation and forest degradation accelerated rapidly on most islands. Coastal and lowland forests were converted to large-

scale commercial coconut, cocoa and banana plantations on many islands, and this process was facilitated by the introduction of new technologies such as steel tools and mechanized transport. Forest conversion has accelerated in recent decades as populations have increased, as more efficient methods and tools for removing forest, such as chain saws, have become more widely available, and as commercial imperatives, such as timber logging and the development of commercial agriculture, have become more important.

Although some countries have increasingly effective systems of forestry reserves, conservation areas and/or national parks to protect their forests for science and humanity, few, if any, have legislation or institutionalized programmes prohibiting the cutting or promoting the replanting, on a significant scale, of endangered tree species. This is threatening the local and regional biodiversity which constitutes the economic and cultural backbone of many Pacific peoples.

### Developments over the past 10 years

Few data are available to show exactly how serious the loss of intact forest has been since the Asian Development Bank (ADB) report in 1992. However, in some countries of the region, such as Samoa, rates of deforestation in recent years have approached 2 per cent per annum (GOWS 1994; Martel in prep.), faster than the estimated rate at which tropical forests are being cleared in the world (0.8 per cent per annum 1980–90) and in tropical Asia (1.2 per cent per annum (FAO 1998)). In the FSM, aerial photography of Pohnpei taken in November 1995 showed that only 15 per cent of the land was under undisturbed forest, compared to 42 per cent in 1976 (FSM Country Report 1996).

The percentage of forest cover in some Pacific island countries is shown in Figure 1.2.

The development of non-wood forest products (NWFPs) as an alternative income-generating activity (to timber) is being given more attention, especially through the initiatives of a number of Non-Governmental Organizations (NGOs). Among the NWFPs and activities being promoted are forest tree nuts (e.g. Ngali nuts), traditional medicinal plants, bee-keeping, *Morinda citrifolia* juice and leaves and butterfly farming.

Forest and tree cover is diminishing in PICs due to a combination of population pressures, loss of traditional controls, shifting cultivation under population pressure, pasture development, mining and logging activities. Much publicity has been given to the increasing impact of logging operations in recent years, particularly in PNG

and Solomon Islands. Pressure on forests from logging operations is also an issue in Vanuatu, Fiji, Niue, Samoa and Tonga.

The loss of forest as a result of agro-deforestation is also an issue in those countries with substantial population densities, e.g. Cook Islands, Federated States of Micronesia (FSM), Kiribati, Marshall Islands, Niue, Tokelau, Tonga, Tuvalu and Samoa. Significant areas of forest are lost annually to fire, caused either by natural events or by humans, in several countries, e.g. Fiji, Cook Islands, Guam. The use of fire to clear land for agriculture is thought to have been responsible for the destruction of large tracts of forest and agricultural plantations during a severe drought in Samoa in 1998. Similarly, FSM has in recent years experienced increased human-caused wildfires, destroying more forest areas than either land clearing or timber extraction.

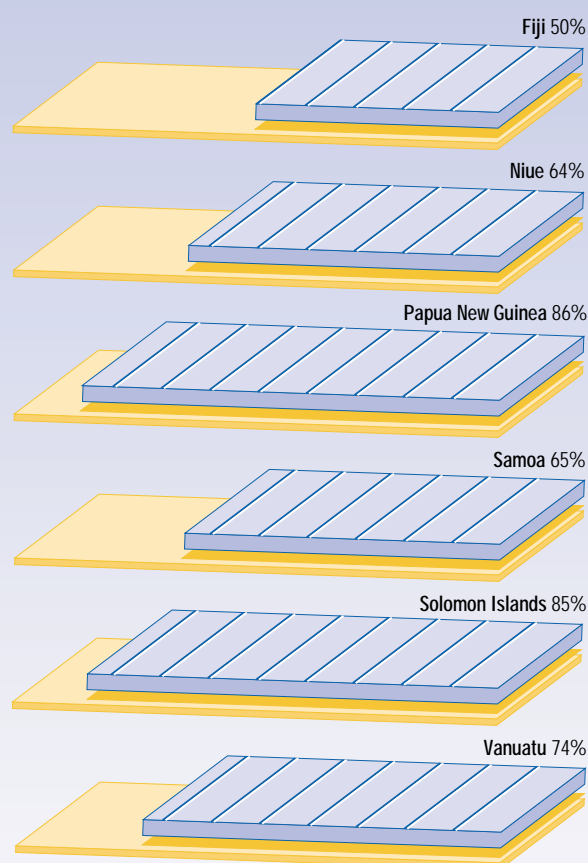
The main direct cause of forest loss world-wide is clearing for permanent or shifting agriculture (FAO 1997). Studies (e.g. GOWS 1994) have shown that most deforestation in Samoa is a result of agricultural activity rather than commercial timber extraction. However, it should be borne in mind that logging operations frequently have severe adverse impacts on soil conservation and productivity, as well as water flow and quality. The effective implementation of the Codes of Logging Practice developed in Fiji, PNG, Vanuatu and Solomon Islands should go a long way in reducing these adverse impacts.

Although it is known that the Pacific is facing rapid deforestation and forest degradation, data on the actual rate and extent of loss and degradation at the national level are limited. In the early to mid-1990s, national forest inventories were taken in Fiji, Solomon Islands and Vanuatu, while PNG carried out a rapid resource appraisal, and Samoa made an assessment of its forest resources. In PNG, Solomon Islands and Vanuatu the forest resource information has been combined with other information systems (e.g. PNG Resource Information System, or PNGRIS) to improve the capability of land-use planning. In Vanuatu a review of forest types using satellite imagery was completed in 1988 by the Land Use Planning Office, which is currently in the process of calculating land-use changes since the 1990 forest resource inventory. As part of their efforts towards sustainable forest use and management, all the four larger countries, i.e. Fiji, PNG, Solomon Islands and Vanuatu, have developed national codes of logging practice and are in varying stages of implementing them.

Fiji and PNG have prepared and implemented national forestry action programmes, whilst Vanuatu, Solomon Islands and Tonga's efforts in this direction have been hampered by financial and other considerations. Since the 1950s and 1960s, Fiji has been systematically developing over 50 000 ha of hardwood, mostly mahogany (*Swietenia* spp.), and another 50 000 ha of *Pinus caribaea* plantations, whilst at the same time keeping its annual logging rate below the calculated allowable annual cut. In 1997, about 152 000 m<sup>3</sup> of saw logs were produced from natural forests, whilst another 112 500 m<sup>3</sup> were produced from pine plantations. When log production from the mahogany plantations begins, in the near future, plantations will be the major source of Fiji's timber, and the pressure on natural forests for timber production will be significantly reduced. Much greater efforts are now being made to rely on natural regeneration to renew the forests after logging.

Forests and cleared land are used by both men and women for: crop gardens; fuel wood collection; gathering

Figure 1.2: Forest cover (per cent of total land area) in some PICs



Source: Country reports at 1998 Heads of Forestry Meeting (PIF and TSP Field Document, in preparation)



### Box 1.1: Logging in Solomon Islands

Deforestation and forest degradation in Solomon Islands provide a good example of a failure adequately to consider the environmental and social costs of logging. Logging for export started in 1961, and has accelerated over the past few years. Half the viable (non-steep-sloped) resource has now been logged, with extraction rates having almost doubled between 1991 and 1992. At current rates, harvesting cannot be sustained for more than eight years and the cessation of logging is likely to produce a significant drop in national income and output. A recent economic assessment by the ADB estimates sustainable annual yields at 270 000 m<sup>3</sup>, yet logging licences have been granted for up to 1.4 million m<sup>3</sup> per annum. Reforestation or regeneration of the forests will take 30–40 years in those areas that have been carefully logged. There has been widespread damage to the residual forests and forest site productivity, with the result that reforestation or regeneration may take anything from 45 to 200 years. Significant under-reporting of volumes and values has eroded the returns to Solomon Islands in the form of royalties and export tax. No significant environmental analysis has been used as an input into decisions on logging in Solomon Islands, despite available evidence from other parts of the world which indicate that the costs, in similar circumstances, can be substantial.

*Source: UNDP (1994)*

medicinal and food plants; capturing animals for food, and sometimes for textile production. Loss of forest habitat reduces the availability of medicinal plants and gathered foodstuff, negatively affects wildlife, and can have a negative impact on family nutrition, with the result that women are faced with more health care responsibilities. When forests are logged and land is allowed to degrade, subsistence gardens must be moved further from villages, and fuel wood must be carried longer distances. This significantly increases women's work loads and can have a negative impact on women's health and their ability to meet family and community responsibilities. Additional social problems can result from medium- and large-scale forest development, including breakdowns of traditional systems of social sanctions and, as men gain income, an increase in alcohol consumption (which is often linked to an increase in violence against women). Deforestation and forest degradation are also known to be associated with increased flash floods and low flows of rivers and streams.

### Trends forecast to 2010

Since the commercial extraction of logs has been largely driven by offshore demand, particularly in the expanding Asian economies, it is of some interest to see how the economic downturn in that region will affect the rate of timber extraction. Anecdotal evidence suggests that in PNG some operators have faded from the scene, whilst (legal) operations were assisted in

that country and in the Solomon Islands when their currency was devalued to offset the impact of the economic difficulties in south-east Asia.

In the larger island countries, particularly in PNG, Solomon Islands and Vanuatu, efforts to reduce the rate of logging to more sustainable levels, to implement the codes of logging practice, and to develop and implement other sustainable forest management measures (e.g. criteria and indicators, forest certification) are expected to continue. The success of these measures will be affected by continuing pressure on these governments to maintain a relatively high (and unsustainable) rate of logging in order to generate revenues needed for development and other programmes. Fiji will soon be ready to begin harvesting its mahogany plantations, and also to play a role in the on-going global efforts to demonstrate that sustainable forest management policies and practices can be developed and implemented.

In the smaller island countries, it is likely that people's awareness of the role of forests and trees in sustaining, and improving, the livelihoods of communities will increase, and greater efforts will be made to protect and enhance the remaining forest and tree resources.

### Conclusion

Forests and trees throughout the Pacific region are being removed or degraded at an unsustainable rate. In some countries (such as Samoa), merchantable timber resources are forecast to run out before the end of this decade (GOWS 1994). In most countries, the rate of deforestation and forest degradation far outstrips the rate of reforestation, which has until recently focused primarily on plantation establishment. Greater emphasis should be placed on: reducing the rate of logging or tree cover removal to sustainable levels; the effective implementation of codes of logging practice and reduced impact harvesting techniques to reduce the adverse impacts of logging on social, environmental and biodiversity elements; and increased use of natural regeneration to provide the next forest crop. Greater emphasis should also be placed on the sustainable harvesting and development of NWFPs (e.g. food, medicines, clean water, biodiversity of flora and fauna) and services (e.g. coastal protection, habitat for wildlife, reduction of soil erosion, regulation of water flow and quality). Given the critical importance of forests and trees to the region – socially, economically and ecologically – it is imperative that the effective

implementation of appropriate policies and practices for the sustainable use, management and development of forest and tree resources be a high priority policy issue for PICs.

## Biodiversity

### Developments over the past 100 years

The Pacific region is one of the world's centres of biological diversity, or species richness. The western Pacific has the highest marine diversity in the world. Up to 3 000 species may be found on a single reef (SPREP 1993b). The region has the most extensive coral reef system in the world. The many thousands of islands are surrounded by a rich complex of coastal ecosystems, including mangroves, seagrass beds and estuarine lagoons. The evolution of island biogeography has led to a high endemism in terrestrial species, particularly on larger islands, which can also have a high biological diversity. The estimated extent of biological diversity however, is not conclusive for either marine or terrestrial systems because detailed biological inventories are lacking. It has been estimated that only 10 per cent of tropical species have been described (SPREP 1992).

The early human colonization of the Pacific islands resulted in radical changes to the biodiversity of the region. Pressure was put on native ecosystems and biodiversity as a result of the conversion of forests to settlements or agricultural land, the exploitation of forest and lagoon resources and the introduction of alien species. There is evidence that a number of bird and other animal species were hunted to extinction by the early Pacific islanders (Steadman 1995). This work shows that the early settlers to the region had a profound effect on biodiversity even with relatively low population densities and the lack of advanced resource-harvesting technologies. The threats to biodiversity have, however, become a more serious issue since European colonization and the introduction of new and efficient technologies and exploitative, commercial values. In the past century, as populations have grown, as resource extraction technologies have continued to advance, and as commercial values have become more widespread, the threats to native biodiversity have increased enormously (SPREP 1993b).

### Developments over the past 10 years

Between 1982 and 1991, the proportion of countries reporting biodiversity loss as a serious problem rose

from 67 to 75 per cent (ADB 1992). The reasons for this increase have been extensively documented in studies prepared for the South Pacific Biodiversity Conservation Programme (SPBCP; e.g. SPREP 1994). Despite having the world's highest proportion of endemic species per unit of land area or number of human inhabitants, the biological diversity of the Pacific islands is among the most critically threatened in the world. A review by the SPBCP cited birds as 'an outstanding example of depletion resulting from the impact of human actions on Pacific island environments' (Given 1992). Eight species of native forest birds were lost in the 1980s due to predation by the brown tree snake, accidentally introduced to Guam from Solomon Islands. Captive breeding programmes have prevented the extinction of two more (Savage 1987).







World-wide, the largest number of documented extinctions (28 between 1600 and 1899) has occurred on the islands of Oceania, which now have more threatened species (110) than any other region (Given 1992). Dahl (1984) estimated that there are roughly seven times more endangered bird species per capita in the South Pacific than in the Caribbean, fifty times more than in South America, and a hundred times more than in North America or Africa.

An overall estimate of species loss in the region cannot be provided due to inconclusive biological inventories. However, it is clear from the information from Solomon Islands alone that earlier estimates are likely to be conservative. As stated earlier in this report, there is a general paucity of data but 'spot' research/survey activity produces a reasonable quality of data in a given time frame. For example, in Solomon Islands 102 forms of birds (mostly at subspecies level) have been considered rare (Leary 1993). Table 1.2 provides an approximate idea of the biodiversity losses in Solomon Islands.

The PICs (especially the smaller islands) are ecologically fragile. Effective conservation at any level is jeopardized by the introduction of exotic plant and animal species, unsustainable development and natural disasters, which can make large and rapid changes to biodiversity in islands. It is widely believed that the uncontrolled introduction of exotic pests has been responsible for great loss of biological diversity, although the extent is not known.

People living in the region rely heavily on biological resources for their economic, social and cultural well-being. This includes the use of natural resources for food, artisanal and medicinal purposes, further

**Table 1.2: Solomon Islands – estimated species loss**

Species		Number	Loss
Birds		173	9
Mammals		52	24
Reptiles		54	5
Frogs		17	4
Invertebrates		130 (est.)	4
Vascular plants		1 077 (est.)	Not known

Source: State of the Environment Report for Solomon Islands (1993)

demonstrating affinity with the natural environment. The culture of all island societies is inextricably linked to the diversity of living species that characterizes the different island environments. The depletion of genetic variety, particularly in native food plant species, is another major concern in terms of biodiversity loss as these are replaced with fewer varieties of high-yield crops. The Pacific countries have a rich genetic heritage of food plants. In PNG, for example, there are an estimated 5 000 kinds of sweet potato, more than 30 root and staple crops, 21 legume bean species, 40 leafy green vegetables, 102 fruits and 89 minor food and flavouring species. In the quest for commercial export agriculture, many of these important genetic stocks are being neglected (ESCAP 1995).

Loss of species, ecosystems and biodiversity is an important issue in the Pacific, as many species are endemic and, if lost from one island, they may disappear entirely. The pressures on biodiversity in the region are therefore a result of a number of causes that have already been touched on. They include large-scale forest logging, commercial agriculture, associated land clearing, and fires. Increasing human populations have meant an intensification of shifting cultivation in many countries and the depletion of marginal forest lands and other habitats. Mining has occurred on a large scale in some countries, where whole ecosystems have been destroyed (e.g. Nauru). In the marine sector, overfishing and destructive practices (including dynamiting) in coastal areas have destroyed and degraded reefs and lagoon areas of many PICs.

These activities are exacerbated by the misconception that nature will take care of itself and that

natural resources are there for humans to use at will. The lack of understanding of the potential impact of poorly planned development and overexploitation of natural resources has made these problems widespread and in some countries urgent. Pacific island culture, which is closely bound to the diversity of the natural environment, is also being eroded in many places as people aspire to materialistic lifestyles and 'better standards of living'.

### Trends forecast to 2010

Endemic species can be lost in the space of a few months through the destruction of critical habitat or through the introduction of predators, insect pests and diseases. The loss of any habitat on a high island is likely to mean the extinction of species of plants or animals. Given current trends in land degradation, the overexploitation of nearshore marine resources, and population growth, the high rates of extinctions experienced in PICs can be expected to continue.

To offset this trend, recognition of the significance and value of biological diversity is growing within the region. The recent economic valuation of ecosystems carried out in Fiji as part of its Biodiversity Strategy and Action Plan provides further support for appropriate action to conserve biological resources. The value of Fiji's ecosystem services is about FJ\$1 billion (US\$0.5 billion) per year, which strengthens the need to conserve ecosystems not only for the resources they contain but also for the services they provide to the people (Sisto 1998). A number of other Pacific countries, such as Samoa, Vanuatu and Solomon Islands are also currently undertaking similar biodiversity strategy and action plans to support their existing protected area systems.

The search for new genetic material of commercial value is expected to place increased pressure on the region's biodiversity. While this may not advance the rate of extinctions, it may have implications for the cultural and economic uses and management of biological resources in island countries.

### Conclusion

The Pacific region is one of the world's most biologically diverse regions: the western Pacific has the highest marine diversity on earth. The world's most extensive coral reef system is also in the region. A rich complex of coastal ecosystems, including mangroves, seagrass beds and estuarine lagoons surrounds the Pacific islands. There is a high level of endemism in terrestrial species, especially on larger islands.

The biological diversity of Pacific islands is among the most critically threatened in the world. Between 1982 and 1991 the proportion of states noting serious biodiversity loss rose from 67 to 75 per cent, according to an ADB survey. Islands of this region now have more threatened species (110) than any other.

Biodiversity in the region is pressurized by large-scale forest logging, commercial agriculture, associated land clearing, and fires. Population pressure has led to shifting cultivation being intensified and marginal forest lands and other habitats depleted. Large-scale mining in some countries (e.g. Nauru) has destroyed whole ecosystems. Land-based sources of marine pollution (for example eroded soils, pesticides, heavy metals, nitrates and chlorinated hydrocarbons) are considered to be one of the four greatest threats to marine biodiversity, along with habitat destruction/degradation (including dynamiting), overexploitation of living resources and invasive species.

As the economies of most PICs are still subsistence based, most Pacific islanders are dependent on local biological and other natural resources for survival. In the Pacific islands, biodiversity conservation is much more than an economic and an ecological issue, it is also a social and cultural one.

## Fresh water

### Developments over the past 100 years

Compared to most developed countries there are relatively few long-term data within the region on historical levels of water quality or quantity. As in other areas (such as Africa) there has been a post-colonial decline in the level and continuity of monitoring activity. Except in some urban areas, on most islands piped water supply systems and water storage systems such as water tanks and reservoirs are a very recent development. There is no doubt that occasional water shortages have historically been a problem throughout the Pacific, especially during drier than normal years. The most severe water shortages would have been experienced on the atolls and raised limestone islands, where there are no rivers and inhabitants must rely on the groundwater lens floating on top of the salt water. The ability of the smaller atolls to sustain an exploitable freshwater lens has determined whether these islands have been able to sustain permanent habitation or not. However, there has been this rather romantic notion that, throughout the coastal areas of Pacific islands, water supplies are supplemented by the ubiquitous coconut tree, which

provides drinking water when other water supplies are in poor supply or unavailable. These areas have never sustained populations of any size or for any length of time (SOPAC 1999).

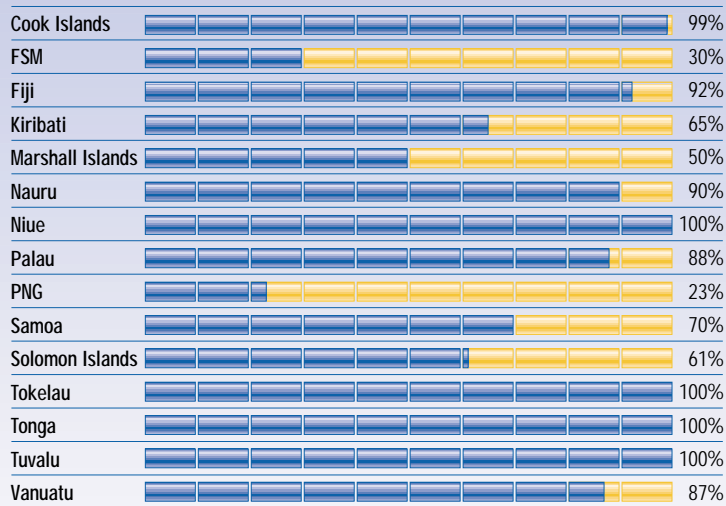
### Developments over the past 10 years

During the 1980s the UN Water Decade helped address a great many of the regional concerns in the water and sanitation sector. One resulting success was the instigation of a regional mechanism focusing on capacity building, sharing technology, co-ordination and avoidance of duplication of effort. At the end of the decade, regional and subregional reports, by WHO and UNDP in particular, provided the first comprehensive region-wide review and synthesis of the situation (UNDP 1996). Figure 1.3 gives an overview.

Water-related issues were also reported as a major problem in 1992 (Thistlethwaite and Votaw 1992), with two-thirds of SPREP members noting problems of supply/storage and an even higher number reporting groundwater pollution. More specifically PNG did not at that time register water shortage as a priority, but would now need to register the effects of recent drought. In Samoa there is concern about the excessively high consumption of water as a result of the inefficient use of water supplies and supply leakage. The region-wide drought in 1998 and the resulting water shortages have highlighted the urgency for Samoans and others to reduce water consumption. Detailed work has not yet been carried out on groundwater pollution levels but the statistics on waste flows (see Atmosphere section, below) show that the pressures are building up, especially in urban areas and on the atolls and low-lying islands. Waste disposal systems (both solid and liquid) are still generally inadequate in the Pacific islands and this problem is likely to continue to worsen as populations increase (Loerzel 1998a; SPREP 1999b).

Fresh water resources and their management give rise to many different problems in the region. In the high islands, despite high levels of total rainfall, water is sometimes not available where and when it is needed due to the seasonality of the rainfall. Localized pollution, excessive sedimentation due to uncontrolled watershed development and water wastage are common problems reported by Fiji, Samoa and Solomon Islands. In some atoll communities where water shortages may force people to use polluted groundwater for drinking and cooking, health problems such as diarrhoea and hepatitis are prevalent, with occasional outbreaks of typhoid, and, in Kiribati, Tuvalu and the Marshall Islands, even rare

Figure 1.3: Percentage of Pacific populations with access to safe water



Source: UNDP (1996)

occurrences of cholera. Often with poor waste disposal and inadequate well-head protection, groundwater is highly susceptible to contamination and water-borne organisms. Pumping from the freshwater lens needs to be carefully monitored and controlled in order to provide warning of impending saltwater intrusion and to test water quality for bacteria counts, chemical residues and total dissolved salts. In Wallis and Futuna, households on Futuna have free access to water but it is not treated, and disease is noted. By contrast, on Wallis, where households are paying for access to water that is treated and analysed on a regular three-month basis, no disease is noted (Goepfert 1998).

Water quality in the high islands is usually acceptable by WHO standards, although some problems occur in villages in flooded riverine and estuarine environments, where, though the water quality may be poor, it is still potable to the local populations. In Guam, groundwater provides over 75 per cent of water needs. Overuse or overpumping of this resource has resulted in increasing chloride concentrations as a result of saline intrusion, making it unfit for drinking. Further evidence of increasing anthropogenic contamination of Guam's aquifers is demonstrated by the increasing nitrate levels (GEPA 1998).

Pollution and enrichment of fresh water occurs to varying degrees throughout the region. It is difficult to give a precise assessment, as there are inadequate water quality data available. The lack of water resource data in most island countries often means that major development is implemented without knowledge of the

practical implications for the environment and the resource. Provision of expert water quality monitoring and analytical services is expensive and difficult for the widely separated islands of the Pacific.

The UNDP report (1996) on *The State of Human Settlements and Urbanization in the Pacific Islands* – prepared for the United Nations Conference on Human Settlements (Habitat II) – provides information on Pacific populations with access to safe water, as shown in Figure 1.3.

It should be noted that many of the data are derived from national population censuses, which, though among the most reliable of sources, are still largely interpretive. There are therefore certain problems in using some of the census data. Most importantly, differences in coverage rules, the scope of the censuses, definitions, and procedures for collecting and processing data all make it difficult to compare results. There are compound problems in the quality of data and their interpretation. For example, whilst a high percentage of people may have access to 'safe water', there is no indication of the reliability of supply of the water; nor do the data reflect the marked differences in access between rural and urban settlements; nor is there a universal definition of the term 'access'.

### Trends forecast to 2010

Current indications are that the future outcomes predicted by the World Bank (1995) study were reasonably accurate, namely that, for urban areas in Fiji, Solomon Islands and Samoa, service quality and environmental conditions for water supply would decline, with a corresponding increase in health risks and productivity losses. In Samoa concern over pollution of groundwater from inadequate waste disposal systems (domestic and commercial, liquid and solid waste) has led to plans for the development of a sewage disposal system for Apia, which will be the first such facility in the country.

Despite the optimistic statistics in the 1994 and 1996 UNDP reports, there continue to be shortages of water supply in many Pacific island countries. There is an obvious need to provide a secure continuous supply. The problem is more one of economics, health and hygiene, and overall water resource management, than just the alleviation of thirst. In particular there is a need to 'drought proof' many regions which are prone to seasonal and cyclical shortages of supply. More importantly, in the region there are many areas that have adequate quantities of water but of poor quality, leading to health problems.



Atolls suffer from minimal surface water storage and limited exploitable groundwater resources. Freshwater lenses are governed by the interaction of rainfall volume and periodicity, tidal fluctuations, seepage, hydraulic conductivity, and abstraction rates. Once the lens, which is in a dynamic state of equilibrium, is contaminated (by saltwater intrusion, for example), the delicate balance between fresh and salt water may take years to re-establish in certain situations. If the contamination is from a land-based source (pesticides or leachate, for example), the problem may persist much longer. There is a growing consensus that global warming may lead to increased energy in the hydrological cycle and consequent greater intensity and frequency of extreme events (drought and flood). This, together with sea-level rise and, on limited land masses, increasing population pressure on the carrying capacity, is likely to further exacerbate the problem.

In urban areas, fast-growing settlements without appropriate water supply and sanitation are not simply the inevitable result of rapid and uncontrolled population growth; they also suggest inadequate government investment in urban services as well as in the rural sectors. Urban centres have an increasingly high demand for water usage. In Tonga, demand for water has risen because of the higher standard of living and on Tongatapu it is estimated that potable water consumption increased almost tenfold over the 1970s–1980s, with the average daily consumption in Nuku'alofa now about 80 litres per person (Thistlethwaite, Sheppard and Prescott 1993). Tonga has highlighted the need for public education on conservation of water and promotes a roof water catchment and rainwater storage programme. Tonga has also embarked on a programme to reduce water loss in the reticulation system. In Guam, residential waste disposal by septic tank systems adds to nitrates in groundwater. Nitrates can reach unhealthy levels if urbanization is not served by central sewage treatment and disposal (Loerzel 1998b). In Fiji, though no data exist, there is a potential problem of diminishing groundwater and river water quality caused by the long-term use of fertilizers and pesticides in the many sugar cane farms. The impact on groundwater recharge and storage caused by the introduction of non-indigenous agriculture (pine forests, for example) is another activity whose impact has not been fully assessed.

Industrial use of water, though limited in the Pacific, may provide a bigger concern through the waste it generates rather than the quantity consumed. Beer making, soft drink manufacture, fish processing and

sugar refining are some of the larger users of water, as are activities associated with the tourism industry. Water is also used for hydroelectric power in some countries, such as Fiji, Samoa, PNG and Vanuatu, but this is not, in general, a competing or consumptive use. In some PICs there is a growing number of light industries and commercial agricultural practices, placing further demands on water supplies. In Fiji water bottling and hydroponics are two new users.

## Conclusion

Water and sanitation as foundations of economic growth, social development and, in some cases, basic survival are vital. The protection and conservation of the supply and quality of water is expected to become an increasingly important issue in the Pacific of the future, especially if global climate change results in increasing rainfall variability in the region. Population growth, urbanization and damage to water catchments as a result of rampant deforestation, inappropriate agricultural activities and inadequate waste disposal are all likely to have an increasing impact on water supplies throughout the region. Improvement in water resource management is fundamental and will require a co-ordinated effort across many sectors, including: improvements in watershed management; reductions in deforestation rates; raising public awareness of wise water use and management; controls over agricultural activities, and improvements in waste disposal, especially sewage disposal facilities.

In many of the PICs management of the resources that exist is a greater challenge than identifying new sources. A management structure or regime is often difficult to put in place when there is a policy vacuum, outdated legislation, insufficient budgetary provisions, an absence of technical capacity and the perennial problem of land ownership.

## Marine and coastal environment

### Developments over the past 100 years

There are very few data on the historical pressures on the marine and coastal environment in the Pacific. However, it should be noted that an extensive database for offshore fisheries in the Pacific has been developed over the past few decades. There is evidence that, since the vast majority of Pacific islanders (excluding PNG) live in the coastal zone, there was considerable pressure on coastal and marine resources, which occasionally led to resource shortages. Local shortages

of marine resources were perhaps partly responsible for the development of traditional fisheries protection strategies such as closed seasons and areas, gear restrictions, and restrictions on species that could be caught and who could catch them (Johannes 1982). However, in most cases the pressure on marine and coastal resources is not considered to have been a serious issue until relatively recently (Baines 1984).

### Developments over the past 10 years

As coastal areas are home to most of the region's population, and the entire populations of the smaller low-lying islands, changes in population density, combined with new technology and changing development priorities, have had a particular impact on coastal environments. Uses of the coastal zone, or activities that take place within it, may be aquatic or terrestrial in PICs and typically include the following:

- fishing;
- coastal shipping;
- port and harbour development;
- water-based recreation, such as diving and other tourism-related activities;
- coastal construction – building of houses, hotels, commercial and industrial premises;
- infrastructure development – building of roads, installation of power and water supplies;
- sewage treatment and disposal;
- rubbish dumping, discharge of factory effluent and other forms of waste disposal;
- coastal protection – construction of sea walls or other forms of shoreline stabilization;
- agriculture;
- logging;
- mining of various types, including petrochemical extraction;
- modification of watercourses (dams, etc.).

Imminent threats to marine and coastal resources resulting from these developments over the past ten years have been outlined in the Strategic Action Programme for International Waters in the Pacific Islands Region (SPREP 1999b). These include:

- nutrients derived from sewage, soil erosion and agricultural fertilizers; eutrophication;
- solid waste disposal, particularly in urban areas;
- sedimentation resulting from land clearance and increased erosion;

- physical alterations caused by destruction of fringing reefs, beaches, wetlands and mangroves for coastal development and by sand extraction;
- overexploitation of coastal food fisheries, particularly through destructive fishing methods.

Specifically, increasing urbanization, dredging and landfill have caused erosion and sedimentation of reefs, sewage discharge has reduced water quality, reef fish are starting to be overexploited due to fishing pressure, rubbish is being dumped along the foreshore and nesting sea turtles have been eliminated from the area (Bryant *et al.* 1998; SPREP 1996). Land reclamation and natural erosion as a result of wave action is also regarded as an imminent threat to the marine environment by Cook Islands, Samoa and American Samoa (SPREP 1998a). Marine invasive species have been identified as an issue in some ports and coastal habitats. There is also a need to address ship-sourced marine pollution in the region (SPREP 1998a). Whilst not a serious problem in PICs, it is a concern and the threat is likely to increase as trade and economies develop further. The role of transit shipping and foreign fishing fleets in this issue should be highlighted. It should be noted that imminent threats to international (deep) waters and offshore areas are encouraging the Pacific island countries to control and fully utilize their EEZs.

The coastal zone is extremely vulnerable and the irreversible nature of many impacts (such as the destruction of seagrasses, mangroves and reef habitats) make it an ideal indicator of the state of the environment in the Pacific. The information gaps are, however, once again serious, as illustrated by the international waters document (SPREP 1997a), which lists across three pages topics for which data are non-existent or seriously deficient.

Whilst land-based and coastal zone environmental issues are a recognized priority in the region, it is also important to appreciate the significance of the oceanic environment. By far the greatest area in the western and central Pacific is deep ocean. This supports, amongst other things, the world's largest tuna fishery, which, with the exception of one species (Bigeye), is in relatively good health. Clearly fisheries resources represent a major focus for long-term economic development in the region. This has the capacity to finance consolidated revenue, with flow-on benefits for environmental areas not currently receiving attention. The challenge facing the region in terms of the oceanic environment is to

ensure that the problems of overcapacity and overexploitation (which have had severe economic and biological consequences world-wide) are not repeated in the region.

The implications for PIDCs' development in relation to reefs, inshore and offshore fisheries over the last ten years are highlighted below.

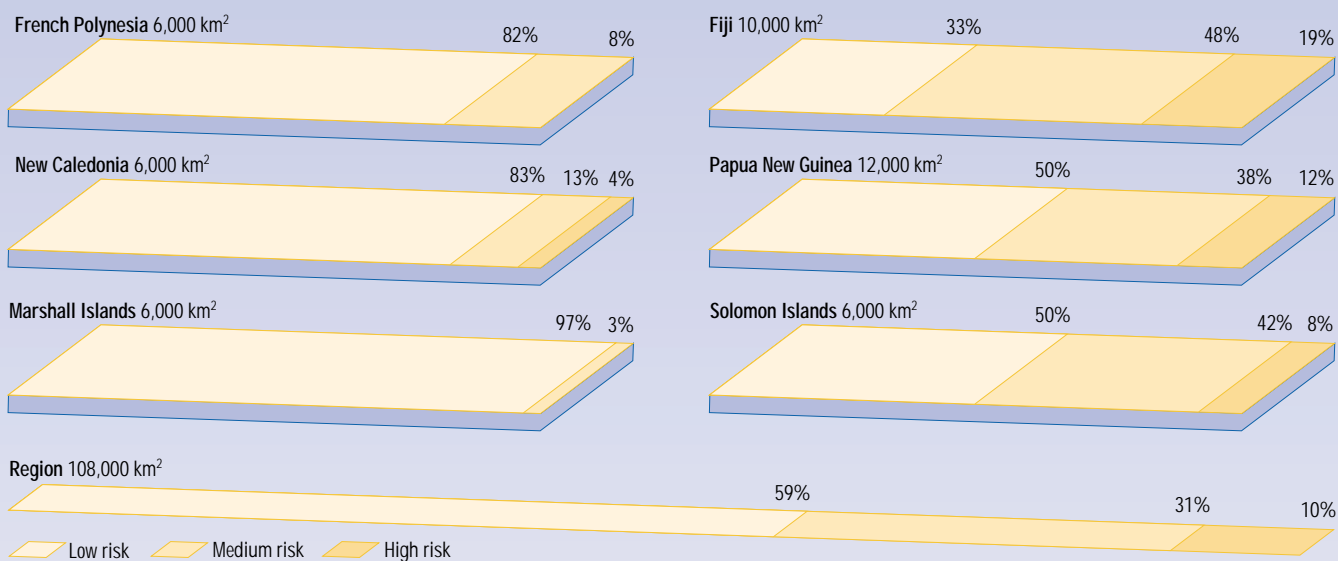
**Reefs**

Coral reefs are among the most biologically diverse ecosystems on the planet, and some living coral reefs may be as much as 2.5 million years old. Yet, in the last

few decades, many of these ecosystems have been destroyed by human activities (Bryant *et al.* 1998).

Species diversity for corals generally declines west to east across the Pacific. Most of the reefs support an exceptional diversity of fish, marine invertebrates and corals. During World War II, hundreds of vessels and a vast load of armaments were deposited on these reef systems, and during the past half century these war relics have been colonized by fish, sponges, soft corals and seaweed, attracting divers and fish. However, on Chuuk in FSM, people have removed explosives from munitions dumps to use for stunning and killing fish.

Figure 1.4: Reefs at risk by region and country



Source: Bryant *et al.* 1998

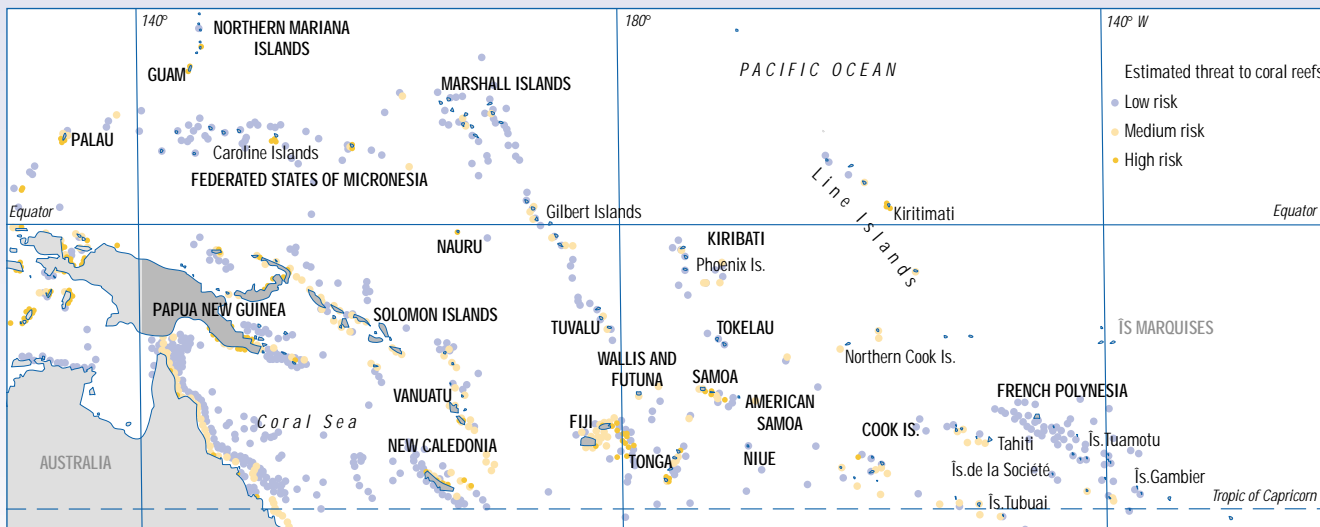
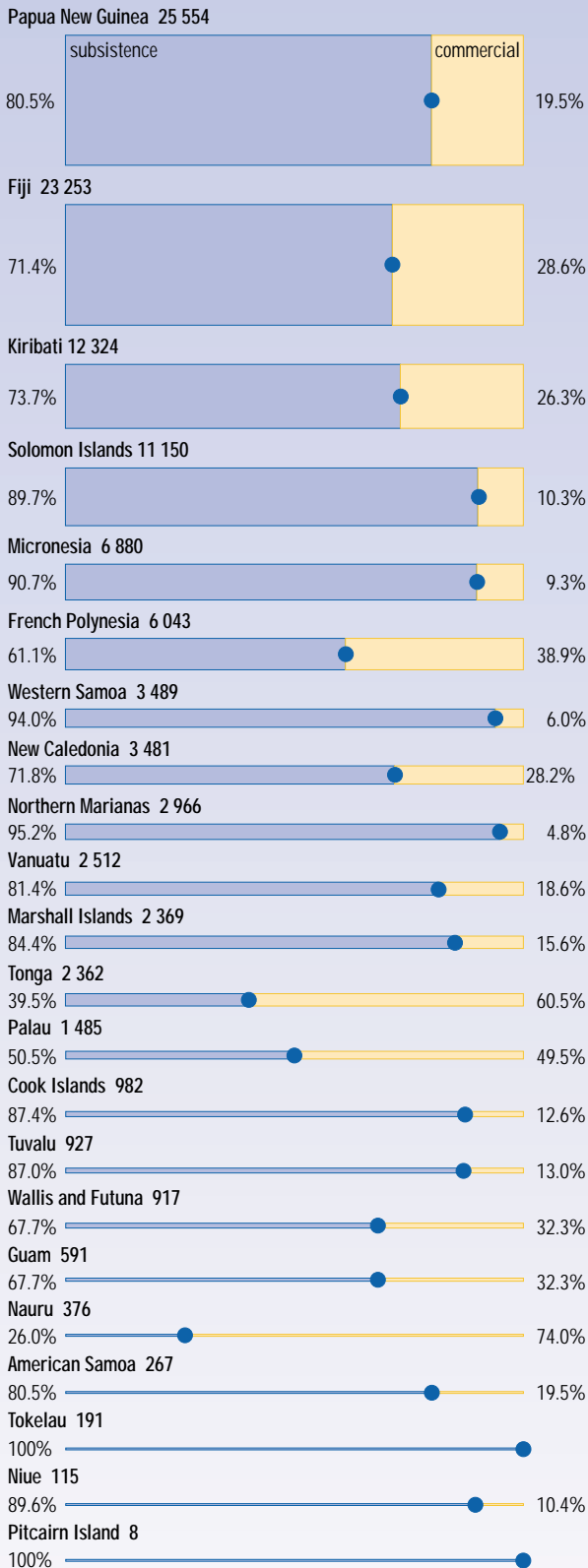


Figure 1.5: Coastal fisheries production in PICs (tonnes/year, est. total)



Source: Dalzell and Adams (1994)

According to a 1994 survey, blasting has now killed 10 per cent of the reefs in the lagoon (Bryant *et al.* 1998).

Fifty-nine per cent of the reefs in the Pacific have been assessed as being at low risk, 31 per cent as being at medium risk and 10 per cent as being at high risk (Bryant *et al.* 1998). Assessment criteria included proximity to coastal development, marine pollution, overexploitation, destructive fishing, and inland pollution and erosion (Bryant *et al.* 1998). Risk statistics for selected countries, and reef distribution are shown in Figure 1.4.

### Coastal fisheries

The importance of subsistence fisheries (Figure 1.5) is underlined by data (World Bank 1995b) indicating that 83 per cent of coastal households of Solomon Islands, 35 per cent of rural households in Vanuatu, 50 per cent of rural households in Samoa, 87 per cent of all households in the Marshall Islands and 99 per cent of all households in Kiribati carry out fishing, primarily for home consumption. A World Bank report (1999) on coastal management in the Pacific has revealed that overfishing poses a major threat to many PICs. The report found that the most serious threats were overharvesting, pollution, garbage, logging and mining. Destructive fishing practices such as dynamiting and fish poisoning were also major problems. In order for the catches to recover, it is important to control harvesting and allow the resources to reproduce. It was also recognized that many communities had limited capacity to control their own fishing practices and pollution sources.

### Oceanic fisheries

The commercial exploitation of marine resources is dominated for the most part by high-technology operations for harvesting highly migratory tuna. Harvesting of these resources (Table 1.3) is at present predominately undertaken by the fishing fleets of distant-water fishing nations, although it involves national tuna fisheries for both local consumption and export. Economic returns to Pacific island resource owners, such as fishing access fees, represent an insignificant proportion of an industry valued at approximately US\$1.7 billion (Preston 1997). In the absence of potential domestic tuna industry development, for some PICs access fees remain the only economic return option. The sustainable management of such an important fisheries resource is the underlying motivation for the current negotiation

process to establish a regional fisheries management regime in the western and central Pacific Ocean. The continued rational exploitation of the pelagic fishery is vital to the improved economic performance of many Pacific islands.

The size of the regional tuna fishery has been increasing steadily over the past two decades, as shown in Table 1.3. The total catch rose to a high of over 1 million tonnes in 1991 and has stayed slightly below this level since then (Preston 1997).

### Trends forecast to 2010

Continued degradation of coastal and nearshore marine resources is expected to continue over the next decade unless the deficiencies in management are addressed. These include the need for mechanisms to integrate environmental concerns, for development planning and decision-making, and for achieving island-wide ecosystem awareness in Pacific island people (SPREP 1998c). Population growth and economic development in coastal areas are expected to continue to place pressure on wetlands and mangroves, generate land-based sources of pollution and increase subsistence and cash demand for living marine resources. The expansion of tourism is expected to contribute to these pressures.

From 1991 to 1996, total tourist arrivals to 13 member countries of the Tourism Council of the South Pacific increased by 17 per cent, from 693 500 to 811 395. Recent studies on global tourism trends predict that visitor volumes to the Pacific region as a whole will double over this decade, with corresponding benefits for Pacific island countries (SPREP 1996).

The expected continued growth in the tourism sector highlights the need for special attention to be paid to the relationship between environmental quality and the sustainability of tourism development – an issue that was identified by countries in the Barbados Plan of Action (SPREP/ESCAP 1996). The need for infrastructure to support growing populations and tourist demands is expected to place pressure on non-living marine resources. This will place further emphasis on improving or finding substitutes for beach mining, which has been particularly damaging in the low coralline islands, which have a critical shortage of suitable construction-grade sand and aggregate for infrastructure development.

Oceanic marine resources are expected to fare a little better. Given the healthy status of the tuna resources, catches could be expected to be maintained at similar levels until 2010. During the same period PICs expect to maintain policies of developing domestic tuna industries

as a means of increasing their share of the economic benefits from tuna exploitation. It might be expected, however, that any growth in the domestic fleet would displace distant-water vessels rather than adding vessels to the overall fleet.

With increased shipping, the opportunities for marine spills will grow steadily over the next decade. The impacts that may be associated with offshore exploration are not yet well understood, and the likelihood of exploration taking place in the next ten years is as yet unclear.

### Conclusions

Marine resources are the major source of protein for Pacific islanders, most of whom live in the coastal zone. In addition, the development of marine resources, including commercial fishing, represents almost the sole opportunity for substantial economic development, especially for the atoll states, such as Marshall Islands, Kiribati and Tuvalu.

Imminent threats to the marine environment include: nutrients derived from sewage, soil erosion and agricultural fertilizers; solid waste disposal; sedimentation; physical alterations caused by

**Table 1.3: Tuna catch by major species in the Secretariat of the Pacific Community statistical area**

Year	Catch (thousands of tonnes)				Total
	Skipjack	Yellowfin	Albacore	Bigeye	
1976	167.5	62.0	30.0	42.8	302.4
1977	200.2	73.6	35.9	41.1	350.8
1978	230.0	86.0	30.4	27.9	374.3
1979	186.4	82.7	25.4	39.1	333.7
1980	211.8	104.5	39.8	41.6	397.7
1981	254.6	110.2	31.1	28.2	424.2
1982	266.6	111.2	28.8	29.0	435.6
1983	426.1	141.3	20.2	26.5	614.1
1984	434.8	129.4	19.6	32.2	616.0
1985	367.3	124.6	27.3	40.5	559.6
1986	431.1	126.4	32.5	34.5	624.4
1987	406.9	183.2	23.7	40.7	654.5
1988	541.6	127.9	33.2	35.7	738.3
1989	531.3	181.2	47.5	34.2	794.2
1990	589.3	202.8	31.0	52.1	875.2
1991	759.1	229.3	24.6	36.7	1 049.6
1992	686.4	275.4	41.2	44.0	1 047.0
1993	535.8	284.3	34.3	49.4	903.8
1994	663.2	263.4	38.5	59.3	1 024.4
1995	666.8	215.8	38.3	37.3	958.2

Source: Lawson (1996)



destruction of fringing reefs, beaches, wetlands and mangroves for coastal development and by sand extraction; overexploitation of coastal food fisheries.

Increases in population density mostly impact coastal environments. Coastal development related impacts are of particular relevance in this zone, with increasing tourism and settlement numbers, and pressure for new developments as a means of economic growth. The rapidly growing urban populations are largely responsible for the destruction of mangroves and beach areas, the pollution of lagoons and harbours, the loss of some marine species and ecosystems, and the fouling of nearshore waters and reefs. There are also losses in the extraction of coral and other marine organisms, not only by tourists but also by commercial exporters.

The commercial exploitation of marine resources is for the most part dominated by high-technology operations for harvesting tuna by fishing fleets from outside the region, with comparatively small returns for Pacific island resource owners.

Increased demand for marine port facilities through the region’s participation in regional and global trade directly impacts on coastal environments and altered current flows can cause siltation and erosion in remote locations.

### Atmosphere

#### Developments over the past 100 years

There is little accurate information on air quality in the Pacific over the past 100 years. Localized air pollution has been associated with land clearance and cooking fires. Few industrial power sources other than diesel electric power generation existed before 1980 and no significant health effects have been recorded.

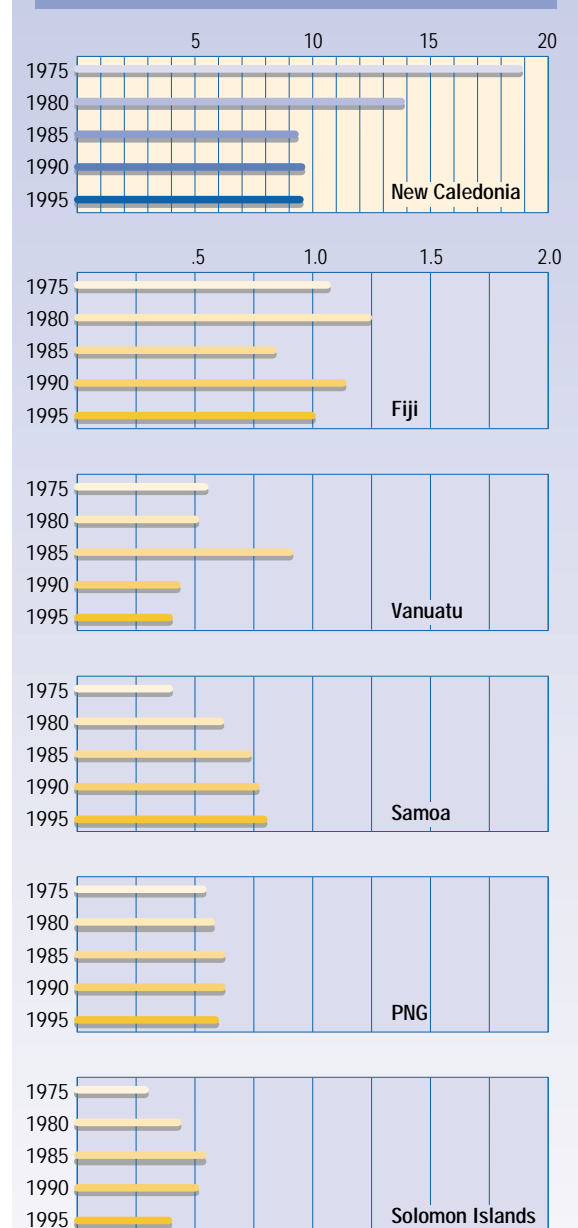
Globally, however, trends in the concentration of carbon dioxide and other greenhouse gases have increased significantly this century, along with a gradual warming of the atmosphere. Within the Pacific region this trend was identified as of particular concern due to the potential of rising sea levels and increased frequency of extreme weather events, such as cyclones, floods and droughts (SPREP 1989).

#### Developments over the past 10 years

Atmospheric pollution has not been perceived to be a problem in most PICs since most islands are generally not highly industrialized or urbanized (NEMS 1991–94; SPREP 1997b). However, in the larger urban areas, such as Suva, Port Moresby and Apia, there is increasing

concern over levels of local air pollution by vehicle exhausts, fires and industrial emissions (Figure 1.6). Few measures have been implemented to set pollution standards or to minimize pollution emissions. Although these localized concerns have not been identified as regional or global priorities for islands (SPREP 1997b; SPREP/ESCAP 1996), atmospheric pollution from industrial nations outside the region has continued to increase and with it associated global warming.

Figure 1.6: CO<sub>2</sub> emissions per capita for selected countries, 1975–95 (tonnes)



Source: Carbon Dioxide Information Analysis Center (CDIAC), 1995

The findings of the Intergovernmental Panel on Climate Change (IPCC) (Houghton *et al.* 1996) confirm that ‘the balance of evidence suggests a discernible human influence on global climate’ and that ‘more convincing recent evidence for the attribution of a human effect on climate is emerging...’, which is unlikely to be ‘a result of natural internal variability’ (Watson, Zinyowera and Moss 1998). This is of on-going and particular concern to Pacific island governments and peoples, most of whose lives are entirely coastal in nature (SPREP 1993a).

The three greatest anticipated consequences of any global warming are expected to be sea-level rise, an increase in climate-related natural disasters (storms, floods and droughts) and disruption to agriculture due to changes in temperature, rainfall and winds. The IPCC has noted that the ‘best estimate’ of sea-level rise from the present to the year 2100 is 50 cm, with a range for all scenarios of 15–95 cm by the end of the century.

In the Pacific, areas under threat have been identified as marine ecosystems, coastal systems, tourism, human settlement and infrastructure (IPCC 1998). There is growing evidence that the nature of impacts in this region is indicative of a changing climate. The region has lost atolls due to rising seas and has experienced more extreme events and weather, coupled with El Niño. The results have included water shortages and drought in

PNG, Marshall Islands, FSM, American Samoa, Samoa and Fiji, and floods in New Zealand. Data gathered by New Zealand’s National Institute of Water and Atmospheric Research (NIWA) also show a general change in the South Pacific climate from the mid-1970s:

- Kiribati, northern Cook Islands, Tokelau and northern parts of French Polynesia have become wetter;
- New Caledonia, Fiji and Tonga have become drier;
- Samoa, eastern Kiribati, Tokelau and northeast French Polynesia have become warmer and cloudier and the difference between daytime and night-time temperatures has decreased;
- New Caledonia, Fiji, Tonga, southern Cook Islands and southwest French Polynesia have become warmer and sunnier;
- Western Kiribati and Tuvalu have become sunnier.

Cyclones are a common feature, with some countries experiencing them almost each year. Table 1.4 shows the level of risk to PICs of natural disasters such as cyclones. With the likelihood that the frequency and intensity of weather extremes will increase global warming, the region’s ability to develop a strong productive base for sustainable development is jeopardized. Tokelau had had only three major storms since 1846 until two cyclones (Tusi and Ofa) struck in

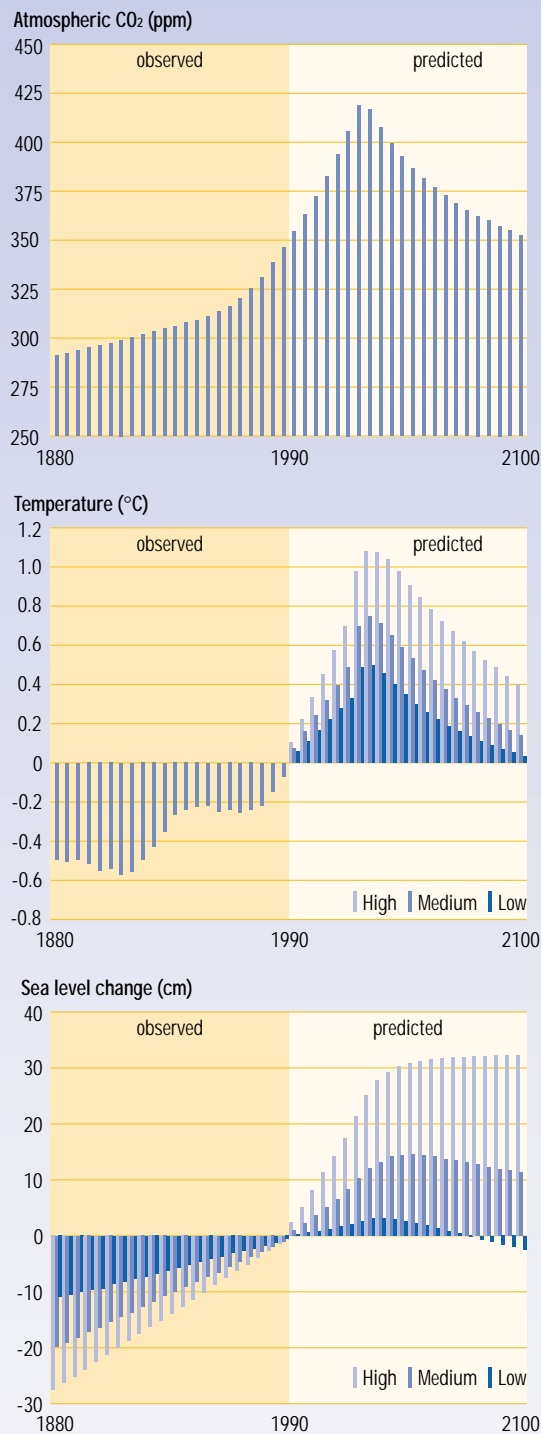
**Table 1.4: Estimated levels of vulnerability to specific natural hazards in selected PICs**

Country	Cyclone	Coastal flood	River flood	Drought	Earthquake	Landslide	Tsunami	Volcano
Fiji	●	●	●	○	○	●	○	
FSM	○	●	○	●	○	○	●	
Kiribati	○	●		●	○	○	●	
Marshall Islands	○	●		●	○	○	○	
Palau	○	○		○	○	○	○	
Solomon Islands	●	●	●	○	●	●	●	●
Tonga	●	●	○	●	●	○	●	●
Tuvalu	○	●		○	○	○	●	
Vanuatu	●	●	●	○	●	●	●	●

○ Low    ● Medium    ● High

Source: UNDHA (1996)

Figure 1.7: Projected sea-level rise with adherence to Kyoto Protocol



Observed global mean atmospheric CO<sub>2</sub> concentrations, and temperature and sea-level changes to 1990 compared with projections to 2100 based on the IS92a emissions scenario to 2000, with a gradual application of the Kyoto Protocol to 2020 followed by a return of all greenhouse gas emissions to natural values from 2025 (Scenario 2). Projections of temperature and sea level are based on low, mid and high temperature sensitivity (1.5°C, 2.5°C and 4.5°C) and mid-value ice-melt parameters, as in IPCC (1996). Observed data are as in IPCC (1996).

the early 1990s. Tuvalu was hit by an average of three cyclones per decade between the 1940s and 1970s, but eight occurred in the 1980s (Nunn 1990).

### Trends forecast to 2010

Observations of the past ten years have been further examined in recent studies of latent energy in the ocean system and regional impacts (Jones 1998; Jones *et al.* 1999). It has been predicted (Jones 1998) that sea-level rise resulting from anthropogenic greenhouse gases already in the atmosphere has the potential to threaten all regions of the Pacific, particularly in areas where coastal impacts are currently marginal. The CSIRO models determined that sea-level rise caused by past human emissions of greenhouse gases would be of the order of 5–12 cm, peaking in 2020–25 (Jones 1998). Sea-level rise likely if the provisions of the Kyoto Protocol were adhered to, and if the world then ceased all anthropogenic greenhouse gas emissions after 2020, would range between 14 cm and 32 cm, peaking in 2050–2100 (Figure 1.7).

The prediction of regional impacts associated with climate change over the next ten years (Jones *et al.* 1999) further reinforces the concerns raised during the last decade. Coastal areas will continue to experience impacts associated with ENSO variability, tropical cyclones and wave action. Tropical cyclones may become more intense, which would increase storm surge height. Current risks are therefore likely to persist and probably increase at a rate determined by sea-level rise (Jones *et al.* 1999).

### Conclusions

Climate change and sea-level rise are expected to have profound effects on the Pacific islands and the issue is therefore expected to remain a priority for the region.

PICs have experienced a range of impacts consistent with a changing climate. A general alteration occurred in the South Pacific climate from the mid-1970s, and the intensity of extreme events, such as the 1998 El Niño induced droughts in Fiji, PNG and the FSM which resulted in severe damage to food and export crops, has caused considerable concern.

Based on current models and on the assumption that the Kyoto Protocol targets are met, coastal areas will continue to suffer phenomena resulting from ENSO variability, tropical cyclones and wave action. Tropical cyclones may become more intense, which would increase storm surge height.

## Urban areas

### Developments over the past 100 years

During the past century Pacific island people have been steadily moving from the outer islands to the provincial or national seats of government, and from rural areas to the urban centres. This has come with a gradual move from a subsistence lifestyle towards a more cash-based consumer society (SPREP/ESCAP 1996). Related problems have been generally highly localized and often associated with urbanization and growth in established population centres; for example, Ebeye Island in Marshall Islands has a population density of 23 200/km<sup>2</sup> (SPC 1998).

Although Pacific towns and cities remain small by world standards, the last century saw them grow in population, as well as economically and in the amount of land they require. By the early 1990s only five countries (PNG, Vanuatu, Solomon Islands, Niue and Western Samoa) had less than a quarter of their population living in urban areas, and seven countries were more than 50 per cent urban (SPREP/ESCAP 1996). In most cases the growth rates for urban populations have been higher than for national populations.

### Developments over the past 10 years

The general trend over the past ten years is that Pacific countries are becoming increasingly urbanized and less rural in their focus than even a decade ago. Although not dramatic when examined as a percentage of total population (Figure 1.8), from Table 1.1 it is clear that for individual states the average is around 45 per cent. The trend is not surprising given the nature of economic and political developments in the past decade. World market prices for agricultural commodities are declining, new investments are more visible in urban than rural areas, and towns are perceived as important conduits for socio-economic, cultural and political innovation and change. Migration to urban areas is a response to these developments, and is a significant component of urban growth, but the towns also grow due to natural increase. The 'town' for a growing number of Pacific islanders is home to a second and even third generation.

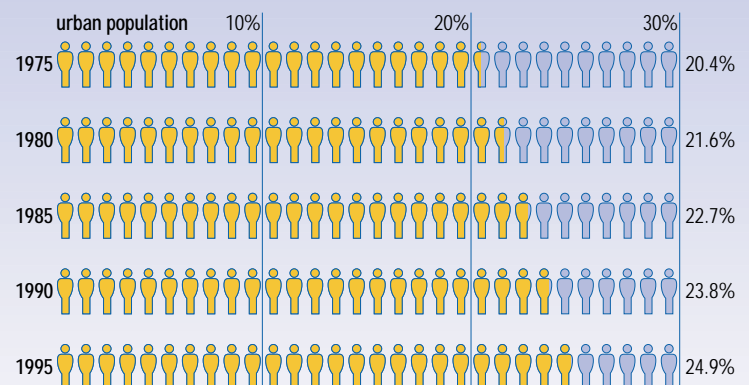
In the larger South Pacific countries, such as PNG, Solomon Islands and Vanuatu, with adequate untapped productive land, the proportion of people living in urban centres is still low. PNG is only 15–20 per cent urbanized (SPC revised 1998). Hence, although the same problems

of urbanization that occur throughout the developing world are also seen in these countries, they are relatively less important in terms of total population than in the urban areas of Suva (Fiji), Nuku'alofa (Tonga) or in particular Majuro (Marshall Islands), Tarawa (Kiribati) or Funafuti (Tuvalu).

It is not possible to generalize about urban issues across the region. Isolated, low-lying, densely settled atolls with few natural resources contrast with urban centres on large, high islands with many resources. Despite the tiny land areas of many PICs, with few resources and urban areas of as little as 3 000 people, the countries of the Pacific are currently facing a situation of growing inequality and urban environmental degradation (Bryant 1995). Some areas are characterized by: overcrowded substandard and often informal housing; a concentration of disease related to poor and unsanitary living conditions such as respiratory illness, tuberculosis and gastro-intestinal complaints; polluted water supplies; and the ever-present difficulty of human waste disposal, particularly on low-lying atolls. Waste management is discussed in more detail in the final section of this chapter.

In general, urban growth across the Pacific is proceeding so fast that governments simply cannot keep pace with facilities and services. Urban areas of the Pacific are now manifesting lifestyles and conditions that were unheard of as recently as 20 years ago. Water is scarce and groundwater often polluted, toilets few, solid waste disposal limited and hence intestinal diseases and ear and eye infections prevalent. At the same time medical and dental services are limited and hospitals understaffed and under-equipped. Health problems

Figure 1.8: Trends in urban population as a percentage of total population across PICs



Source: United Nations Population Division (1996)

related to living conditions are increasing. For example, in Fiji the number of new tuberculosis cases is growing annually; in most of the Pacific dengue fever is a major problem, with periodic epidemics responsible for a number of deaths. Illnesses related to water supply and sanitation are prevalent, especially in informal settlements where dwellers are living in marginal locations with inadequate waste disposal, potable water and sanitation.

There is an unequivocal link between diets changing from traditional island foods and the incidence of lifestyle diseases throughout the Pacific island region. Thirty per cent of all Pacific islanders now live in urban areas, where they are compelled to eat less nutritious (generally imported) foods. Cardiac diseases, diabetes and other non-communicable diseases are the leading causes of death in the region, with Guam, PNG, Nauru and Fiji leading the rest of the Pacific islands in these aspects of morbidity. Changing values and habits account for an increasing number of deaths from suicide and accidents, and for increasing problems from excessive alcohol consumption and crime. A handful of countries have reported AIDS cases; with the exception of four countries, there are growing numbers of HIV-positive cases (SPREP/ ESCAP 1996).

The most visible indicators of change in human settlements in the Pacific are the rise in squatter housing and urban poverty, and the decline in the quality of the urban environment, especially in standards of shelter, infrastructure and environmental management. These issues all point to a growing crisis that neither communities nor governments have been able to reverse. The major problems facing urban centres in the Pacific include:

- serious shortage of land, and conflicts with traditional land tenure;
- falling standards of infrastructure;
- an increase in the number of squatter settlements and informal housing;
- poverty, vulnerability and environmental degradation.

Environmental issues are more pressing and urgent in the Pacific urban centres because of the rising population pressures, often on small and low land masses; vulnerability of urban areas to sea-level rise because of their coastal nature; economic and cultural dependence on the natural environment; prevalence of

natural disasters; and vulnerability of freshwater lenses on atolls to environmental impacts. Pacific countries note that many of these problems arise from the lack of urban planning and management which, if well organized, could mitigate the effects of change in human settlements.

The standard of living for the region's urban dwellers is relatively high when compared with those in other developing countries, largely the result of the continued support from traditional networks for and among people living in urban environments. However, there are some worrying trends. Although empirical data are usually sketchy, there are indications of: rising unemployment, particularly among young people; high drop-out rates from primary schools; low household cash incomes; and a growing incidence of substance abuse and crime (SPC 1998).

### Trends forecast to 2010

Urbanization trends in the Pacific are likely to continue. Decentralization and rural resettlement schemes have been tried with varying success. Despite schemes for repatriating people to rural areas, not everyone has a village to return to and thus the problems facing urban areas will continue to grow. Increasing urban poverty and environmental degradation are expected to become more obvious, making urbanization and the resulting change in the nature of human settlements one of the major challenges facing Pacific communities in the next decade (UNDP 1996).

A major policy issue is the extent to which aid spending has been concentrated on islands/areas with urban concentrations. This partly reflects government policies that spend aid for the benefit of the government, so both government and aid become localized. Consequently, both governments and donors should be more conscious of outer island development, focusing on infrastructure and support for the private sector. However, this needs some care as there are obvious requirements to assist urban concentrates once they occur (water supply, roading etc.) and reversal of population flows is unlikely. Countries with a strong focus on outer island development are Cook Islands and Tuvalu.

These pressures of increasing urbanization and Westernization will necessitate an increased emphasis on many issues, including:

- the critical need for national and regional capacity-building as a platform for the realization of



- sustainable development in the South Pacific;
- the need to inform and involve people at the grassroots level, particularly local NGOs and villagers, in decisions affecting the allocation and management of local resources;
- the impact of demographic pressures on the capacity of national governments and regional organizations to plan responses to key problems and the increasing importance of town planning, including zoning of areas under government jurisdiction;
- the importance of recognizing and respecting the key role of traditional practices, cultures and the subsistence economy in many Pacific Island countries;
- the difficulties of distance, isolation, dispersion and national budget constraints in designing and implementing environmentally sound and sustainable development programmes in the region.

## Conclusions

Urbanization and the resulting change in the nature of human settlements represents one of the major challenges facing Pacific communities in the next decade.

The major problems facing urban centres in the Pacific include: serious shortage of land and conflicts with traditional land tenure; falling standards of infrastructure; an increase in the number of squatter settlements and informal housing; poverty, vulnerability and environmental degradation.

Although the region's urban populations are small, with overall only about one in four people living in an urban environment, almost everywhere in the region urban growth has outstripped rural population growth by a large margin. In some island countries, urban areas contain over half the total population.

The major pressures of continuing degradation of urban areas are exerted by high population growth rates, industrialization, urbanization and consumerism. Urban sprawl and industries associated with urban areas, including manufacturing, power generation and the provision of services and infrastructure, both create waste and pollution and encroach on beaches, wetlands and forests.

Increased urbanization also places demands on infrastructure, including sewerage, power, communications and transportation services. Inadequate sewerage has severe health and environmental implications, causing degradation of river, subsurface and coastal water quality, with adverse effects on recreational and fishing activities.

## Waste management

### Developments over the past 100 years

The impacts of pollution and the need for waste management in PICs were small for most of the past century as most waste products were biodegradable and populations were dispersed. Commonly wastes were disposed of through individual dumping in lagoons and rivers or on unused land close to villages.

Growing urban populations and increasing imports of non-biodegradable materials and chemicals related to agricultural and manufacturing have brought with them environmental health problems and a rapid confrontation with the realities of waste and toxic and hazardous substances management. All PICs now share the problems of disposal of waste and the prevention of pollution. The physiographical characteristics of some Pacific islands, their small size, isolation and oceanic location, and their dependence on a marine and limited terrestrial resource base, make them highly vulnerable to contamination by toxic and hazardous wastes and chemicals, as well as radioactive materials. The development of common landfill sites over the past 50 years was often carried out without extensive planning or the establishment of the necessary management arrangements to maintain them effectively.

### Developments over the past 10 years

In the past decade trends have continued and the management of solid waste, wastewater and chemicals is now a major concern in many PICs. The history of waste disposal in the region has led to a growing awareness of the dangers posed to the Pacific environment and people.

Solid waste management is a particular concern for PICs, with many lacking land suitable for waste disposal sites. The last decade has seen an increase in the importation of goods, which has resulted in dramatic shifts in the waste stream in some countries, with plastics, cardboard, paper and metals now being of greater significance than organic matter. Increased levels of participation in regional and global trade have exacerbated this problem. Increased urbanization also places demands on infrastructure, including sewerage. Inadequate sewerage has severe health and environmental implications, causing degradation of river, subsurface and coastal water quality, with adverse effects on recreational and fishing activities.

Results from various national studies on solid waste production in Pacific countries (Figure 1.9) show a

range of average daily waste generated in the domestic sector: from 0.2 kg/person/day in Rarotonga, Cook Islands, to 0.7 kg/person/day in Tongatapu, Tonga (Government of Kingdom of Tonga 1994). The same studies further highlighted that the household waste stream in most Pacific island states is dominated by biodegradable material (vegetable and putrescible materials and garden wastes). However, there is also a relatively high proportion of paper and plastics (average 22.5 per cent of total waste generation), metals (average 11 per cent of total waste generation) and glass bottles in the waste stream. Few data are available for commercial or industrial wastes as in most PICs most (recorded) waste is currently generated by the domestic sector (WHO 1996).

In the larger towns, the search for environmentally safe and socially acceptable sites for solid waste disposal has become a perennial concern, which is, for several towns at least, seemingly insoluble. In smaller settlements and coastal peri-urban situations, mangrove

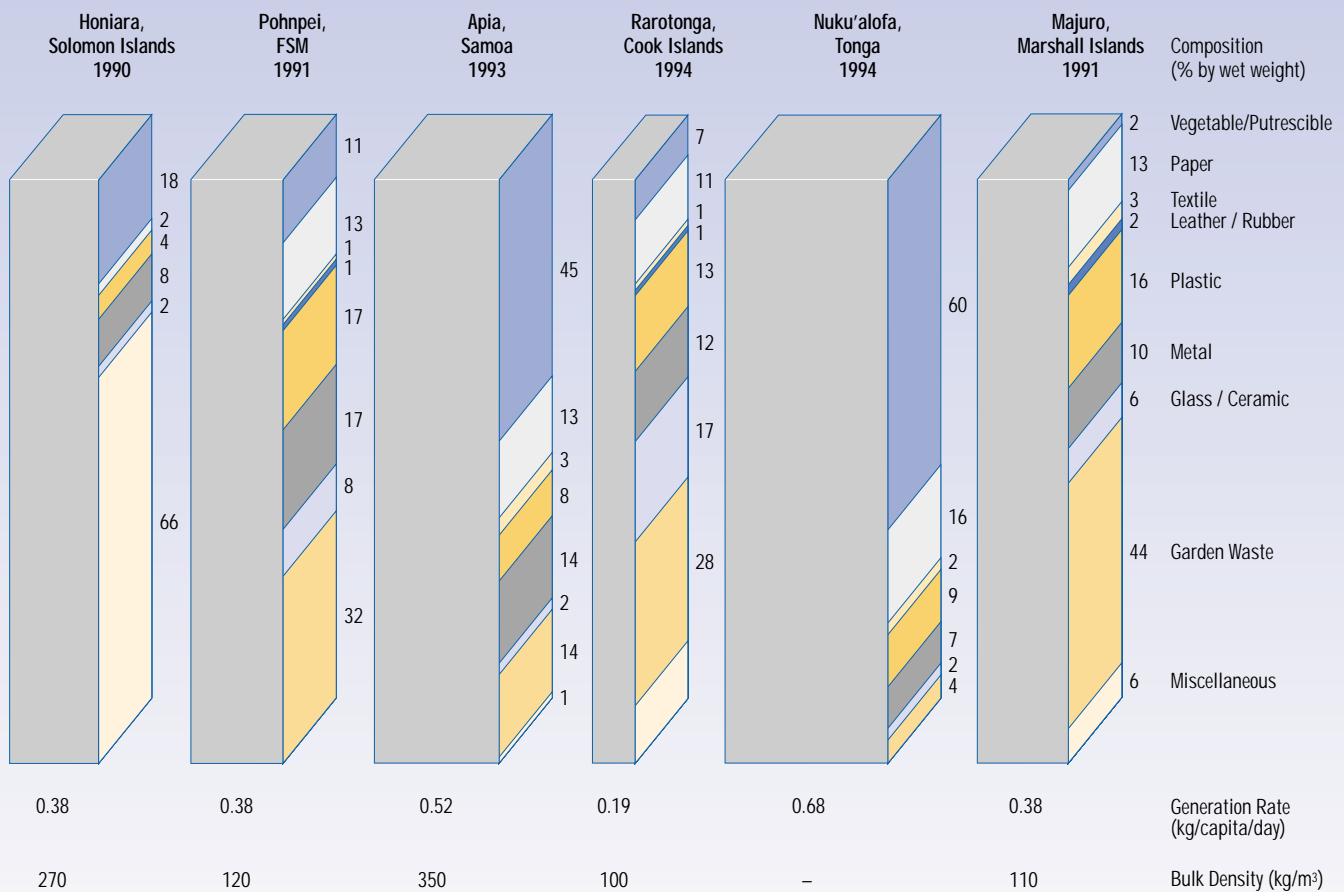
areas or beaches have become the casual dumping grounds for much of the waste, ranging from derelict cars to household refuse. Expected further urbanization and industrialization will make these problems even worse.

Inadequate sanitation systems for the disposal or treatment of liquid wastes have resulted in high coliform contamination in surface waters and in groundwater near urban areas. Various incidents have also been reported of pollution by toxins from industrial waste, effluent from abattoirs or food-processing plants, by biocides and by polluted effluent from sawmills and timber processing areas.

Figure 1.9 and Tables 1.5 and 1.6 provide an insight into solid waste generation and the contributions of wastewater to pollutant loads in urban centres in the region.

The last ten years have seen the continued use of a range of chemicals for agriculture and manufacturing. The region in general has little capacity for monitoring the pollution from toxic and hazardous substances but

Figure 1.9: Characteristics of municipal solid waste in PICs



Source: World Health Organization (1996)

there is increasing awareness of the impacts and magnitude of the problem (SPREP 1997b). These monitoring deficiencies are seen in inadequate laboratory facilities and the lack of trained field sampling and analytical laboratory staff. All countries of the South Pacific share a problem of safely disposing of solid and liquid wastes, particularly as a result of urbanization. Point source pollution from industrial wastes and sewage, inappropriately sited and poorly managed garbage dumps, and disposal of toxic chemicals are all significant contributors to marine pollution and coastal degradation. There is also growing concern that toxic and hazardous waste may be brought to the region from developed countries for disposal. Discharges from selected PICs are shown in Table 1.5.

A recent study of persistent organic pollutants in the region found that considerable stockpiles existed in some countries and that a number of sites had been contaminated through past disposal or storage of these chemicals (SPREP/AusAID 1999). The study is summarized in Table 1.6.

In addition, it has been found that deficiencies exist in many PICs with respect to other aspects of chemicals management (SPREP/AusAID 1999), notably:

- *School laboratory chemicals.* It is clear that many schools have enjoyed easy access to laboratory chemicals that frequently they do not have a need for. Consequently stocks of unwanted and unidentified chemicals are common, and teachers have been inadequately trained in appropriate handling techniques.
- *Medical wastes and chemicals.* Management of hospital wastes in many countries is inadequate, with little attention given to waste segregation or disposal. In addition, some countries have enjoyed

donations of drugs that unfortunately have later been found to be either out of date or simply inappropriate for use in the particular country.

Various incidents of pollution from industrial waste have been reported, including: effluent from abattoirs, fish canneries or other food processing plants; leachate from sawmill areas; and copper-chrome arsenic chemicals used in the preservation treatment of wood. While the impacts of inadequate waste disposal are clearly evident in some locations, the composition of industrial wastes generated throughout the region have not yet been fully catalogued nor has their extent been quantified. Industrial activity based on agricultural products, light engineering, preservative treatment and other processing of wood, fibreglass fabrication and manufacture of plastic packaging has led to pollution and waste. All these activities generate solid and liquid waste, some of it toxic.

### Trends forecast until 2010

Areas of particular concern over the next decade will include the necessity for environmental health, protection of the quality and supply of fresh water resources, and environmentally sound management of toxic chemicals and hazardous and solid wastes. General trends indicate an increased use of plastics, paper and metal (cans), which may be reflected in a change in consumption patterns.

Particular effort is required at the national level to strengthen the capacity of island countries to minimize and prevent pollution. In the long term, environmentally sound, cost-effective disposal options are limited. In addition to assistance with immediate disposal issues, regional and international support will be needed for programmes to reuse, recycle and reduce wastes and to

**Table 1.5: Summary of waste loads discharged from industrial wastewater in selected PICs**

Country	Pollutant characteristics (tonnes/year)					
	BOD	SS	Oil and grease	Nitrogen	Phosphorus	Lead
American Samoa	4.5	179.2	64.7	255.0	167.3	0.00
Fiji	510.6	431.9	112.6	25.6	0.9	0.04
New Caledonia	37.4	6.1	0.0	0.0	0.0	0.00
Papua New Guinea	508.9	1 083.4	765.3	0.0	0.0	0.00
Solomon Islands	513.6	494.8	560.8	18.7	0.1	0.00
Vanuatu	548.1	241.4	98.0	117.2	42.7	0.00
Samoa	63.7	10.4	0.0	0.0	0.0	0.00
Total	2 186.8	2 447.4	1 061.4	416.5	211.0	0.04

Source: Nancy Convard (1993)

**Table 1.6: Contamination by persistent organic pollutants in PICs (not including PNG or French and US territories)**

Category	Estimated quantity
Agricultural chemicals (including DDT)	130 tonnes
Potentially PCB contaminated transformer oil	220 000 litres
Pesticides contaminated sites	21
Bitumen contaminated sites	8
Oil and diesel contaminated sites	29
CCA contaminated sites	7
Potentially contaminated solid waste disposal sites	20

Source: SPREP/AusAID (1999)

give effect to the Waigani Convention and the Global Programme of Action for the Protection of the Marine Environment from Land Based Activities.

## Conclusions

All PICs share the problems of waste disposal and the prevention of pollution. The small size, remoteness, physical structure and rapid urbanization of many islands have exacerbated these problems.

Overcrowding has serious consequences for environmental contamination, not only from sewage, but also from the disposal of animal waste (especially from pigs) and household garbage, and because of the limited supply of fresh water. There are very limited recycling and waste management programmes in the small countries, and rubbish is generally burned or dumped into the sea or in mangroves.

Incidents of dangerous and illegal pollutants being discharged into streams and oceans have increased, hand in hand with a growing manufacturing industry. Point source pollution from industrial wastes and sewage, inappropriately sited and poorly managed garbage dumps, and disposal of toxic chemicals are all significant contributors to marine pollution and coastal degradation.

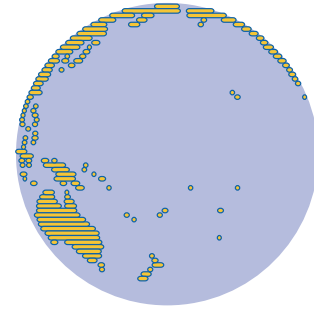
Changing patterns of consumption in the next few decades as countries' GDP and the population's affluence increases are likely to be reflected in major rises in per capita waste generation. Increased use of plastics, paper and metal (cans) through importation by the packaging industry is indicated. Consequently, non-organic waste management is expected to become an increasingly critical environmental challenge throughout the region, surpassing that of disposal of organic waste.

Contamination from stockpiles and past disposal of persistent organic pollutants presents a challenge for PICs. The challenge will include rehabilitation of sites,

disposal in another country and the means to ensure adequate chemicals management in the future, in particular for school laboratory and medical chemicals

The three Rs of waste management – reduce, reuse and recycle – cannot be fully applied in the circumstances of most PICs. The size of the market is too small to impose special packaging requirements, and this also affects the economic opportunities for recovering waste materials or recycling them.

# Policy Responses



## Policy background

Current policies related to the environment and natural resource use in the region stem from a complex mix of often relatively recent colonial administration and strong social and cultural values and mores. Many Pacific island nations became independent states in the 1970s (Fiji, Kiribati, PNG, Solomon Islands, Tuvalu) and 1980s (Vanuatu). Nauru and Samoa achieved independence earlier. Cook Islands and Niue are self-governing in free association with New Zealand. Tonga was never a colony. Two former US trust territories became freely associated independent states in 1986 and members of the United Nations in 1991. Palau has been a freely associated State of the USA, like FSM, for several years. American Samoa, French Polynesia, Guam, New Caledonia, Northern Marianas, Pitcairn Island, Tokelau and Wallis and Futuna remain formally attached to metropolitan countries.

The Pacific island nations have a wide range of systems of government. Countries with a British colonial history (e.g. Fiji, Solomon Islands) have adopted a Westminster-based parliamentary system. Micronesia, with its historical ties to the USA, operates a federal political system. Regardless of their particular forms of government, they share a strong common history of consultation when deciding local, national or regional affairs. Each country displays a strong sense of national identity. Several countries

have been governed by a single party in the years since independence, but all enjoy considerable freedom of political debate. These countries have encouraged a multiplicity of non-governmental institutions which provide strength and vitality to the fabric of society. Family and churches of various faiths are pre-eminent among those institutions, but there is also a growing network of vigorous, articulate and active private voluntary organizations concerned with many different aspects of national life and policy.

Pressure for accountability and better quality of information is coming from Pacific island communities as well as from overseas aid donors and NGOs, along with mounting public concern about the spread of corruption at official and political levels. In a number of countries, the public service is going through a prolonged crisis of confidence and competence, which has compromised its ability to perform effectively. Several Pacific island governments have responded by improving financial controls and restructuring their public service, for example Vanuatu's Comprehensive Reform Programme effected in 1997. In spite of difficulties, it should also be recognized that governance in the Pacific still has a strong foundation of community and traditional political systems.

The region also has a history of regional co-operation with a well-developed legal and institutional framework within which to address issues of common concern. The Pacific's regional institutions are working through the South Pacific Organizations



Coordinating Committee (SPOCC) to develop a Regional Development Strategy and sustainable development framework that incorporates the key linkages between the various development sectors. Sustainable management of these sectors, including agriculture, health and marine resources, is being actively promoted through the SPOCC working groups.

In 1996 the South Pacific Forum adopted an Economic Action Plan to stimulate investment and job creation. Economic and public sector reform measures being adopted include: implementing trade and investment policies that encourage the diversification of export markets and sources of investment; reviewing exchange rate management; improving management of capital assets; improving the business climate; achieving free and open trade and investment; addressing multilateral trade issues; and promoting sustainable tourism development.

Economic reform in the region comes at a time when countries are also concerned about their vulnerability to a wide range of economic and environmental factors, such as climate change. They are also concerned about the impacts of development on community cohesion and the natural resources upon which both cash and subsistence economies depend. The Forum Leaders and Economic Ministers are therefore fully aware of the need to implement economic policies that fully respect the differing natural resources and environmental endowments of the region, and that take into account the social and cultural impacts. Pacific leaders have recognized the important links between environment and development and have stated clearly that development must be both economically and ecologically sound (Forum Secretariat 1993). This was endorsed by Environment Ministers in 1996 and is now being implemented at the national level and at the regional level through the Forum process. As an example, the Forum Economic Ministers in July 1999 agreed to adopt an integrated policy framework for promoting the sustainable development of tourism.

It is only relatively recently that policies have taken account of the environmental dimensions of development and specific resource exploitation. The extent to which this has had an impact is difficult to determine. At recent meetings of the Apia and SPREP Conventions, in October 1995, it was apparent that governments were finding reporting requirements a strain on limited human and financial resources.

## MEAs and non-binding instruments

This section reviews some of the multilateral environmental agreements (MEAs) that have been implemented in the Pacific islands region. The global, regional and soft law agreements under review are discussed separately, focusing on the implementation, impact, compliance and effectiveness levels of the MEAs, taking into account the linkages between the three areas. The overall barriers to the implementation of MEAs in the region are identified, and items for policy action reviewed.

### Global MEAs

#### IMPLEMENTATION AND COMPLIANCE

Table 2.1 sets out a list of some of the major global environmental MEAs in existence in the Pacific region and the PICs that have implemented MEAs by either signing, acceding to and/or ratifying those instruments.

The status with respect to the implementation of the conventions by territories of metropolitan powers depends on the treaty-making arrangement the territory has with the respective power in relation to an MEA. Exactly which conventions have been implemented in the territories as a result of the implementation of a convention by a metropolitan power is not easy to determine and is an item for policy action below.

Multilateral Environmental Agreements (MEAs), provide the main link with global policy, and there is a growing awareness of the need to participate effectively in the development of such global agreements. This trend started with the active involvement of the Pacific island states in the UN Convention on the Law of the Sea (UNCLOS), the agreement on Conservation and Management of Straddling Fish Stocks (CMS) and the UN Framework Convention on Climate Change (UNFCCC) negotiations. In recent times it has continued with the region's interest in the Convention on Biological Diversity (CBD) – particularly Article 15 on access to genetic resources – and the Convention on Combating Desertification (CCD) .

#### United Nations Framework on Climate Change

The UNFCCC has been ratified by 12 PICs, and both PICs and Alliance of Small Island States (AOSIS) countries have played a pivotal role in the climate change negotiations. PIC influence has ensured that their special and vulnerable status is recognized in Chapter 17 of *Agenda 21*, as echoed in the preambular

Table 2.1: Global Multilateral Environmental Agreements

as at 12/11/98	Basel	Cites	CBD	FCCC	FCCC pr	Ozone 85	Montreal 87	London 1990	Copenhagen 92	Montreal 97	MARPOL	AGMT 95	UNCLOS	UNCLOS: MHFM S	CCD
Cook Islands			●	●	●	●							●		●
FSM	●		●	●	●		●						●	●	●
Fiji	●	●	●	●	●	●	●					●	●	●	
Kiribati			●	●		●	●								●
Marshall Is			●	●	●	●	●	●	●		●		●	●	●
Nauru			●	●									●	●	●
Palau													●		
PNG	●	●	●	●		●	●				●		●	●	
Samoa			●	●	●	●	●						●	●	●
Solomon Is			●	●	●	●	●						●	●	
Tonga			●			●	●				●		●	●	●
Tuvalu			●	●	●	●	●				●		●		●
Vanuatu		●	●	●		●	●	●	●		●		●	●	●
Australia	●	●	●	●	●	●	●	●	●				●	●	●
New Zealand	●	●	●	●	●	●	●	●	●				●	●	
Niue		●	●		●							●	●	●	
Tokelau									●						
France	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Fr Polynesia															
New Caledonia															
Wallis and Futuna															
United Kingdom	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Pitcairn						●	●							●	
United States	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
American Samoa*															
Guam*															
N Mariana Is*															

● ratified

\*Agreements ratified by the USA also apply

paragraphs of the FCCC.

The FCCC regional activities have been launched in ten countries under the Pacific Island Climate Change Assistance Programme (PICCAP) and in 11 countries under the South Pacific Sea Level and Climate Monitoring Project.

Countries such as Kiribati have led the way in the Pacific with respect to development of national policy on climate change and institutional arrangements, which in Kiribati occurred in 1990, well before the adoption of the agreement itself at Rio in 1992. This has enabled the region to make real progress in strengthening technical and scientific capacity and in collecting oceanic, sea-level and weather data to meet international obligations.

#### United Nations Convention on Law of the Sea

Fifteen PICs have ratified UNCLOS and its impact on the

region cannot be overstated. Access to a valuable pelagic fishery, guaranteed in the EEZ provisions of UNCLOS, promises the region continued income. PICs have been swift to ratify subsequent international agreements, for example the 1995 Agreement under UNCLOS Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Species. The speed at which ratifications have been made to that Agreement is further evidence of the importance and impact of fisheries to Pacific nations. The economic spin-off generated under UNCLOS has attracted the political commitment needed to set the platform for effective fisheries protection and management laws. This will be important as economic activities push into new frontiers, such as the seabed and access to the rich marine resource.

Given the clear economic benefits, the PICs have been more motivated to pass marine-related legislation,

including legislation to control pollution that might affect the lucrative fishing resource. The most significant legal development for conservation in the region is in the area of fisheries management, such as PNG's Fisheries Act 1994 and the Solomon Islands Fisheries Act 1998. Samoa has successfully introduced village fishery reserves and has done so by drawing on the knowledge and help of the local communities. Samoa has also passed Fisheries Regulations (1995). Enforcement has had limited success. However, the mere fact that, under the regulations, a village or an individual as opposed to the state can commence an action for environmental damage is a significant milestone and is encouraging.

### Convention on Biological Diversity

The Biodiversity Convention is also well supported. Loss of biodiversity, access to genetic resources, and associated issues of benefit-sharing and intellectual property rights (especially in relation to traditional knowledge and biosafety) are important issues to PICs. One of the main concerns of PICs is the need to control access to their genetic resources and to derive a fair share of the benefits from the use of these resources.

Compliance with the CBD has been slow. At a regional workshop in 1998 with 14 participating countries, it was reported that only four countries had completed the National Reports required to be lodged with the CBD Secretariat by January 1998 (Cook Islands, Marshall Islands, Fiji and Samoa). Similarly, few had finalized their national biodiversity strategies, though eight had established inter-agency coordinating committees. No country had passed separate biodiversity legislation or legislation governing access to genetic resources, drawing instead on existing sectoral laws to implement CBD obligations.

### Convention on Combating Desertification

The drought relief provisions of the CCD are important

to PICs, many of whom have experienced extended dry seasons. Whether or not the convention will have long-term relevance for the region remains to be seen.

### Other global MEAs

Few PICs have signed, ratified or acceded to the Basel, MARPOL or London Dumping Conventions. However, there is scope for some of the provisions of these and other conventions to be implemented indirectly via regional conventions. The SPREP (Noumea) Convention, for example, is widely supported and specifies that it is to be read consistently with the London Dumping Convention. The SPREP Convention also amplifies and expands on the general Part XII provisions of UNCLOS but goes further by recognizing the special marine and coastal environment of the South Pacific Region. While Basel is not regionally well supported, the Waigani Convention concluded under Article 11 of the Basel Convention has been signed by the majority of PICs (Tsamenyi 1996).

Compliance with global MEAs in the region varies. Clearly most PIC states do not have the capacity, using their own resources, to implement the many provisions of the conventions described above. Progress has been made in capacity-building and monitoring for the CBD, FCCC and UNCLOS, largely because of access to external funding, especially from the GEF, UNEP and EU under the Lomé Convention. However, as a general rule, in the absence of expert personnel and external funding for implementation and compliance, there has been little activity on the part of the PICs themselves.

Nevertheless, the conventions described above have been effective in developing appropriate environmental policies by heightening awareness of the inter-relationships at stake in environmental protection and sustainable development. In addition, legislation implementing the international conventions exists in a number of PIC countries.

### OVERALL EFFECTIVENESS OF GLOBAL MEAS

Generally the more recent and holistic MEAs on biodiversity and climate change have been effective in developing appropriate environmental policies in the Pacific by heightening awareness of the inter-relationships at stake in environmental protection and sustainable development. These agreements have also been effective in mobilizing much-needed funding for the region and enabling participation and visibility of the region in global negotiations.

The impacts of UNCLOS, given the longer period of

#### Box 2.1: National case study: PNG

PNG is one of the few countries to have ratified all the above pollution-related agreements. It has taken systematic steps towards implementation, including specific legislation, and has also recently developed an Oil Spill Response Plan 1997, which includes distribution of US\$1.5 million of equipment to six regional ports and a 22-person inter-departmental and industry committee. Some activities are carried out in co-operation with NGOs, such as waste management at a dump site in Wewak that includes grassroots participation in monitoring and collection of data and identification of waste streams.

time for its negotiation (1972–82), are perhaps more apparent in the region. Historically, there had been little regulation of coastal and oceanic resources. UNCLOS ushered in new regimes such as those covering exploitation of the deep sea areas, and rights in archipelagic waters.

Coastal state jurisdiction in the Pacific, as elsewhere, has extended further and further seaward to cover areas up to 200 nautical miles (and beyond to where the continental shelf terminates or where archipelagic waters are claimed), with corresponding reduction in the area of ‘High Seas’. The net result has been a more equitable distribution of resources between developed and developing countries because the resource-rich marine areas could be (and have been) claimed by developing countries. (As noted in Chapter Four, Emerging Issues, there is a need for further attention to this issue by PICs.)

The Agreement under UNCLOS Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Species 1995, and the speed at which ratifications have been made to that Agreement, is further evidence of the importance and impact of fisheries to Pacific nations. Given the clear economic benefits, the PICs have been more motivated to pass marine-related legislation, including legislation to control pollution that might affect the lucrative fishing resource. Another highly significant example of regional action following from UNCLOS was the conclusion in 1993 of the Multilateral Treaty on Fisheries Between the Governments of Certain Pacific Island States and the United States on shared benefits from the latter’s fishing activities.

Similarly important, in relation to port state control, was the Tokyo Memorandum of Understanding (MOU) on Port State Control, which was concluded under the auspices of the International Maritime Organization (IMO). UNCLOS could therefore be said to have enabled closer links to be formed between the Pacific and international organizations such as the IMO and the International Atomic Energy Agency (IAEA).

### BARRIERS TO IMPLEMENTATION

PICs face a number of barriers to the implementation of global MEAs. These include:

- inability to participate fully in the heavy calendar of meetings because of a lack of finance and experienced personnel;
- lack of funding mechanisms or personnel with the

necessary expertise or understanding of new MEAs to enable the countries to implement fully national obligations under conventions;

- outdated laws in need of reform;
- little recognition of the newly emerging environment departments/units on the part of more powerful agencies;
- legal and law enforcement personnel who do not have the time to deal effectively with environmental offences;
- difficulties in the central management and enforcement of traditional/customarily owned land;
- an acute lack of reliable links and computer equipment to inform and update countries on environmental developments;
- difficulties in ascertaining which global MEAs apply to the respective Pacific island territories because there have been only a few instances when a metropolitan power declares that the MEA in question either extends or does not extend to its territory;
- lack of specific funding for the implementation of supportive regional agreements (Apia, SPREP and Waigani Conventions).

### Regional MEAs

Table 2.3 sets out the list of regional MEAs in existence in the Pacific region and the PICs that have

#### Box 2.2: Climate change and sea level rise – a capacity-building response

Ten PICs are implementing the GEF/UNDP/UNITAR-funded Pacific Islands Climate Change Assistance Programme (PICCAP) through the South Pacific Regional Environment Programme. A further two are implementing similar projects – PNG through UNDP, and Niue through UNEP. All of the countries are undertaking ‘enabling activities’ or activities to meet the obligatory reporting requirements of the Convention. However, enmeshed within these activities is the need to ensure sound and longer-term policy development and integration of climate policies with national development planning. For PICCAP this is part of the project design and activities. Countries participating in PICCAP will establish the technical and scientific background prior to policy development, such as national greenhouse gas inventories, mitigation options, and vulnerability and adaptation assessments. From the results of these activities, policy dialogues and policy formulation will ensure that climate change responses appropriate to each country’s development context and needs are established. The raising of awareness and capacity-building on climate change across a wide range of sectors nationally is a vital need and is part of the project design. Government-recruited co-ordinators and the establishment of multidisciplinary country teams ensure that, following technical studies, the development of climate policy consistent with national priorities takes place.

implemented MEAs by either signing, acceding to, and/or ratifying those instruments.

### IMPACTS

The regional agreements cover issues as diverse as protected areas, marine pollution, waste management, nuclear testing and fisheries. As mentioned above, most are consistent with a pre-existing global MEA. For example the Waigani Convention is consistent with the Basel Convention and the Niue Treaty implements Article 73 of UNCLOS.

While some conventions are well supported, others are not. For example, ten PICs have signed the SPREP Convention. However, the Convention on the Conservation of Nature in the South Pacific (the Apia Convention), signed relatively early in 1976 by four PICs, has so far attracted only six countries in the region. Even fewer PICs file country reports in accordance with the requirements of these conventions.

Accurate assessment of the impact of some of the regional conventions is made difficult because of the overlap between global and regional instruments in similar subject areas. Overlap exists between the Apia Convention and the SPREP Convention with respect to protected areas, and between both instruments and the CBD in relation to the same. The SPREP Convention refers to ocean dumping of radioactive waste, which is also mentioned in the London Dumping Convention 1972 (although the latter was amended in 1996), as well as in the Rarotonga Treaty.

### IMPLEMENTATION AND COMPLIANCE

Implementation and compliance has been most effective in the area of the marine-orientated conventions, as illustrated in Box 2.3.

With respect to the Convention for the Prohibition of Fishing with Long Driftnets in the Pacific 1989, some states were particularly efficient in enacting legislation, for example the Marshall Islands Marine Resources Authority (Amendment) Act 1989.

Cook Islands has displayed the greatest commitment to regional agreements by ratifying all five agreements, signing the Waigani Convention and introducing effective framework legislation for the capital (Rarotonga Act 1994–95), as well as preparing a Prevention of Marine Pollution Bill.

However, little action at the national level appears to be attributable specifically to the SPREP and Apia Conventions. An exception is Samoa, which has

established no fewer than 58 protected areas, amended its National Parks and Reserves Act 1974 and introduced its Fisheries Regulations in 1995.

Largely outdated sectoral laws remain in force throughout the Pacific, with inter-agency co-ordination occurring on an *ad hoc* basis. In Vanuatu, for instance, environmental responsibilities are scattered between five ministries and 15 departments. This inevitably creates confusion, though there is inter-agency co-ordination with respect to environmental impact

#### Box 2.3: National case study: the Niue Treaty

The Exclusive Economic Zones of the PICs cover 30 million km<sup>2</sup> of ocean space, where there is a lucrative tuna harvest to the value of US\$1.4 billion. The Niue Treaty on Co-operation in Fisheries Surveillance and Law Enforcement in the South Pacific region is, however, applicable only in the territorial sea and archipelagic waters of the Forum States. That limitation aside, it could be said to be an effective agreement, triggering regional programmes and corresponding revisions of national fishery laws.

The Treaty, based on the general principles in Article 73 of the United Nations Convention on the Law of the Sea (UNCLOS), is an umbrella agreement. It is intended to provide flexible arrangements by enabling parties to enter subsidiary agreements in the co-operative sharing of surveillance platforms and enforcement equipment, empowerment of surveillance officials (to stop, detain, seize vessels or direct to port), enhancement of extradition procedures, evidentiary provisions, and the authorization of prosecutors/witnesses in each other's courts. The regional response was the establishment of the Monitoring, Control and Surveillance Division of the Forum Fisheries Agency (FFA), which achieved the following:

- harmonized minimum terms and conditions of foreign fishing vessels that have been used by understaffed and often inexperienced Forum State officials in access negotiations with powerful distant-water fishing nations;
- establishment of an FFA Regional Register of Foreign Fishing Vessels in 1983, and the requirement for registration prior to any issue of fishing licences, with sanction through suspension from the Register for fishing violations;
- satellite-based regional vessel monitoring system (automatic location communicator – ALC) as a requirement for all foreign fishing vessels, which will provide speed and direction details to assist in enforcement operations. In terms of national legislation, although measures of the 1970s and 1980s had already incorporated certain provisions such as penalties and release on posting of bonds, the latest enactments (since 1994) have indeed incorporated most of the international and regional obligations. Increased penalties have resulted in effective deterrence, due to fines in a range between NZ\$100 000, not less than US\$800 000 in criminal proceedings and even a maximum of US\$5 million for illegal fishing in civil proceedings. The most recent legislation is the Solomon Islands Fisheries Act 1998 and Merchant Shipping Act 1998, affecting approximately 129 foreign fishing licences issued per year. There have been on average 5–6 prosecutions per year.



assessments under the National Advisory Committee on Environment (NACE) and the Rural Lands Development Committee. Vanuatu has, however, made a significant policy commitment under the current Comprehensive Reform Programme. This gives environmental and resource management a priority in the development planning agenda.

Framework environment laws elsewhere in the Pacific have been drafted over the last ten years, but few have been enacted, either because of arguments about their implementation/effectiveness or because of concern that they might impede development activities.

### OVERALL EFFECTIVENESS OF REGIONAL MEAS

The regional conventions have been effective to the extent that they constitute a platform on which further action may be based. Much national implementation has taken place in the fisheries area. However, the overall effectiveness of the other regional MEAs is not readily evident. The Waigani Convention is not yet in force, little regional interest has been shown in the Apia Convention, and the SPREP and the NFZT Conventions generally reflect a compromise between the interests of the PICs on one hand and the metropolitan powers on the other.

There are no special arrangements made for the funding of Apia or SPREP Convention related activities, or for Secretariat support. Bare funding is provided for the biennial meetings of the parties. In terms of monitoring and reporting under these Conventions, the parties requested preparation of a standardized format for national reports in 1994. After many iterations, it was agreed in 1996 that the guidelines needed to be simplified and should avoid duplication of reporting under other international agreements. This reflects a wider issue that arises with regional instruments.

Also of note in the area of regional agreements is the role of regional trade agreements as co-ordinated by the Forum Secretariat. Increasingly, the role of such instruments in managing sustainable development will need to be recognized and utilized where appropriate. Some of the areas of concern where trade and the environment overlap are:

- Domestically Prohibited Goods (DPGs);
- the issue of fishing subsidies;
- the importation of Living Modified Organisms (LMOs);
- eco-labelling;
- sustainable tourism;
- intellectual property rights.

### BARRIERS TO IMPLEMENTATION

- As noted above, the lack of specific funding for the implementation of regional agreements (Apia, SPREP and Waigani Conventions) has been a barrier to effective implementation and participation in agreements. In particular, legal activities and capacity-building to develop appropriate legislation have only taken place through *ad hoc* financial assistance.
- The last significant regional activities in the field of environmental law were the UNDP-funded Capacity 21 Project and the IUCN/ADB project in 1994–97, which resulted in legal reviews of national legislation in 12 PICs as part of the larger NEMS process. The Government of Australia has also been funding a legal capacity-building programme in Melanesia since 1994 to strengthen national environmental legislation (PNG and Solomon Islands).
- Sometimes, environmental issues are not as high a priority for the Pacific as trade and economic development, education, health and public sector reform. Environmental protection is still seen as hampering ‘development’, with resultant delays in making progress with formal legislation.

### Non-binding agreements

#### GLOBAL

##### Agenda 21

The Pacific was well represented at the Earth Summit (United Nations Conference on Environment and Development – UNCED, 1992), with over one hundred delegates including nine heads of government, and the preceding 18 months of preparations involved a considerable commitment and investment by the region and its partners in sustainable development (Miles 1992). The region has since endorsed *Agenda 21* at the highest level (Forum 1992) and its objectives and activities have become an integral part of the region’s Action Plan for Managing the Environment in the South Pacific, 1997–2000 (SPREP 1997b). The extent to which these have become part of national policies and programmes is unclear. The development of National Environmental Management Strategies has facilitated this integration but the actual implementation of *Agenda 21* has been largely driven by the availability of funding and political momentum (e.g. related to the negotiation and implementation of MEAs).

Of all the elements in *Agenda 21*, Chapter 17 has received considerable attention from PICs. This has been expressed through their involvement in the

Table 2.2: Progress to implement the Barbados Programme of Action

Chapter of Barbados Programme of Action	Regional initiative
Climate change and sea-level rise	<ul style="list-style-type: none"> <li>● Capacity-building to meet reporting obligations under the UNFCCC</li> <li>● Sea-level rise monitoring programme</li> </ul>
Natural and environmental disasters	<ul style="list-style-type: none"> <li>● Strengthening of meteorological capacity, introduction of EMWIN and tropical cyclone warning upgrade</li> </ul>
Management of wastes	<ul style="list-style-type: none"> <li>● Development of PACPOL</li> <li>● Assessment of persistent organic pollutants</li> </ul>
Coastal and marine resources	<ul style="list-style-type: none"> <li>● International Waters Strategic Action Programme</li> <li>● Multilateral High Level Consultations covering conservation and management of the region's highly migratory fish stocks</li> </ul>
Freshwater resources	<ul style="list-style-type: none"> <li>● Establishment of the Pacific Water Association</li> </ul>
Energy resources	<ul style="list-style-type: none"> <li>● Review of the energy sector and continued development of the Pacific Power Association</li> </ul>
Tourism resources	<ul style="list-style-type: none"> <li>● Further promotion of sustainable tourism and the integration of the private sector within the Tourism Council for the South Pacific (to become the South Pacific Tourism Organization)</li> <li>● Pacific centre of excellence on sustainable tourism (USP)</li> </ul>
Biodiversity resources	<ul style="list-style-type: none"> <li>● Action Strategy on the Conservation of Nature and Natural Resources and Round-table process</li> </ul>
Administrative capacity	<ul style="list-style-type: none"> <li>● National Environment Management Strategies (NEMS)</li> <li>● Economic and public sector reform process</li> </ul>
Regional co-operation	<ul style="list-style-type: none"> <li>● Improved co-ordination through a regional development strategy and working groups of the South Pacific Organizations Co-ordinating Committee</li> <li>● Subregional implementation through the establishment of subregional offices of the UN system (e.g. FAO and WMO)</li> <li>● START – Oceania established at USP</li> </ul>
Transport and telecommunications	<ul style="list-style-type: none"> <li>● Regional aviation agreements</li> <li>● Establishment of the Pacific Islands Telecommunications Association</li> <li>● Improved communications – connectivity is increasing in the region and SIDSNET is slowly evolving, with clear benefits for the region</li> </ul>
Human resource development	<ul style="list-style-type: none"> <li>● Regional Strategy for Environmental Education</li> <li>● Proposed Pacific Centre for Sustainable Development</li> </ul>
Implementation monitoring and review	<ul style="list-style-type: none"> <li>● Initial assessment of an Environmental Vulnerability Index</li> </ul>

negotiation of the Implementing Agreement under UNCLOS for highly migratory fish stocks, the Barbados Programme of Action and the Global Programme for the Protection of the Marine Environment from Land Based Activities (GPA).

### Barbados Programme of Action

It also is hard to gauge the extent to which the Barbados Programme of Action has influenced the action taken by the region and its development partners to implement sustainable development. The Programme of Action provides a comprehensive framework for the sustainable development of islands but so far has been linked to few specific funding mechanisms apart from the GEF. There have, nonetheless, been a significant number of initiatives that can be identified as implementing the Barbados Programme of Action. These are shown in Table 2.2. Of these, the development and imminent implementation of the Strategic Action Programme for International Waters has drawn directly on the Barbados Programme

of Action and its influence on the Global Environment Facility's international waters portfolio.

In 1996, the region submitted a report to CSD4 on activities to implement the Barbados Programme of Action. Since this time, considerable effort at a national level has been complemented by collective regional action to fulfil commitments made to the blueprints for sustainable development – *Agenda 21* and the Barbados Programme of Action. Particular effort has been made to build capacity, develop effective policy and plans, better co-ordinate national and regional action, take stock of the region's environment and natural resources, and reform national and regional arrangements where necessary. Examples of commitment and progress include, at the national level, the formulation and implementation of National Environmental Management Strategies (NEMS), the establishment of environment units and the development of environmental legislation and policies. Examples at the regional level include the work of SPREP, the progress in integrating environmental and other social concerns in the region's economic and public

**Table 2.3: Regional Multilateral Environmental Agreements**

Forum Sec. = Secretariat of the South Pacific Forum

- Signature
- Ratification-Accession
- Signature/Ratification-Accession

Depository	Convention on Conservation of Nature in the South Pacific Entry into force 26 June 1990				Convention for the Protection of the Natural Resources and Environment of the South Pacific Region Entry into force 22 August 1990		Convention to Ban the Importation of Hazardous/Radioactive Wastes; Control Transboundary Movement and Management of Hazardous Wastes within the South Pacific Region 16 Sept 1995 (not in force)			South Pacific Nuclear Free Zone Treaty SPNFZT 6 August 1985			Niue Treaty on Co-operation in Fisheries Surveillance and Law Enforcement in the South Pacific Wellington 1990		Convention on the Prohibition of Fishing with Long Driftnets in the South Pacific Wellington 1990	
	Govt. Samoa	Forum Sec.	Protocol 1	Protocol 2	Forum Sec.	Forum Sec.	Protocol 1	Protocol 2	Protocol 3	FFA	FFA	Protocol 1	Protocol 2			
Secretariat	SPREP	SPREP			SPREP	Forum Sec.				FFA	FFA					
Australia	○	●	○	●	●	●				●	●					
Cook Is	○	●	●	●	○	●				●	●					
FSM		●	●	●	●					●	●					
Fiji	○	○	○	○	●	●				●	●					
Kiribati					○	●				●	●					
Marshall Is		●	●	●						●	○					
Nauru		○	○	○	○	●				●	●					
Niue					○	●				●	○					
Palau		○	○	○	○					●	●					
PNG	○	●	●	●	●	●				●						
Samoa	●	●	●	●	○	●				●	○					
Solomon Is		○	○	○	●	●				●	●					
Tonga					○	○				●						
Tuvalu		○	○	○		●				●	○					
Vanuatu						●				●	○					
France	●		●	●				○	○	○						
French Polynesia																
New Caledonia																
Wallis & Futuna																
New Zealand		●	●	●	○	●				●	●					
Tokelau																
UK		○	○	○				○	○	○						
Pitcairn																
US		●	●	●				○	○	○	●	●	○			
American Samoa																
Guam																
Northern Marianas																

Compiled by SPREP (1999)

sector reform programmes through the Forum Economic Ministers' Meeting (FEMM), and the South Pacific Organizations Coordinating Committee (SPOCC) Regional Development Strategy and working groups on marine resources and tourism.

### Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities

The international community adopted the Global Programme of Action for the Protection of the Marine Environment from Land Based Activities in Washington DC in 1995. While a range of national and regional initiatives have attempted to address the issues of source categories covered by the GPA, no specific initiative has been taken to implement the GPA in the Pacific region (SPREP 1999a). The first steps to develop a complementary Regional Programme of Action are expected to take place in 1999.

### REGIONAL

A number of non-binding environmental agreements operate in the Pacific. Most of these agreements have translated into specific programmes and are consistent with the objectives of *Agenda 21*.

The principal agreement for environmental protection is the SPREP Action Plan 1997–2000. This is a requirement of the Agreement Establishing SPREP

(1995), which gave the South Pacific Regional Environment Programme (SPREP) new legal status and a framework for members to improve co-ordination on environmental matters and to protect and improve the shared environment of Pacific island states. The programmes contained in the Action Plan cover a wide range of detailed environmental issues. The five priorities identified in the Action Plan are:

1. Biodiversity and Natural Resource Conservation
2. Climate Change and Integrated Coastal Management
3. Waste Management, Pollution Prevention and Emergencies
4. Environmental Management, Planning and Institutional Strengthening
5. Environmental Education, Information and Training

Related to the implementation of the Action Plan, governments and NGOs have agreed to an Action Strategy for the Conservation of Nature and Natural Resources. This was revised in 1998 and is now the focus for a series of donor/institution/NGO round-tables to promote its implementation.

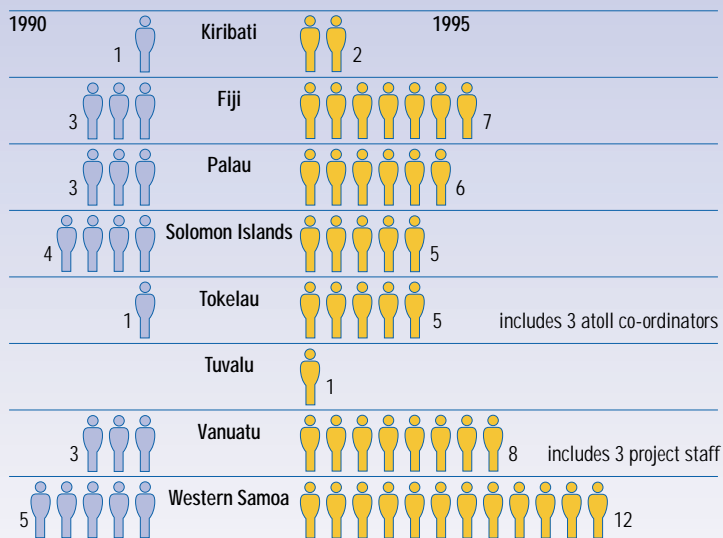
## Laws and institutions

### Institutional and legal frameworks at national level

While it may be difficult to demonstrate categorically where there has been progress to protect the environment at the national level, some of the policy and institutional foundations for progress towards sustainable development are being put in place. These include the strengthening of environment units and the adoption of National Environmental Management Strategies (NEMS).

The capacity of countries to undertake activities to protect the environment and to integrate environmental objectives into national planning and decision-making is a useful measure of progress. Any increase in the number of staff in environment units, particularly at a time when the public sector is under pressure to downsize, is an indication that governments are making some commitment towards the implementation of *Agenda 21*. Not all positions are financed solely from government funds but those that are financed through official development assistance result from government requests for assistance and are normally linked to the provision of counterparts and logistic support. As shown in Figure 2.1 there has been a discernible increase in the region.

Figure 2.1: Change in staffing levels of environment units in selected PICs



Source: after Miles (1994)

This does not include capacity in fisheries agencies, the community or NGOs. It is likely that there has been some increase in the capacity of NGOs and local communities as a number of donors and activities have focused on these groups in the region.

As recorded in the series of NEMS documents, these efforts have noted encouraging progress in a number of countries. There is also a well-established regional network of environmental personnel, with useful extensions outside the region. Modern technology, especially e-mail and the Internet, leaves local environmental staff on remote islands far less isolated than was the case twenty, or even ten, years ago. This trend will continue as further advances in technology will continue to revolutionize the communications sector, with clear benefits for the flow of information within the region.

The machinery of government has also been modified to introduce environment and/or conservation agencies. Usually they are part of a larger resource management department, but in some cases they are free-standing. Even more than their counterparts elsewhere, these groups are invariably under pressure, with small

numbers of staff and a rapidly increasing workload. Financial resources are also a constraint, but budgetary increases alone would not solve the staffing problem. Capacity-building has been identified as one of the main priorities for the region during the current phase: it is a need that affects the largest countries as well as the smallest. Also, in some countries the mainstreaming of environmental policy and resource management approaches across all sectors of government has been identified as a legitimate, useful approach.

Current institutional arrangements in regard to the government structure and management of the environment are summarized in Table 2.4.

Legislation dealing with environmental protection has been drafted in several countries (Cook Islands, Fiji, Kiribati, Papua New Guinea, Samoa, Solomon Islands and Vanuatu). In some cases the legislation has incorporated procedures for environmental impact assessment (EIA), but care has been taken not to make these too demanding of slender administrative and technical resources. The implementation of this legislation is the next step in the process of legal reform (Boer 1993).

**Table 2.4: Institutional arrangements at national level in PICs**

Country or territory	Description
American Samoa	Environmental matters dealt with by the Environmental Protection Agency, the Department of Marine and Wildlife Resources and the American Samoa Coastal Management Program
Cook Islands	Cook Islands Environment Service, Ministry of Foreign Affairs and Immigration
Federated States of Micronesia	Department of Health Education and Social Affairs, Department of External Affairs
Fiji	Environmental matters dealt with by the Ministry of Local Government, Housing and Environment
French Polynesia	Environment matters dealt with by the Department of Environment and Special Adviser for Foreign Affairs
Guam	Guam Environmental Protection Agency established in 1973 to administer laws and regulations adopted for the protection of air, land and water. Guam formalized EIA requirements and wetland use controls in 1998 following eight years of management under executive orders.
Kiribati	Ministry of Environment and Social Development
Marshall Islands	RMI Environmental Protection Authority has broad powers to monitor environmental quality and to enforce protective regulations.
Niue	Department of Community Affairs
Northern Mariana Islands	Office of the Governor
Palau	Palau Environmental Quality and Protection Board (EQPB)
Papua New Guinea	Department of Environment and Conservation
Samoa	Environmental issues are coordinated by the Division of Environment and Conservation within the Department of Lands, Surveys and Environment.
Solomon Islands	Division of Environment and Conservation, Ministry of Forests, Environment and Conservation. DEC is guided by the priorities identified in NEMS and by its recently passed Environment Act.
Tokelau	Office of Tokelau Affairs, Department of Natural Resources and the Environment
Tonga	Environmental issues are co-ordinated by the Environmental Planning and Conservation Section, Ministry of Lands, Surveys and Natural Resources.
Tuvalu	Each Ministry deals with environmental issues falling within its own area of responsibility. No single body is responsible for environmental protection and management, although attempts to co-ordinate through the Office of the Prime Minister and the National Planning Co-ordinating Committee have been made.
Vanuatu	Environmental issues in this independent republic are co-ordinated by the government's Environment Unit. The Department of Forests has established an internal Conservation Unit to deal primarily with forest conservation issues, particularly in areas related to Forest Policy and the Code of Logging Practice.

Governments have also shown a commitment to improved forestry practices, particularly in the larger island countries. National forestry action programmes (in Fiji and PNG), national forest resource inventories (Fiji, PNG, Samoa, Solomon Islands, Vanuatu), codes of logging practice and forest policy/legislation reviews (several countries) have been among the measures taken. In the smaller island countries, the response has included watershed management programmes and expanded reforestation and agroforestry initiatives. In all countries, governments have increased their support for the non-timber forest products subsector.

EIA-related regulations exist in at least nine other Pacific countries, but implementation and enforcement remains weak, with provisions inserted in unco-ordinated sectoral laws. Vanuatu is one of the few countries to have established an inter-agency committee for assessments (Rural Lands Development Committee). Given limited country capacities, assessments in even the more established countries of PNG and Fiji are of the order of only 3–6 per year. Some countries, such as Solomon Islands and FSM have EIA requirements as part of legislation to control foreign investment but these are also inadequately implemented. Guam's local EIA requirements have been applied for eight years and, although 1998 was a very slow year for development, 17 EIAs were reviewed.

Draft laws that seek to co-ordinate all environment and conservation related issues have either been passed, exist or are in the pipeline in Fiji, Solomon Islands, PNG, Kiribati, Niue, Samoa, Cook Islands, Nauru and Vanuatu. In Fiji the detailed provisions of the Sustainable Development Bill are now being enacted in parts, with the first such enactment in 1998 relating to implementation of obligations under the Ozone and Montreal agreements. Despite the significant implementation score for ozone-related MEAs in the region, only PNG (1997) and Fiji (1998) have enacted legislation.

In response to waste management problems, many PICs have developed and enacted legislation that addresses litter (e.g. Fiji's Litter Decree of 1991); local councils have been empowered to provide sanitary services dealing with rubbish (Kiribati's Local Government Act of 1984); and Public Health Acts (Papua New Guinea, Solomon Islands) have provided mechanisms for regulating and controlling domestic refuse, as well as covering health, sanitation, scavenging and disposal of waste. Some PICs are also working

towards specific legislation regarding waste management. For example, the Fijian authorities have included a comprehensive section on waste minimization and management as a component of their overall draft sustainable development legislation, which is currently being considered by cabinet. It is expected that the legislation will be approved in mid-1999.

A further example of the use of legislation is the use of village by-laws in Samoa. These have been passed to create no fewer than 60 village fishery reserves ranging in size from 1 500 to 16 000 m<sup>2</sup>. Other legislation is more conventional and gives effect to EIA and the establishment of various types of Protected Areas (Boer 1993).

Like other regions, the Pacific faces the 'implementation gap'. This means that the policies that are on paper or in the statute book may not be implemented in a consistent way and may, in the worst cases, be completely bypassed (SPREP 1992). Not surprisingly, this arises when the pressure to reap an economic benefit by rapid resource extraction is too great, and when governments are reluctant to slow down a project by sticking to the letter of environmental regulation.

### **Institutional and legal framework at regional level**

The Pacific region has many regional organizations. The primary organizations are listed below (for further details see Box 2.4):

- South Pacific Regional Environment Programme (SPREP);
- Forum Secretariat (FS);
- Forum Fisheries Agency (FFA);
- South Pacific Applied Geoscience Commission (SOPAC);
- Secretariat of the Pacific Community (SPC);
- Tourism Council of the South Pacific (TCSP);
- University of the South Pacific (USP);
- Pacific Island Development Programme (PIDP).

The implementation of *Agenda 21* and the Barbados Plan of Action requires these organizations, with often narrow sectoral mandates, to co-ordinate their activities and collaborate actively on projects. Since the Earth Summit, collaboration between regional organizations in the Pacific has increased (Miles 1994). The Council of Regional Organizations for the Pacific (CROP), formerly the South Pacific Organizations Coordinating



Committee (SPOCC), is the formal co-ordination mechanism for regional organizations and a recent review by CROP of institutional arrangements in the marine sector aims to ensure complementary mandates and to avoid duplication among regional organizations. CROP, with the Forum Secretariat providing permanent administrative support, is providing an important framework for ensuring regional institutions are focused on common regional goals. This also allows for improved mainstreaming of environmental considerations into regional policy and programmes.

At an operational level co-ordination between regional organizations occurs through their participation in the sectoral meetings convened by each other. Another approach to co-ordination is in the joint planning and implementation of projects. Recent examples include a

co-ordinated response to Canadian development assistance (CSPOD II) and the development of a Strategic Action Programme under the international waters portfolio of the Global Environment Facility (GEF). The Forum Secretariat is responsible for promoting the harmonization of regional programmes through the preparation of a regional development strategy (Forum Secretariat 1993). At the regional level the Pacific's regional organizations are working through the CROP Regional Development Strategy process to develop a sustainable development framework that incorporates the key linkages between the various development sectors. Sustainable management of these sectors, including agriculture, health and marine resources, is being actively promoted through the CROP working groups.

#### Box 2.4: Members of the Council of Regional Organizations (CROP)

**South Pacific Regional Environment Programme (SPREP).** SPREP was established in 1982 by the governments and administrations of 22 PICs and four developed countries with direct interests in the region. It is the intergovernmental organization charged with promoting co-operation, supporting protection and improvement of the Pacific environment and ensuring its sustainable development. In the last ten years this has focused on biodiversity conservation, waste management, climate change, impact assessment, and environmental education and awareness.

**Forum Secretariat (FS).** The Forum was established in 1971 from the independent and self-governing countries of the Pacific. Its 16 members are Australia, Cook Islands, Fiji, Kiribati, Marshall Islands, FMS, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu. The Forum's mission is to enhance the economic and social well-being of the Pacific islands in support of the efforts of national governments. Its responsibility is to facilitate, develop and maintain co-operation and consultation between and among its members on issues such as trade, economic development, transport, energy, telecommunications and other related matters. As the permanent chair of SPOCC, the Forum provides a lead co-ordination role in the Pacific.

**Forum Fisheries Agency (FFA).** The FFA was established in 1979 by the independent states comprising the South Pacific Forum. With a broad mission to enable its member countries to obtain maximum sustained benefit from the conservation and sustainable use of their fisheries resources, the FFA has in practice concentrated on assisting member countries in the management and development of their tuna resources, in particular the negotiation and implementation of related agreements among its member countries and with distant-water fishing nations.

**South Pacific Applied Geoscience Commission (SOPAC).** SOPAC originated in 1972 as the Committee for Co-ordination of Joint Prospecting for Mineral Resources in South Pacific Offshore Areas, a United Nations (ESCAP) project to assist South Pacific countries by investigating their non-living marine resources. Its member countries are Australia, Cook Islands, Fiji, Guam, Kiribati, Marshall Islands, FSM, New Zealand, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu. SOPAC has been involved in offshore projects, including oil and mineral prospecting, resource surveys and nearshore activity (i.e. assessing sand and aggregate resources for construction), advising PICs on environmental effects of physical modifications to the coast, water and sanitation, and co-ordinates with SPC on health-related issues and with SPREP on pollution issues.

**The Secretariat of the Pacific Community (SPC).** Established in 1947, the SPC has 5 metropolitan and 22 island countries/territories as members and is headquartered in Noumea, New Caledonia. Its current work programme covers such diverse activities as agriculture and plant protection, marine resources, rural development and technology, community health, statistics, economics, demography, women's programmes and activities, community education and training, youth and adult education, information services, awards, grants, and cultural conservation and exchange. It is mandated to provide development assistance, management advice and applied research in the coastal/national fisheries sector and research on oceanic (mainly tuna) fisheries.

**Tourism Council of the South Pacific (TCSP).** The TCSP is a regional intergovernmental organization jointly owned by its 12 member countries. Its role is to work with national tourist offices, international airlines and tour operators to increase visitors' arrivals to the region, to market and promote tourism and to help the private sector enhance the quality of their products and services through a variety of programmes on training, tourism awareness and preservation of the environment.

**University of the South Pacific (USP).** USP was established in Suva, Fiji in 1969 and has campuses and offices, tutorial studies, classrooms and libraries in 10 of the 11 countries of the region. (e.g. in Tonga the Institute of Rural Development, in Vanuatu the Pacific Law and Language Units, and in Kiribati an Atoll Research and Development Unit). The university has four schools (Agriculture, Humanities, Pure and Applied Social and Economic Development), seven action-orientated institutions (education; marine resources; natural resources; Pacific studies; research, extension and training in agriculture; rural development; social and administrative studies) and units for atoll research and extension services.

**Pacific Island Development Programme (PIDP).** Initiated at the East-West Center in Honolulu, PIDP has 22 members, including Pacific island developing countries and territories. The Programme draws academic resources from regional and international organizations to plan and conduct projects mainly concerned with: private sector development; positive cross-cultural business interactions; training senior government officials, representatives of the private sector and other professionals; regional advisory services to help formulate national development policies and strategies; establishing computerized databases of regionally relevant information; and publishing significant research results.

## Economic instruments

It is clear that the key to sustainability of resource use and the achievement of environmental conservation is the integration of environmental safeguards in economic decision-making. This is a complex task, which needs to be addressed at all levels, from the national policy level to the local level. To achieve long-term economic and environmental viability, some comprehensive institutional and legal changes need to be made. These include the introduction of integrated mechanisms for the generation of economic and environmental policy, and the enactment of legislation at national and provincial (or state) level to ensure that policies can be carried out within a consistent and enforceable legal framework.

Techniques of environmental accounting and economics have evolved in recent years to take greater account of the sustainability of welfare and to provide improved guidance for environmental policy. These may be of particular interest to small island states, given their heavy dependence on the natural environment. Initial work on environmental accounting and economics in the region (Fairbairn and Tisdell 1994) identified an underlying need to better quantify natural stocks and environmental assets for the successful introduction of these techniques. Many examples of economic instruments are being used globally but there is no explicit country or regional effort to examine their applicability to PICs. Examples of the use of economic instruments in island communities have been shown to produce benefits (SPREP 1998e). There has been little concerted effort towards the use of economic policy instruments, in spite of their encouragement in country NEMS produced in the early 1990s.

Examples of economic instruments currently used in the PICs include:

- access fees and licensing of foreign fishing vessels (Preston 1997);
- deposit-refund schemes for glass bottles (GOWS 1994);
- user fees for park, reserve or coastal access to customarily owned land (SPREP 1993b).

The success of the instruments has not been formally evaluated. Their overall impact on environmental protection and enhancement needs to take into account the large subsistence economy that still functions in the region. Communal management of resources can be

relatively efficient and can provide social security at the village level. However, titles of the local community need to be definite and settled and there may be a need to improve communal or village governance. Once the titles of local communities become definite this should establish a legal responsibility for the use of these resources. For example, a village may be held to be liable for adverse environmental spillovers on other villages caused by its activities, and compensation or penalties may be imposed; or, if favourable externality is created by the village, be eligible for reward. Furthermore, within the village greater consideration should be given to the rights and responsibilities of resource owners.

In many cases, village leaders would benefit from more accurate information about environmental changes and risks in the local area, as well as their possible impacts on other communities. Negotiated intercommunity settlement of issues of mutual concern, such as impacts of environmental spillovers, should be encouraged.

## Industry and new technologies

The countries of the South Pacific are small and in general do not rely heavily on an industrial base. The necessity for cleaner and innovative production processes is therefore perceived to be less than in more industrialized nations. As a result governments have not given the imposition of strict controls over industry a high priority, sometimes with adverse impacts. Initiatives in the areas of cleaner production processes and new technologies are at an embryonic stage within the region.

The adoption of cleaner production processes has not been given a high priority by manufacturers in the region. The management of tailings waste at the BHP Ok Tedi mine in Papua New Guinea is one example. Due to cost considerations a tailings dam was not built and maintained, with tailings instead being discharged directly into the Ok Tedi river for many years. The resulting environmental damage to the river is now famous internationally as an example of inappropriate waste disposal and has cost the company many hundreds of millions of dollars in compensation.

The SPC Plant Protection Programme is providing training on pesticide safety and the promotion, facilitation, training and research of non-chemical means of pest control: that is, biological control, integrated pest management, use of protein bait sprays and bagging of fruit to prevent infestation by fruit flies.

There is also the growing importance of organic produce, a niche sector that, with the right marketing, may be able to provide higher returns to farmers.

A number of companies have established 'green' products (Fullerton 1998), and a number of opportunities exist to further develop eco-labels in the Pacific. Pacific island governments and the private sector are being consulted on ways to maximize these opportunities.

### Financing environmental action

The lack of human, technical and financial resources is a fundamental constraint to the integration of environment and development in decision-making in most PICs. In the past, with the benefit of aid inflows and remittances, the central banks in PICs have performed credibly in maintaining stability in domestic prices and balance of payments. In the last few years, however, the need for fiscal discipline has become evident. The current high inflation rates, mounting balance of payments deficits, falling external reserves and public sector deficits pose serious threats to national development and disadvantage PICs relative to their competitors. Island countries are also vulnerable to falling export prices, rising import prices and overseas interest rates which are beyond their control.

All countries are seeking to attract more foreign direct investment, in order to boost output and foreign exchange earnings. Apart from timber, minerals and tuna fisheries, flows of foreign direct investment remain well below hoped-for levels. Forum member countries have now agreed to work towards implementation of an investment code along the lines of the Association of Pacific Exporting Countries' (APEC's) non-binding code, as a signal to potential investors of the region's commitment to promoting investment.

Financial flows, in themselves, have no environmental impact: it is the use of these flows that are of concern. For example, aid or internal finance to build infrastructure and capital flows to construct tourist facilities have obvious environmental impacts. Consequently, the issue becomes one of how these real impacts are dealt with. By and large assessment of these real impacts is through the application of environmental impact assessments (EIAs). These attempt to assess economic, social and environmental impacts, and either to balance these out in order to determine a net benefit or cost, or identify ways in which to ameliorate the negative economic, social and environmental impacts.

Most PICs have adopted, through their NEMS, a

general policy to undertake such an EIA in all cases (or for projects of substance). In addition, aid donors will usually require an EIA for projects they are funding. There are recommendations that international financial institutions insist on PICs mainstreaming environmental concerns by requiring their governments, as a loan condition, to make financial allocations to implement environmental regulations. Finally, investment regulations for foreign and domestic investors, town and country planning regulations and so forth, also commonly require EIAs.

The integration of EIA into the planning process is now widespread in the developed world and is becoming obligatory in projects funded by multilateral and bilateral development assistance. There is a tendency in some quarters of government, however, for EIA to be regarded as an unnecessary extra hurdle in the development process and one that is concerned with peripheral interests. Earlier this decade, many PICs highlighted their concerns as to EIAs having no formal legal status, with their application being purely discretionary as part of planning permission approval or departmental licensing. In Fiji, NEMS highlights key development bodies such as the Trade and Investment Board, Fiji Development Bank and Native Land Trust Board to develop policy provision for any form of EIA, to minimize serious implications for development initiatives.

However, it is important to draw a distinction between the existence of regulations and policies and their application. Thus, while the requirement to undertake EIAs will be universal, the extent to which these are actually undertaken might well be less than perfect. Consequently the issue in relation to the environment is not to control financial flows, but to control their use. If the proposed use of funds is unacceptable on environmental, social or economic grounds, then the flow of funds should not occur.

It has not been possible to determine the extent of access to or mobilization of financial resources necessary for the implementation of the Barbados Plan of Action in the Pacific region. However, some progress has been made. At a national level, there are indications that a greater proportion of national budgets has been mobilized for environmental management and sustainable development. For example, staffing levels of environment units have been increased in all PICs at a time when government indebtedness is high in some countries and when there is pressure to reduce employment in the public sector. However, most PICs still have small environment and conservation agencies, and generally

few staff, often with limited training and experience. For the small island states, the training and retaining of environmental specialists is a particular concern.

At a regional level SPREP's financial resources have increased steadily over the past five years although the projections are that this trend is stabilizing. This is shown in Figure 2.2. It appears that for specific environmental activities new funds are available. The stand-off between developed and developing countries over the allocation of financial resources, which still exists at an international level, is less obvious in the Pacific region.

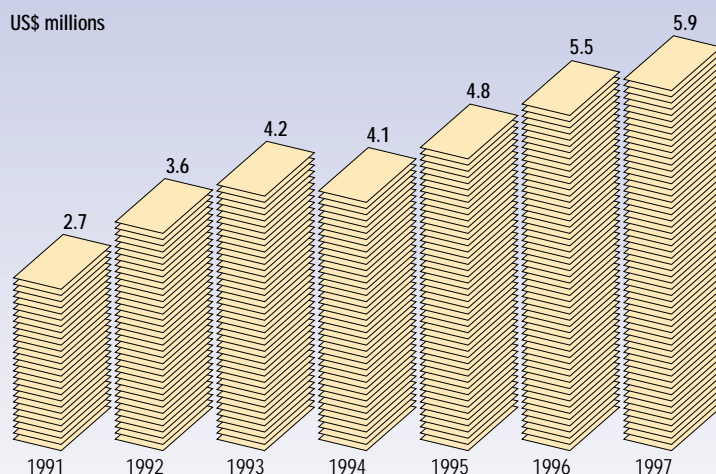
As a measure of their commitment to the environment and sustainable development, in 1991 the 26 member countries of SPREP also agreed to increase the total of their voluntary contributions from US\$250 000 to US\$500 000. The balance of the funds shown in Figure 2.2 is made up of extrabudgetary contributions. Over the next five years considerable extrabudgetary support is likely from Countries such as Australia, Canada and New Zealand, and donors like the EC, GEF and UNDP.

### Public participation

Policy approaches aimed at facilitating community participation are integral to a number of programme areas at a national level and within regional organizations. Specific examples include:

- approaches taken in developing NEMS at country level;

Figure 2.2: SPREP expenditure on regional environmental programmes



Source: SPREP 1991–1997

### Box 2.5: Participation in the Convention on Biological Diversity

The fundamental principle of the Convention is that States have the sovereign right to exploit their own resources pursuant to their own environmental policies and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or areas beyond the limits of national jurisdiction (Article 3).

Article 8 (j) states '... States are expected to respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application for the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practice'.

In the Pacific, with often over 80 per cent of resources held in customary land tenure arrangements, the importance of participatory approaches to conservation cannot be over-stated. Western concepts of national parks and nature reserves failed to protect biodiversity in the Pacific because they ignored the close relationship between Pacific island people and the natural resources. Imposing 'reserve status' therefore isolated, and sometimes antagonized, the very people whose livelihood depended on the resources of the area in question. A community-based approach to conservation programmes in PICs recognizes the need for the land and resource owners and users to be at the front line in the conservation of the resources they depend on. They must be committed to the conservation of these resources as their very existence dictates that they do so.

The Action Strategy for Nature Conservation and Protected Areas in the South Pacific is a regional strategy for the promotion of sustainable development and the conservation of biodiversity. The strategy recognizes the important role of local landowners and communities in conservation of biodiversity and seeks to encourage recognition of its importance to Pacific island societies and sustainable economic development based on the region's biodiversity.

- private sector involvement in trade and investment programmes, tourism development and regional environmental policy;
- capacity-building for environmental management and planning activities, as outlined in the Regional Project Document, July 1998;
- community resource management activities, as outlined in the Capacity 21 Programme, to improve the capacity of customary landholder groups to plan for the management and monitoring of their land and sea areas for sustainable development;
- community and consultation processes related to the implementation of GEF projects;
- village-level coral reef monitoring programme in Samoa;
- crown-of-thorns clean-up by reef user communities in Cook Islands;

- training for local communities in sustainable agriculture and fisheries practices in Samoa;
- Participatory Rural Appraisal (PRA) workshops for local communities and conservation officials in Solomon Islands;
- some domestic measures in the area of biodiversity and nature conservation have also broken new ground by using traditional practices and customary ownership to support conservation measures in the coastal fishery, as in Samoa; these measures have been particularly participatory in nature, as is described in Box 2.5 outlining Convention on Biological Diversity activities.

The importance of non-government organizations (NGOs) in the region also needs to be highlighted. The role of NGOs in promoting participatory and grassroots development is well recognized. NGOs are effective vehicles in encouraging and empowering the disadvantaged to play a greater role in improving their own well-being. Increasingly, NGOs are working hand-in-hand with governments and development partners in national development efforts. The potential of many indigenous NGOs and community-based organizations in helping to promote human development is, however, not fully realized because of inadequate management capability, lack of skills in programme planning and implementation and often weak project accountability and monitoring systems.

NGOs at the regional level include the Pacific Islands Association of NGOs (PIANGO), which functions as a regional NGO association focusing on the organization and regional development of NGOs in the Pacific. Most countries have a national umbrella NGO association, such as DSE in the Solomon Islands, and the Tuvalu Association of NGOs (TANGO) in Tonga and Tuvalu. The Foundation for the Peoples of the South Pacific (FSP) is a regional non-profit organization aiming to work with the Pacific people in human development programmes and to improve the quality of life for village people. Activities range from rural housing construction programmes and income generation projects to community forestry activities. FSP is present in Solomon Islands, Vanuatu and Tonga. NGOs at the international level, such as the World Wide Fund for Nature (WWF), The Nature Conservancy (TNC) and Greenpeace, also play a significant role in the promotion of environmental management and sustainable development in the region.

At the national level, there are a growing number of NGOs, with a range of mandates and objectives: women's

development programmes, research (ecological, historical, cultural), disaster relief, the co-ordination of youth activities, adult literacy programmes, farmer support programmes, family planning programmes and academic institutions such as USP extension service centres that, for example, run community training programmes in Tonga. Some NGOs, such as the Girl Guides Association in the Cook Islands, have developed environmental policies. Vanuatu and Solomon Islands have in recent years witnessed the establishment of the Vanuatu Environment Organization (VEO) and the Solomon Islands Indigenous Peoples Environment Organization (SIPEO).

During the last decade, there has been an important shift in the direction of NGO activity. During the 1980s, the crisis of the rainforest worldwide led a number of international NGOs to conduct campaigns to 'stop logging'. In the Pacific, some NGOs from Australia and New Zealand followed this line, whereas others adopted a slightly different approach. They became involved on the ground and looked for options available to forest owners to derive income in other ways, such as investment in eco-tourism and eco-timber.

Over the same period, and sometimes with support from offshore NGOs, the local movement became more active, especially in PNG and the Solomon Islands. This local thrust was partly towards non-wood forest products as a means of providing income for the forest-owning community, but it also took up the theme of sustainable management. Some NGOs went into the provision of training courses in forest management, chainsaw operation and other technical skills, so that local people

#### Box 2.6: Campaigning to raise awareness and change behaviour

Regional campaigns for the conservation of key species and ecosystems have proved effective at the regional level. The 1995 Year of the Sea Turtle campaign resulted in one country declaring a one-year moratorium on the commercial harvesting of this important but critically threatened species. This moratorium was later extended for another three years. A number of other countries have expressed the desire to follow this example but have yet to do so. The 1997 Year of the Coral Reef campaign demonstrated the effectiveness and success of awareness-raising to motivate people to change their attitudes and behaviour regarding the use of a resource such as coral reefs.

Policies for the conservation of migratory species such as sea turtles and marine mammals can only be successful in a region like this if there is international co-operation. Unfortunately, whilst Pacific islands have again taken the lead in promoting a regional ban on the commercial harvesting of sea turtles, neighbouring states continue to harvest them at unsustainable levels. More must be done at the international level if these species are to survive.



could derive maximum benefit from the extraction of a sustainable volume of timber. NGOs have also been strongly supportive of policy measures to protect the use of traditional and indigenous knowledge, as in the Suva Declaration of 1995.

### Environmental information and education

The importance of environmental education and awareness-raising is increasingly well understood throughout the region and forms an integral element of support to all environmental programmes.

Environmental education programmes have developed a wide range of formal and non-formal curriculum resources and provided training activities for teachers, NGOs, church leaders and the media, all aimed at raising environmental awareness.

One of the most significant recent events in environmental education in the Pacific was the convening in mid-1998 of a regional conference for environmental education and training. The major output of the conference was the 'Action Strategy for Environmental Education and Training in the Pacific Region, 1999–2003', which was subsequently endorsed in principle by the 10th SPREP Meeting. The Action Strategy, published in

#### Box 2.7: Small Island Developing States (SIDS) and the Lomé Convention

##### Lomé Convention

The Lomé Convention, which for the past 25 years has been the framework for the European Community and its African Caribbean and Pacific (ACP) development co-operation partners, has from the very beginning taken into consideration the obstacles particularly hampering the SIDS<sup>1</sup>. Out of the 71 ACP countries 26 are independent island states<sup>2</sup> and 17 of them<sup>3</sup> fall under the category of least-developed ACP States, which entitles them to special treatment under the Convention<sup>4</sup>. When compared with other ACP regions the island states have derived considerable benefits *per capita* from the European Development Fund (EDF) allocations<sup>5</sup>. In addition, for several island ACP countries the trade protocols of the Lomé Convention on sugar, bananas and rum have provided privileged access to the European market, and also indirect price support for these products. In order to assist some SIDS to diversify their mono-producer economies, the EU is supporting some banana and mineral producers with EDF and budget line assistance. Good examples of this are Jamaica and the Windward Islands.

##### Lomé and Environment

Lomé IV embodied for the first time in 1991 environmental objectives stating that 'development shall be based on a sustainable balance between its economic objectives, the rational management of the environment and the enhancement of natural and human resources' (Art. 4) and a new Title I on Environment spelled out the principles, priorities and procedures for integrating 'environmental aspects' into all other Lomé operations. It did not however set any quantitative targets and as EDF 7 was programmed just prior to the Rio Conference, it is unreasonable to expect the Rio commitments to be fully reflected in the EDF national indicative programmes for 1990–95. The integration of the environment dimension into EC development co-operation takes place at three different levels: direct financing of projects and programmes with specific environmental objectives; environmental concerns in the overall dialogue with the partner countries; and through efforts to ensure that overall development and economic co-operation activities integrate environmental issues, in particular by using Environmental Assessment tools.

In 1996, the EC initiated a comprehensive independent evaluation of the environmental performance of its programmes in the developing countries. It was concluded that, in the period of 1990–1995, the overall environmental performance of EC programmes was relatively

low compared to the extensive policy objectives. Only a few ACP countries included environment into their National and Regional Indicative Programmes as a cross-sectoral issue at the strategic level, although almost all rural development programmes incorporated natural resource management. However, it was also indicated that improvements have been set in motion since 1990 through the design of specific strategies and through a more systematic use of Environmental Assessment tools and the integrated Project Cycle Management. In late 1993 the Commission introduced formal procedures, which became mandatory in 1996, for assessing the environmental implications of project proposals and for integrating environmental factors during the project cycle. Over the period 1990–1995, Environment Impact Assessment (EIA) procedures were rarely applied, although those actually undertaken being of a high quality. In 1998, the various departments of the Commission involved in economic and development co-operation started a comprehensive review to update and harmonise the EIA procedures and guidance. Strategic environment assessments will be introduced during policy formulation and country programming. However, since Lomé Convention is a partnership agreement, the success of environmental policies depends only in part on incorporation of priority objectives into the design of EC programmes. More importantly, it depends on the commitment of ACP governments to these objectives in their respective national and regional indicative programmes.

##### Post-Lomé

The current Lomé IV Convention expires 29 February 2000 and negotiations with a view to concluding a new development partnership agreement were started in September 1998. In 1996 the European Commission published its Green Paper on the future ACP-EU relations launching the debate on the thorough review of the present Convention. The Paper observes that the relationship between the EU and the ACP countries will enter a new phase, that this renewed relationship will have to be based in the new global reality and that the innovations introduced will have to increase the efficiency of the co-operation programme. It also identifies some special aspects of importance to the SIDS: the challenges of further regional integration and transition to a competitive economic environment; problems such as political transitions, heterogeneous economies within the region, lack of human resources, migration and drugs<sup>6</sup>; and stresses the attention to be given



### Box 2.8: Case Study in Collective Policy-making – the South Pacific Biodiversity Conservation Programme (SPBCP)

The establishment of conservation areas has been identified as critical to the implementation of the Action Strategy for Nature Conservation in the Pacific Region. This strategy recognizes the important role of the land and resource owners in the conservation of biodiversity and seeks to encourage their full support and participation in the planning, establishment and management of areas set aside for the conservation of important biodiversity.

Funded by the GEF pilot phase through UNDP and SPREP, with co-financing from Australia, the South Pacific Biodiversity Conservation Programme (SPBCP) has established 17 community-based Conservation

Areas in 12 countries of the region—Cook Islands, Fiji, FSM, Kiribati, Marshall Islands, Niue, Palau, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu. These areas are owned and managed by local communities with assistance from relevant government agencies and NGOs through Conservation Area Co-ordinating Committees (CACCS). Sustainable economic development opportunities have been identified for a number of CAPs with certain activities such as eco-tourism already showing great potential as a means of sustaining Conservation Area Programmes (CAPs), and communities in the long term.

to problems relating to transport, communications, environment and preservation of natural resources.

On the surface the EU and ACP agree on the principles and objectives of future co-operation: strengthened partnership through deeper political dialogue – a partnership geared towards poverty reduction, sustainable development and further integration of the ACP into the international economy. Both mandates recognise the need for ‘differentiation’ between ACP countries (e.g. by providing special treatment to least-developed countries and vulnerable land-locked and island countries).

However, the aspirations of designing a simple, leaner and user-friendly agreement, are not necessarily focused on same priorities. The Commission’s mandate translates the commitment of radical review of the existing Convention into four main priorities. First, to rationalise and simplify existing instruments by grouping all resources for long-term development into a single facility (including structural adjustment, Stabex, Sysmin, decentralised co-operation etc.). Second, to restore the centrality of programming while linking resource allocation to performance. Third, to move away from projects towards support for sectoral reforms and, if conditions allow, direct budget aid. Fourth, to introduce the concept of differentiation in resource management. The ACP reform agenda looks quite different. There is much insistence on reducing delays; improving transparency; simplifying aid instruments; clarifying the division of roles and reducing the adverse effects of aid on local institutions and capacities. The focus is on improving day-to-day management, less on changing the rules of the game. The three main proposals of the ACP group differing from the EU mandate are: more time before making changes; retain as much as possible of the current agreement; and a fairer deal – the ACP call for existing access for agricultural goods to be improved, whereas EU is not prepared to settle the case before negotiations on the future trade arrangements (REPAs), maintaining the current access provisions until the new agreement.

Generally, the ACP seem more ‘conservative’ than EU. The principles that the ACP promote are: local ownership of reforms; Predictability and security of resources; Partnership with more explicit allocation of responsibilities; Simplification and rationalisation of instruments and Flexibility in programming. As for the actors in partnership, in its negotiating mandate the ACP Group is rather vague about the nature and modalities of the private sector involvement

whereas for EU extending partnership to a wide range of actor seems to be a political priority.

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<sup>1</sup> Art. 335 Lomé IV Convention

<sup>2</sup> Western Coast of Africa: Cape Verde and Sao Tomé & Principe; the Caribbean: Antigua and Barbuda, Bahamas, Barbados, Dominica, Dominican Republic, Grenada, Haiti, Jamaica, St. Christopher & Nevis, St. Vincent & the Grenadines, St. Lucia and Trinidad & Tobago; Indian Ocean: Comoros, Madagascar, Mauritius and Seychelles; South Pacific: Fiji, Kiribati, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu

<sup>3</sup> Antigua and Barbuda, Cape Verde, Comoros, Dominica, Grenada, Haiti, Kiribati, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Sao Tome and Principe, Seychelles, Solomon Islands, Tonga, Tuvalu, Vanuatu and Samoa

<sup>4</sup> Art. 329 Lomé IV bis

<sup>5</sup> The total funds provided by the EC to island developing states for the period 1976–1995 were 4447 MEURO. For the period 1996–2000 (Lomé IV bis) the package foreseen for the National and Regional Programmes amounted to 1024 MEURO.

<sup>6</sup> Green Paper p. 21

February 1999, will be used by Pacific island countries as a guide for all environmental education and training related projects and programmes.

### Social policies

It is clear that social goals have not been given equal priority with economic goals in national planning in many PICs. This is evidenced in continuing low literacy rates in some countries; the number of underskilled and inappropriately skilled school leavers (coupled with unemployment and underemployment on the one hand and significant expatriate presence on the other); low levels of income; the inability to control traditional diseases like malaria; and the emergence of

'lifestyle' diseases.

Environmental considerations are rarely given the weight that is vital to the sustainable development planning process. PICs have declared their commitment to integrate environmental considerations with economic and sectoral planning and policy-making and to formulate resource utilization policies in accordance with the precautionary principle. There is still a need to adjust planning and management systems to integrate considerations such as population trends, consumption patterns, health and nutrition concerns, educational standards and requirements, the availability of both traditional and innovative technologies, financing considerations, and the complementary roles of public and private sector organizations.

#### Box 2.9: Lomé and the Pacific Region

##### Regional co-operation

Regional co-operation under the Lomé Conventions shall promote long-term collective, self-reliant, self-sustained and integrated social, cultural and economic development and greater regional self-sufficiency. In recognition of regional co-operation as a special feature of the four Lomé Conventions, over 10 percent of the Lomé funds have been set aside for projects dealing with issues of interest to groups of ACP states on a regional basis. This funding is in addition to national allocations.

In the Pacific region, previous Regional Indicative Programmes (RIPs) have concentrated on alleviating problems resulting from the huge distances between the eight ACP countries by implementing projects in the fields of transport and telecommunication, and have contributed to enhancing regional assets: agriculture, marine resources and tourism.

About €120 million has been allocated to this kind of co-operation since 1976. Under the first Lomé IV Financial Protocol (7th EDF), the RIP (€35 million) carried this strategy forward, while adapting it to new needs in environmental protection and human resources development. Projects have been implemented in support of fisheries, tourism, agriculture, regional air transport and human resources development. Projects under environment included Cyclone Warning Systems and the Regional Waste Awareness and Education Programme.

The RIP under the Second Financial Protocol of Lomé IV (€35 million) provides for a significant increase in human resources development (from 10 percent to 45 percent), and puts more emphasis on environment within its second area of concentration. In human resources development, the EC will support the regional sector strategy: a review of knowledge requirements and developing and implementing long-term strategies for human resource development in the Pacific. The support will be directed to tertiary education and harmonization of secondary and primary education at the national levels. Attention is also paid to enhancing policy skills in the area of telecommunications and information technologies, capacity-building and institutional strengthening, sustainable management of agriculture and forestry, and in health infrastructure, training and research capacity. Tourism and shipping receive attention, but mainly to upgrade these services to international standards, with no particular attention to sustainable

ecological aspects. The second area of concentration is the sustainable development of natural resources and environmental management and protection. The objective is to broaden the production base and increase incomes out of natural resources, while ensuring that these resources remain available in the long term, keeping in mind the fragile nature of the region's most important assets. The support of the EC within this area of concentration will go to activities such as: information and data collection, development and implementation of common policies, rules and regulations, and other activities to ensure the sustainability of the natural heritage of the region. To achieve higher investment returns and income-generation, greater ownership and participation by the member countries and communities in harvest or production, and adequate monitoring and surveillance of the natural resources, will be supported by the EC.

Since 1994, resources from the General Budget of the European Community have been mobilized to support five projects aimed at the sustainable use and conservation of rain forests in the Melanesian sub-region. The AIDS programme, implemented by the Secretariat of the Pacific Community and supported with some €400 000, is also funded from budgetary resources.

However, it is not clear to what extent the different programmes that will be supported will be carried out with an integrated approach to sustainable development. It will depend very much on how the RIP will be implemented and on the approach taken by the Pacific governments and their capacity in this field. There is no mention in the RIP of specific support for integrating environmental concerns into the overall development planning.

##### Post-Lomé and trade

In the past, aid flows to the Pacific have been highly influenced by Stabex transfers which accounted for 32 percent of all aid but were more than 60 percent in three of the years (1987, 1991 and 1992). €282 million was committed through Stabex, of which €189 million went to Papua New Guinea, €29 million went to the Solomon Islands, €22 million went to Vanuatu and €17 million went to Samoa. For all of them, Stabex funds have been the largest single component of the EC aid they receive (42%, 28%, 61% and 40% respectively). The other instruments are not significant. Fiji benefits from the second-largest

quota (165 348 tonnes per year) under the Sugar Protocol annexed to the Lomé Conventions. This quota covers about 45 percent of the country's sugar exports and provides benefits of €40–50 million per year. The gross income from Fiji's sugar exports to the EU in 1998 amounted to almost €92 000.

In November 1998, the European Commission released studies on the impact on ACP countries of its proposed Regional Economic Partnership Agreements (REPAs). General conclusions of the studies were: 1) In most cases, LDCs have little to gain from REPAs in terms of market access to the EU. (Total funds provided by the EC to island developing states for the period 1976–1995 were €4 447 million. For the period 1996–2000 (Lomé IV bis) the package foreseen for the National and Regional Programmes amounted to €1 024 million. They can keep non-reciprocal trade preferences in any case. 2) The loss of non-reciprocal preferences would hardly affect the export performance of many ACP countries. 3) By contrast, the direct or indirect effects of not renewing the protocols could dramatically affect the exports of some ACP countries. However, the studies did not estimate these effects as this would have required separate studies. 4) The negative impact on customs revenues varies considerably, but could be substantial for some.

The main conclusions summarised for the Pacific region were: The eight Pacific ACP countries have not been organized as a regional group, but belong to the South Pacific Forum along with eight other countries. The report suggests that a Free Trade Area (FTA) could be negotiated with the Melanesian Spearhead Group (MSG), a sub-group comprising Papua New Guinea, Fiji, Solomon Islands and Vanuatu. A more general Partnership Agreement could cover all eight Pacific ACP countries. The lack of institutional capacity of the MSG would need to be addressed. Besides, the interests of the other members of the South Pacific Forum would need to be considered, notably Australia and New Zealand. The latter in particular would probably require the same access to the ACP Pacific countries as granted to the EU. A step towards the above direction was taken on 1 June 1999 when Trade Ministers of the South Pacific Forum endorsed in principle a Free Trade Area between the Forum Island Countries in the region.

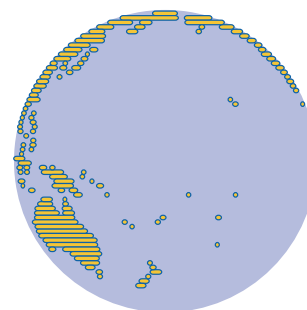
The termination of the sugar protocol and the preferences for canned tuna would have large implications for Fiji in terms of employment, export earnings and thus the government's budget. Even if

the protocols remained, both sectors would need to adjust, probably with some support from donors. For the seven other Pacific ACP countries, the termination of Lomé preferences would have no significant effect. Effects on imports are also likely to be small.

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# Alternative Policy Options



## Overview

The evidence gathered for this report suggests that the region will continue to face a steady – and sometimes serious – decline in environmental quality. This decline will vary across and within PICs. It will be most marked in the rapidly growing urban areas, but cumulative impacts in the coastal zone are also likely to become dramatic. From the analysis of the state of the environment (Chapter One), the common environmental problems of priority for the region remain largely unchanged. These are:

- loss of biological diversity – continuing in both marine and terrestrial environments;
- threats to fresh water resources – further complicated by the potential of climate change and increasing pressure from growing populations and tourism development;
- degradation of coastal environments – in particular coral reefs and inshore fisheries – from land clearance, sedimentation and destructive fishing practices;
- climate change and sea-level rise – expected to require adaptive responses even if the Kyoto Protocol targets are met;
- land and sea-based pollution – continuing from a wide range of sources.

From the review of current policy it is clear that there have been some successful approaches to addressing

these pressing environmental and sustainable development concerns of the region. They include:

- community-centred environmental initiatives for the establishment of conservation areas, education and awareness campaigns, and as a model for protection of international waters;
- improved co-ordination at national and, in particular, regional levels through the South Pacific Organizations Coordinating Committee (SPOCC);
- increased capacity in the public sector to deal with environmental issues;
- increased awareness and increasing participation within Pacific island communities;
- strengthened regional legal framework to deal with common environmental concerns.

While significant progress has been made, there remains concern that current policy initiatives are not keeping pace with the rate of environmental degradation and related development imperatives in PICs (SPREP 1998b). In general:

- there is a lack of enforcement or implementation of many policies and legislation;
- there are weaknesses with regard to the protection of indigenous property rights in the region;
- implementation of small, focused policies is generally far more effective than large, comprehensive policies.

These gaps combine with a general weakening of enforcement through traditional and community structures as a result of continuing urban migration and increasing pressure for cash income at the village level. From the analysis above and consistent with the recent submission to the United Nations Commission on Sustainable Development (Forum Secretariat 1999b), effort is clearly required to:

- further increase capacity in the public sector to deal with environmental issues, in particular within departments involved in planning and resource use (e.g. agriculture, fisheries, tourism, finance);
- provide basic infrastructure, in some cases in combination with appropriate regulatory and economic mechanisms and enforcement/implementation of existing legislation;
- promote effective partnerships among all stakeholders, in particular local communities, NGOs and the private sector;
- further develop skills training, and basic and higher education opportunities for sustainable development;
- build upon efforts to integrate environment and development within PICs. Efforts to implement economic and public sector reform, along with the work of the SPOCC, provide opportunities to do this. Ideally this integration would continue to promote a holistic approach to island development, to make most effective use of the capacity within countries and regionally;
- gather basic information that establishes baselines or benchmarks and ongoing systems for monitoring and assessment of key indicators that can be used to assist decision-making and measure progress in implementing sustainable development. Also essential are effective communications and networking systems to share that information;
- make explicit the links between health, population and the environment, including issues of gender, as contained in the Port Vila (Population) and Yanuca Island Declarations and the Rarotonga Agreement (Healthy Islands);
- compile a composite vulnerability index of economic as well as ecological/environmental parameters, as was highlighted in the Barbados Programme of Action. The 1998 South Pacific Forum agreed the index should be included among criteria for determining Least Developed Country status and for deciding eligibility for concessional aid and trade treatment. The Pacific region is now

engaged in the development of the ecological aspects of a vulnerability index and will contribute to the efforts of UNDP, the World Bank and the Commonwealth Secretariat to develop a composite vulnerability index.

In this context, and as recommended by the Regional Consultation on the Pacific Islands Environment Outlook held in Apia, Samoa, on 9–10 November 1998, a useful focus for the following discussion of alternative policy options is the reduction of the impacts of human population and the improvement of public health.

### Population and health

Population experts have focused on these interrelated issues of the human environment in the Pacific. They are succinctly summarized in a publication prepared by SPC for the International Conference on Population and Development, held in Cairo in 1994:

*'Environmental degradation is most evident where populations and economic activity are concentrated together, particularly around towns, and where resources such as timber and minerals are being over-exploited. Demand on resources has increased not simply because there are more people, but also because their individual requirements have increased. The seeming inexhaustibility of resources has until very recently encouraged people in the Pacific, as elsewhere in the world, in a short-sighted use of resources.'* (SPC, revised 1998)

The estimated population growth rate of 2.2 per cent per annum is an average across the region and thus conceals these trends, as well as the considerable variations within the region. As noted, there are also in-country variations: Vanuatu, for example, has an urban population growth rate of 8 per cent per annum, whereas the national statistic is 2.4 per cent (SPC 1998). The future outlook is complicated further by the fact that the low population growth figures for much of Polynesia are due in part to a continuing high level of migration to developed countries around the Pacific Rim. When economic conditions deteriorate in those countries (which is the current situation), there is likely to be a fall in the rate of emigration.

The governments and people of PICs have taken major initiatives in recent years to begin to articulate their urban development needs and priorities. Fiji is

addressing this in the planning and infrastructure standards of its public housing sector; Kiribati is working on an urban management plan for South Tarawa; the Marshall Islands are introducing a Majuro water supply and sanitation project; and Vanuatu is developing an urban growth management strategy in the areas of water supply, environmental sanitation, environmental health and urban expansion.

As population pressures grow, the region will see an increase in the problems of environmental health, as illustrated below in the discussion on safe drinking water. Malnutrition and disease will affect populations to a much higher degree. As in other parts of the developing world, serious poverty will create obstacles to sound environmental practices.

These patterns will reinforce the effects of internal migration, and the progressive weakening of traditional controls on resource management. All migrants take something, leave something and pick up something. Migration patterns in the region, as elsewhere in the world, are driven by the wish to find greater opportunities – usually in terms of employment and cash income, but also in areas such as education and access to entertainment/recreation, or spectator sport.

### Water and food security

Security of access to clean, fresh water and adequate nutrition is fundamental to both survival and development. In the Pacific, as noted in Chapter One, there are increasing grounds for concern that shortages will occur and that human health will be adversely affected. At the Regional Consultation, for example, water issues were raised by Guam, Tuvalu and American Samoa, while Fiji referred to the high demand from the tourist industry – a factor that in a dry year exacerbates supply problems for the local population. In the case of water, supply problems arose in several countries and territories during the extreme El Niño event of 1997–98. This had serious effects on food supply for subsistence communities, for example in PNG, where there was widespread crop failure.

Some problems could be alleviated through investment in improved storage and distribution systems. In most countries, year-round rainfall could meet human demand if adequate amounts could be stored in reservoirs or tanks at the village level. Conservation measures would still be needed, together with proper treatment to ensure the availability of potable water. Rising living standards can lead to higher consumer

demand, which needs to be matched with public awareness campaigns, possibly combined in due course with metering arrangements. Assistance will be needed to help countries place the supply of clean water on a sustainable basis.

In other countries, particularly smaller islands and atoll groups, the crisis of water security is more serious and cannot be handled through improved storage alone. The freshwater lens (which stores the small amount of rainwater that drains from the surface of an atoll) is not sustainable if too much is taken for human use. Some populations may need to install desalination systems, which are expensive to operate but which could draw on the daytime availability of solar or other forms of renewable energy. The main requirement will be to plan such investments well in advance, before the shortage of fresh water reaches crisis point.

Food security as an issue is relatively new for Pacific populations, although it has always arisen in the wake of natural disasters. Traditionally, it has not been an area of concern for public policy, but this is changing as the result of a number of factors. The link with extreme weather conditions has been mentioned above, as has the impact of rising populations. Over-exploitation of coastal fisheries is another significant factor in most countries of the region (SPREP 1997a).

It may become more difficult in future to ensure that Pacific island populations have the basic ‘cushion’ needed when there are fluctuations in food supply, for climatic or other reasons. With a higher proportion of the population living in urban areas, there will be less capacity to produce subsistence crops. Financing may be needed for new initiatives in food production. One example is investment in fishing boats capable of winning a share of the oceanic tuna resource.

There is an important link between the issues of food and water security and the preservation of biodiversity, as well as the wider question of reducing the high levels of vulnerability in the region. It is well known, for example, that the protection of mangrove areas will produce benefits through the marine food chain. If degradation of other habitats can be reversed, similar benefits will be available. (In New Zealand, for example, recreational and commercial fishermen have come round to supporting the establishment of further marine reserves, on the grounds that it will aid the recovery of fish populations in neighbouring zones.) Inland, the protection of streams and rivers from run-off is attainable through planting programmes, which can also be planned to provide food for threatened birdlife.



The success of community-based conservation projects in the region could therefore lead logically to local improvements in food and water security and a greater degree of resilience in handling natural disasters and extreme climatic events. Such initiatives should be taken at the local/village level and could do much to offset the growing impacts of urbanization.

### Pollution and waste management

A number of countries see this as a high priority (Fiji, Niue, Samoa and the USP raised this at the Regional Workshop) and it has already been discussed, together with the link to urbanization, in Chapter One. The reversal of present trends will call for a concentrated effort to build capacity across the region, backed by a menu of policy options that will reduce the volume of conventional waste streams (both solid and liquid). Attention also needs to be given to new and unfamiliar forms of waste, such as packaging material that is hard to dispose of, or the by-products of new technology.

The three Rs of waste management – reduce, reuse and recycle – cannot be fully applied in the circumstances of most PICs. The size of the market is too small to impose special packaging requirements on a distant exporter, and this also affects the economic opportunities for recovering waste materials or recycling them. The region is thus at the end of the line for many waste streams generated in manufacturing countries, and special measures (e.g. surcharges, taxes or deposits) may be justified for plastics, cans and bottles. Such instruments are fully in line with the Polluter Pays Principle. The funding thus obtained could be used in part to ensure that these materials can be sorted and back-loaded at reduced rates to destinations where recycling can be carried out.

There are other areas where a ‘clean Pacific’ policy may be justified, given the limited space for waste disposal facilities on many islands and the huge exposure of coastal regions to intractable waste, such as polystyrene and plastic bags. It is here that the link is most obvious with the need for clean water and food security. Public education and awareness will need to be built up, using vernacular material – as has been shown in some of the region-wide campaigns on conservation issues.

The composition of the waste stream will respond both to rising levels of consumption and to shifts in production patterns in exporting countries. The example of building materials is a case in point.

Increased proportions of treated timber and plastic composites mean that building wastes, particularly from commercial buildings, hotels and larger public institutions (e.g. schools, hospitals), will become less easy to dispose of. This is an area where awareness can be developed within the industry and where standards can be used as appropriate. Demonstration projects using an adaptation of traditional building techniques, using local materials where available, would assist in the process.

Regional action is needed in some of the more specialized areas of waste management: information networks can be developed on the identification and handling of hazardous wastes and toxic materials, and guidelines can be drawn up for improved environmental management in ports and harbours and for the protection of freshwater lenses. Other actions will be primarily local in nature: examples include the construction of siltation controls, planting to assist filtration and protect water bodies, and sorting of waste streams at village/neighbourhood level.

In relation to this, an important policy issue confronting governments and regional agencies is whether the region can expect to influence the choice of technology in a direction that improves the health and welfare of Pacific peoples. This could be achieved, for example, if a technology is introduced which reduces the present high levels of risk and vulnerability to which the region is exposed. Environmental opinion tends to regard technology as a two-edged sword: it promises lower throughput of resources and reduced pollution, but it also removes us further from any direct connection with natural cycles and the resources on which we ultimately depend for survival.

### Integrated decision-making

To make progress with water security and waste management issues it will be important to develop effective ways of integrating environmental considerations within decision-making. Since the Earth Summit in 1992 there has been a theoretical acceptance of the need to integrate environment and economics. Examples of such integration taking place in PICs are outlined in Chapter Two. The extent, however, to which this has gone beyond co-ordination through committee structures and consultative process is unclear.

The logic of integrating environment and economics leads to the conclusion that it is the development agency (Finance, Planning, Development or Treasury)

that must be accountable for the impacts on the environment that flow from the investments approved by governments. Such impacts may be positive as well as negative. The essential feature is that they become part of the cost/benefit analysis carried out by that agency. If the Ministry of Finance takes on the task of addressing environmental costs (and benefits), the relationship with the existing environment agency or department must be considered.

First, the application of cost/benefit calculations is only one part of the task that faces the trained environmental administrator. Much of the technical work, e.g. in relation to toxic or hazardous materials, will never fit with the finance portfolio. When necessary, advice on these aspects of risk assessment can be supplied by experts to other agencies of government.

Secondly, the environment agency could be given responsibility (and funding) for remedial and restorative initiatives – protecting biodiversity, preventing erosion, avoiding degradation of land and water, or applying conservation principles to resource management in the informal sector. It would supply expertise to assist in the assessment of costs and benefits, and to identify ways in which win-win solutions could be achieved, either through adjustments to project design or through a switch to different technology. This would enable PICs to take advantage of the rapid shift in industrial countries towards technology that is both efficient in commercial terms and minimal in its environmental impact.

Such choices at the administrative level could put the region in a leadership position and could generate a new approach to the issues of sustainable development analysed in the earlier chapters of this report. If alternative policies are to be encouraged in the areas listed above, and if they are to be given equal weight in decision-making, the first step would be to draw a clear distinction between:

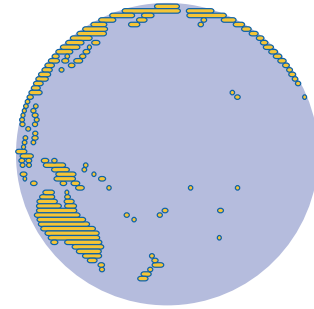
- cases where investment analysis requires the incorporation of environmental cost/benefit analysis before the investment is approved, drawing on the standard techniques now applied by the World Bank and other multilateral institutions;
- cases where the environmental impact flows from individual actions in the informal sector, and where the solution does not require any major capital investment.

The implementation of alternative policies to bring environmental factors into the centre of development

decision-making will require deliberate administrative reform. Most countries are in the process of administrative or public sector reform, mainly in order to reduce the size of the public sector. While this has the potential to limit the influence of environmental units even further, it does provide opportunities to adopt structures that reflect the strong cultural and traditional approaches to the management of resources for the benefit of future generations. Indeed, there is a strong economic argument for ensuring that the administrative reforms extend to and draw on the community or informal sector.

In some PICs there is a core group of staff at the middle level of government (and in the NGO networks) with the skills and confidence to push for sustainable solutions to local problems. They are able to link and interact with a wider network of resource people in other countries, using the Internet and other tools that were not previously available. Their sensitivity to local values and conditions will enable them to judge how technology transfer can be tailored to fit the unique economic, social, political and cultural circumstances of each community. However, having said this, it should also be noted that in many PICs senior and middle-level public servants have considerable (financial and political) limitations to their jobs and are often not the people who decide what technologies are going to be transferred to the countries or the communities. In countries such as Fiji, these decisions are increasingly being shifted to the private sector. This implies a need to engage private business interests if PICs are to move towards sustainable development.

# Emerging Issues



This final chapter identifies some issues that are likely to dominate the environmental agenda over the next 25 years, and links these to some of the global trends that are already making their effects felt in the Pacific. It poses some of the questions that are specific to the region, and that may not arise elsewhere.

## Globalization and economic reform

'Globalization' of the world economy and related trade liberalization is expected to have a profound effect on Pacific island economies. In response to 'globalization', the region's Economic Action Plan (1996) sets out measures to stimulate investment and job creation. These were outlined in the 'Policy background' section of Chapter Two, Policy Responses, and are designed to maximize the benefits to the region from potentially greater global travel, trade and tourism.

A wide range of environmental issues for island countries are expected to stem from increased travel, trade and tourism. The more obvious include the impact of invasive species, diseases and the question of wastes, as discussed earlier. More subtle are the pressures from corporate interests to gain access to genetic resources that may have medicinal or other commercial value. As noted previously, no local legislation has been put in place to give effect to the provisions on intellectual property rights in the Convention on Biological Diversity. This is discussed in more detail below.

External economic fluctuations, more influential for

small and open economies, will increase the problems of environmental management. In assessing the impacts of the 1997–98 economic downturn in the Asian region, for example, experts have concluded that the Pacific island economies, like other SIDS, are characterized by a high degree of vulnerability (Forum Secretariat 1998). For a general treatment of the situation of small states and the possible development of an index of vulnerability, see Commonwealth Secretariat (1998). This same description has been used in environmental reports on the region for many years and in studies on the effect of natural disasters (see, for example, UNDP/UNDHA 1996, 1997). The new element is the growing interaction between globalization as a force in the Pacific region and the wide spectrum of ecological pressures that most countries are experiencing.

The process of public sector reform and economic restructuring necessary to maximize benefits to the region will also bring with it challenges and opportunities for environmental protection and sustainable development. Rapid deregulation, combined with a loss to private firms of skills formerly available in the public service, are expected to alter approaches to capacity-building and mechanisms used to ensure environmentally sound practices.

Sound environmental policy will therefore require two additional elements:

- a proper assessment of long-term and downstream risks;

- an internalization of all costs, including the cost of managing these risks.

It follows that environmental advisers to governments of the region will need ‘a seat at the table’ when significant investment decisions are being evaluated. Another emerging issue therefore revolves around the choice of public sector mechanisms to achieve this in PICs.

### Adaptation to climate change

As outlined in the ‘Atmosphere’ section in Chapter One, the need to take measures to adapt to climate change appears inevitable for PICs. These measures will need to address the frequency and intensity of extreme events, as well as the effect on PICs of sea-level rise – even at the lower end of the prevailing estimates for the next century.

Some of the possible effects of climate change and sea-level rise that are expected in PICs are noted in Table 4.1.

There are, however, a number of local actions that could minimize these negative impacts of climate change and sea-level rise, should they occur. Improving the management of natural coastal systems such as coastal forests, mangroves, beaches, reefs and lagoons, the careful planning of coastal zone developments, and the construction of coastal defences such as sea-walls to protect particularly valuable and vulnerable sites, are all actions that can be implemented now.

Adaptation strategies will not be cost-free. There are, however, ways in which they can be linked to other investments that need to be made and to other environmental objectives discussed elsewhere in this report. In other words, an adaptation strategy that is planned for implementation over 30–50 years will impose lower costs than one that has to be handled in a five-year period.

Particular emphasis will need to be placed on development policies, programmes, plans and projects to ensure they take into account the likely effects of climate change and incorporate adaptation as necessary. This is

**Table 4.1: Indicative list of potential impacts of climate change and sea-level rise requiring adaptive responses in PICs**

Coastal zone	<ul style="list-style-type: none"> <li>● Inundation and flooding of low-lying areas</li> <li>● Coastal erosion</li> <li>● Possible increase in cyclone-related effects</li> <li>● Changes in sediment production due to changes in coral reef systems</li> </ul>
Water resources	<ul style="list-style-type: none"> <li>● Changes in freshwater lenses and other groundwater resources</li> <li>● Salt intrusion of groundwater resources</li> <li>● Changes in surface-water resources</li> <li>● Changes in surface run-off, flooding and erosion</li> </ul>
Agriculture	<ul style="list-style-type: none"> <li>● Changes in commercial crop yields</li> <li>● Changes in subsistence crop yields</li> <li>● Changes in plant pest populations</li> <li>● Possible changes associated with changes in ENSO, drought and cyclone patterns</li> <li>● Changes in soil quality</li> </ul>
Fisheries	<ul style="list-style-type: none"> <li>● Changes in distribution and abundance of offshore fish species</li> <li>● Changes in productivity of inshore fisheries</li> <li>● Changes in fish breeding sites</li> </ul>
Ecosystems	<ul style="list-style-type: none"> <li>● Coral bleaching and coral degradation (also possible increased upward coral growth)</li> <li>● Changes in mangrove health and distribution</li> <li>● Degradation of sea grass meadows</li> <li>● Changes in forest ecosystems</li> <li>● Changes in wetland systems</li> </ul>
Human health	<ul style="list-style-type: none"> <li>● Increased incidence of vector-borne diseases such as malaria and dengue fever</li> <li>● Increased heat stress and heat-related illnesses</li> <li>● Indirect effects on nutrition and well-being secondary to effects in other sectors, such as agriculture and water resources</li> <li>● Deaths, injuries and disease outbreaks related to possible increases in extreme events such as cyclones, floods and droughts</li> </ul>

Source: SPREP 1999c

of greatest significance for long-term investments (e.g. port development, infrastructure, tourist hotels, tree crop plantations and forestry), where climate change 'may stress a resource or ecosystem sensitive to climate change or have an effect on the ability of society to cope with climate change' (Campbell and de Wet 1999).

In a recent analysis for policy-makers (Campbell and de Wet 1999), three types of proposals were considered in terms of adaptation and development:

1. Proposals in which the main objective is *development*. In these projects the adaptation component can be seen as additional, but necessary in order to ensure sustainability. Examples:
  - infrastructure development;
  - housing programmes;
  - agricultural development;
  - tourism development.
2. Proposals that are specifically adaptation oriented. Examples include:
  - coastal protection;
  - developing drought/salt resistant crops;
  - public awareness programmes on the effects of climate change and on possible adaptive strategies.
3. Proposals including capacity-building for dealing with the likely effects of climate change. Examples include:
  - institutional development;
  - human resource development, including:
    - climate science training;
    - technical training for adaptation;
    - public awareness skills training.

Overall, the optimal adaptation approaches will be anticipatory approaches that facilitate the inclusion of adaptation options in development.

### Access to genetic resources and intellectual property rights

One emerging issue that will increase in importance is access to genetic material. As previously noted, this has already attracted commercial prospectors and, as the coverage of protected areas increases, there could be a growth in back-door or illicit dealings, such as happens world-wide with endangered bird and animal species. The steps that need to be taken at the

legislative level are only one part of the response strategy. Conservation staff and managers of protected areas will need to work with local communities in order to build awareness and achieve co-operative surveillance.

Threats to the region's environment that could result from uncontrolled access include: excessive collecting that depletes the species being sampled, damage to the ecosystems where the sampling occurs, and the accidental spread of diseases or introduction of alien species in the process of collecting. Access should be managed, to ensure that collecting is sustainable and that the region's ecosystems are conserved. Control could be achieved through a system of permits for bioprospecting, collecting and export, where permission is granted provided specified conditions are met.

One mechanism for the country of origin to share in any benefits that may arise from use of the genetic resource is to require benefit-sharing as a condition of granting an access permit. Governments, private companies, individuals and local communities can benefit from the results of research, information on research methods, training, facilities, fixed payments and royalties. In the case of the TaroGen project commenced in 1998, participating PICs expect to benefit through improved conservation of taro varieties and the development of taro varieties that increase food production – the first goal is to develop taro varieties resistant to blight.

Controlled access provides a means for parties to the Convention on Biological Diversity to balance their obligations under Articles 6 and 15. Parties have agreed, under Article 6, to 'develop national strategies, plans or programs for the conservation and sustainable use of biological diversity' and, under Article 15, to 'facilitate access to genetic resources.....by other Contracting Parties'.

Investors in genetic resources will usually seek intellectual property rights to protect their investment. Intellectual property rights include rights in relation to inventions, such as patent rights, copyright, plant variety rights, registered and unregistered trademarks including service marks, geographical indications, registered designs, confidential information (i.e. protection of undisclosed information in a commercial context, including trade secrets and know how), and all other rights resulting from intellectual activity in the industrial, scientific, literary or artistic fields. Note that patents give creators exclusive economic rights for only a limited time and act as an incentive to disclose information to the public. In contrast, trade secrets are

not time limited and cannot be used by others as a basis for further innovation.

In developing an access and benefit sharing regime, countries may wish to recognize intellectual property rights, including the rights of holders of traditional knowledge such as the location and traditional uses of genetic resources.

This is a category of environmental change that requires intensive monitoring and careful consideration of approaches to access and intellectual property. With a host of immediate administrative pressures to attend to, local agencies will need all the help they can get, including funding. As in the case of offshore fisheries, it is not practicable to seal off the region from pressures that are being felt elsewhere. Coherent decision-making at the national and regional level can, however, make a difference



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Acronyms

Participants in the Regional Consultation

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## Acronyms

ACP	African, Caribbean and Pacific	MARPOL	International Convention for the Prevention of Pollution from Ships
ADB	Asian Development Bank	MEA	Multilateral Environmental Agreements
ALC	Automatic Location Communicator	MHFM	Management of Highly Migratory Fish Stocks
AOSIS	Alliance of Small Island States	MSG	Melanesian Spearhead Group
APEC	Association of Pacific Exporting Countries	NEMS	National Environmental Management Strategy
BPOA	Barbados Programme of Action	NGO	Non-Government Organization
CBD	Convention on Biological Diversity	NWFPS	Non-Wood Forest Products
CBEMP	Capacity Building for Environmental Management in the Pacific	PENRIC	Pacific Environment and Natural Resource Information Centre
CCD	Convention on Combating Desertification	PIANGO	Pacific Islands Association of NGOs
CDM	Clean Development Mechanism	PICCAP	Pacific Islands Climate Change Association Programme
CITES	Convention on International Trade in Endangered Species	PICs	Pacific Island Countries
CMS	Conservation and Management of Straddling Fish Stocks and Highly Migratory Species	PIDCs	Pacific Island Developing Countries – Cook Islands, Fiji, Federated States of Micronesia, Kiribati, Republic of the Marshall Islands, Nauru, Niue, Papua New Guinea, Palau, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu
COP	Conference of the Parties	PIDP	Pacific Islands Development Program
CROP	Council of Regional Organizations for the Pacific	PNG	Papua New Guinea
CSD4	Fourth Session of the Commission on Sustainable Development	PNGRIS	Papua New Guinea Resource Information System
DPGs	Domestically Prohibited Goods	PRA	Participatory Rural Appraisal
EDF	European Development Fund	REPA	Regional Economic Partnership Agreement
EEZ	Exclusive Economic Zone	RIP	Regional Indicative Programme
EIA	Environmental Impact Assessment	SAP	Strategic Action Programme
ESCAP	Economic and Social Commission of Asia and the Pacific	SIDS	Small Island Developing States
EU	European Union	SOER	State of the Environment Report
FAD	Fish Aggregate Device	SOPAC	South Pacific Applied Geoscience Commission
FAO	Food and Agricultural Organization	SPBCP	South Pacific Biodiversity Conservation Programme
FCCC	Framework Convention on Climate Change	SPC	Secretariat of the Pacific Community
FEMM	Forum Economic Ministers Meeting	SPREP	South Pacific Regional Environment Programme
FFA	Forum Fisheries Agency	TCSP	Tourism Council of the South Pacific
FS	Forum Secretariat	TNF	The Nature Conservancy
FSM	Federated States of Micronesia	UNCED	United Nations Conference on Environment and Development
FTA	Free Trade Area	UNCLOS	United Nations Convention on the Law of the Sea
GEF	Global Environmental Facility	UNDHA	United Nations Division of Humanitarian Affairs
GEO	Global Environment Outlook	UNDP	United Nations Development Programme
GEPA	Guam Environmental Protection Agency	UNEP	United Nations Environment Programme
GLASSOD	Global Assessment of Soil Degradation	UNFCCC	United Nations Framework Convention on Climate Change
GPA	Global Programme of Action for the Protection of the Marine Environment from Land Based Activities	UNIA	United Nations Implementing Agreement
IAEA	International Atomic Energy Agency	USP	University of the South Pacific
IMO	International Maritime Organization	WHO	World Health Organization
IPCC	Intergovernmental Panel on Climate Change	WMO	World Meteorological Organization
IUCN	International Union for the Conservation of Nature and Natural Resources	WWF	World Wide Fund for Nature
LMOs	Living Modified Organisms		

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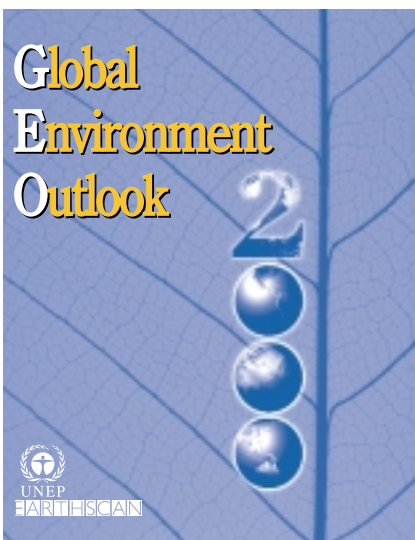
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