REGIONAL RESOURCE CENTRE FOR ASIA AND THE PACIFIC

UNEP

ENVIRONMENTAL INDICATORS South Pacific

Environmental Indicators
South Pacific

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Regional Resource Centre for Asia and the Pacific

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Definition of an indicator is not uniform across the various publications, organisations and institutions that have been referred to in this publication. Efforts have been made to standardise the data for a particular indicator from the different sources but there still might exist some discrepancies in the data-reporting method. UNEP-RRCAP does not take responsibility for the same.

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FOREWORD

Agenda 21 emphasized the need for developing indicators to provide the solid base for decision making at local, national, regional and global levels. The Johannesburg Plan of Implementation in 2002 reiterated the need for indicators to monitor economic, social and environmental progress for sustainable development. Goal 7 of the UN Millennium Development Goals is set for countries to ensure environmental sustainability through integrating principles of sustainable development into country policies and programmes, and reverse the loss of environmental resources.

This report on 'Environmental Indicators for South Pacific' has been prepared to present the trends of twenty three key indicators on air, water, land and biodiversity. It also presents trends on social and economic conditions through the selected indicators. Data have been collected for each indicator for each country in South Pacific for 1990, 1995 and 2000. This report provides an assessment of economic, social and environmental conditions in South Pacific based on available data and information. Lack of updated scientific database has been a major challenge in preparation of the report.

This report highlights that South Pacific has the lowest population of all the sub-regions in Asia and the Pacific. South Pacific is economically and culturally a diverse sub-region consisting of developed countries such as Australia and New Zealand and smaller island nations with developing economies. The smaller island nations are being challenged by rapid urbanisation. These countries have fragile ecologies and it is imperative that the urbanisation process is tempered with awareness about the environment and safeguards to protect the natural environment along with improving living standards.

This region also possesses great marine biodiversity. The Great Barrier Reef is the largest system of coral reefs in the world. This marine biodiveristy is being threatened by increasing population, urbansiation and unsustainable land use patterns. Increasing global greenhouse gas emissions pose a threat to the lower lying islands of the sub-region. Water shortage and quality of drinking water are issues of concern in this sub-region.

UNEP hopes that the 'Environmental Indicators for South Pacific' will be a useful document for government, non-government, regional and international organizations in the pursuit of developing policies and action plan. UNEP gratefully acknowledge the contribution of Environment Ministries, agencies, institutes and individuals in the preparation of the report.

Klaus Töpfer
United Nations Under-Secretary General and
Executive Director
United Nations Environment Programme
August 2004

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The South Pacific Regional Environment Programme (SPREP) Secretariat, for the review of this publication.

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South Pacific Project Team at
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CONTENT

INTRODUCTION

South Pacific is a sub-region of Asia comprising a total of twenty one countries and territories which can be subcategorized as: Australia and New Zealand; Melanesian countries (Papua New Guinea, Solomon Islands, New Caledonia, Vanuatu and Fiji); Mid-sized open islands of Polynesia and Micronesia (Tonga, Samoa, American Samoa, French Polynesia, Palau, Guam, and the Northern Mariana Islands); and the Small island micro-states (Cook Islands, Kiribati, Tuvalu, Federated States of Micronesia, Marshall Islands, Niue, and Nauru). The subregion is politically, ethnically, geographically and economically diverse. More than 2000 different languages are spoken across the region.

The South Pacific has the lowest population of all the Asian and Pacific subregions (just over 30 million). The South Pacific also has some of the highest marine diversity in the world – upto 3,000 species may be found on a single reef.

Indicators

Indicators can be defined as statistics, measures or parameters that can be used to track changes of the environmental and socio-economic conditions. Indicators are developed in synthesizing and transforming scientific and technical data into fruitful information. It can provide a sound base for decision-makers to take a policy decision on present as well as potential future issues of local, national, regional and global concerns. It can be used to assess, monitor and forecast parameters of concerns towards achieving environmentally sound development.

The 1992 UN Summit on Environment and Development at Rio recognized the role of indicators towards promoting sustainable development. Chapter 40 of the Agenda 21 called on countries at the national level, as well as international, governmental and non-governmental organizations to develop indicators in order to provide the solid basis for decision-making at all levels. Agenda 21 specifically called for harmonization of efforts towards developing sustainable development indicators at the national, regional and global levels.

The Commission on Sustainable Development (CSD) in 1995 undertook an initiative to assist countries with developing framework for sustainable development indicators, and building capacity for integrating indicators in policy formulation and decision-making. The overall goal of the programme was to develop country specific indicators that will be used by countries while reporting the progress on sustainable development.

International Development Goals (IDG) were formulated and agreed by the international community at different UN conferences that took place in the last decade. In order to achieve environmental sustainability, goals called upon developing countries to formulate a national strategy for sustainable development by 2005, and to reverse the current trends in the loss of environmental resources, at both global as well as national level, by 2015. These goals are merged into Millennium Development Goals (MDG).

At the UN Millennium Summit held in 2000, Millennium Development Goals (8 goals, 18 targets and 48 indicators) were endorsed by the governments and civil society, in

order to improve economic, social and environmental conditions in a specific timeframe. Goal 7 is set for countries to ensure environmental sustainability through integrating principles of sustainable development into country policies and programmes, and reverse the loss of environmental resources.

The Johannesburg Plan of Implementation (JPOI), 2002 called upon countries to initiate work on indicators in order to monitor progress on sustainable development. Governments in Johannesburg committed to various goals, targets and financial assistance (through ODA and partnership) in order to achieve a measurable positive change. Indicators would be the useful tools to track the economic, social and environmental progress over the timeframe.

Environment is constituted of air, water, land and biodiversity, which are life support systems for human beings. Human activities in the pursuit of economic development have caused immense pressure on environment. Reversal of environmental degradation is the paramount essential in order to safeguard the well being of present as well as future generations. Indicators are means of measuring progress of desired actions. In order to track the progress on implementation of the Agenda 21, and Millennium Goals, there is an expressed need to develop framework for simple indicators on environmental resources, i.e. air, water, land and biodiversity.

To fulfil this need, UNEP-RRCAP has produced the Environmental Indicators report for each sub-region of Asia and the Pacific. We have painstakingly researched and collected data for a list of key environmental indicators. These indicators, which are replicated across each sub-region, were chosen after serious deliberation by our in-house experts, to best reflect the environmental concerns in and across the sub-regions. The indicators can be sub-divided in to the following categories: 1. Social 2. Economy 3. Environment. The category environment is further sub-divided into 1.Land 2.Water 3.Air 4. Biodiversity. Thus, the above categories provide a comprehensive view of the sub-regional progress on environment and sustainability.

Social Indicator

The South Pacific sub-region comprises a total of twenty one countries and territories which can be subcategorized as: Australia and New Zealand; Melanesian countries (Papua New Guinea, Solomon Islands, New Caledonia, Vanuatu and Fiji); Mid-sized open islands of Polynesia and Micronesia (Tonga, Samoa, American Samoa, French Polynesia, Palau, Guam, and the Northern Mariana Islands); and the Small island micro-states (Cook Islands, Kiribati, Tuvalu, Federated States of Micronesia, Marshall Islands, Niue, and Nauru). The sub-region is politically, ethnically, geographically and economically diverse. More than 2000 different languages are spoken across the region.

The South Pacific has the lowest population of all the Asian and Pacific sub-regions (just over 30 million) and while it has a high rate of population growth, this has mostly been absorbed through migration to the region's larger peripheral islands. Over the past decade, the population of the Pacific Island region has grown steadily at 2.2 per cent annually, with a much higher growth rate in the urban areas than in the rural areas. This population spurt is reflected in the composition of the population with all countries demonstrating youthful populations. This large number of youth can have a negative socio-economic impact in terms of job availability and unemployment rates.

The growing urban population and urban expansion has generated a new set of environmental problems such as high waste generation, poor effluent disposal, overcrowding, poor infrastructure and flow of land based pollutants into sensitive coastal environments. Urban growth, especially in the smaller Pacific islands has overburdened the fragile ecology. The urbanizing rate has outpaced the concomitant growth in infrastructure and services, resulting in deteriorating urban environmental conditions.

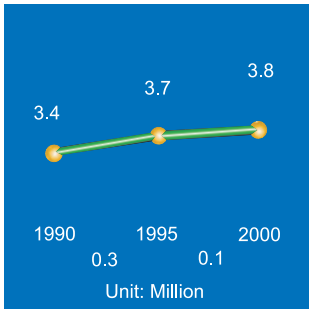
Australia and New Zealand are classified as highly developed countries. Many of the Pacific island countries have not been classified according to Human Development Index. Conventional indicators suggest that many Pacific Island populations are at poverty level – however many communities still enjoy a degree of subsistence affluence based on traditional, non-monetary resource management systems.

Poverty in Pacific islands may not manifest itself as food shortage and destitution but more in lack of access to basic services and employment opportunities. Lack of access to primary health services may lead to high infant mortality rates. Papua New Guinea, particularly the rural areas, shows high infant mortality rates. Lifestyle factors such as lack of exercise and poor diet have contributed to an increase in coronary heart disease and diabetes, thus adversely affecting the life expectancy at birth rates.

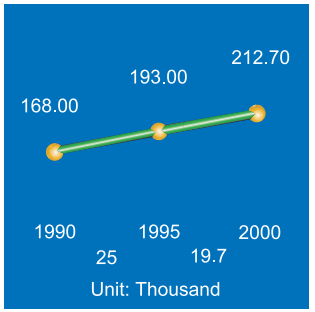
Infant mortality rate remains high for most of the islands. Though over the decade, all countries of the region have shown a decrease in the infant mortality rates. The highest life expectancy at birth is for Australia at 78.9 years. All countries in the region have shown an increase in life expectancy at birth during the past decade. An exception is Marshall Island, which has shown a decrease in life expectancy during the last decade.

Social Indicator - Population

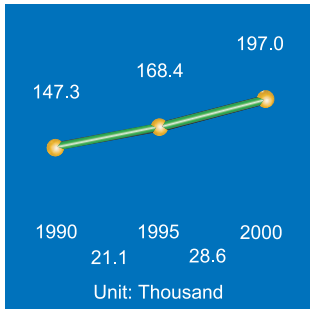
New Zealand



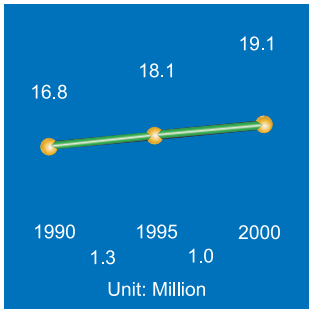
New Caledonnia



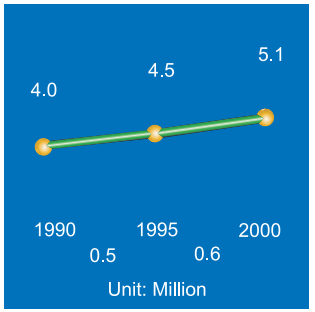
Vanuatu



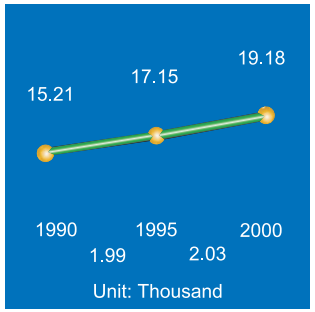
Australia



Papua New Guinea

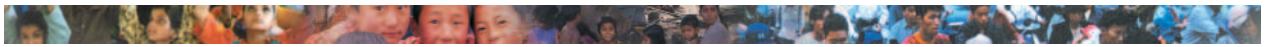


Palau



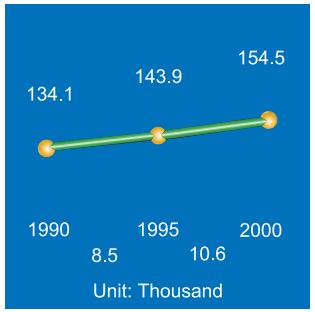
Note: Australia has the highest population in the region – 19.1 million, while some of the smaller Pacific islands are very thinly populated. This subregion has the lowest population of all the subregions in Asia and Pacific. The population has been growing in all the PICs of the subregion over the last decade

Source: WDI 2002, GEO-3 GRID data, UNEP, UNDP, UN ESCAP

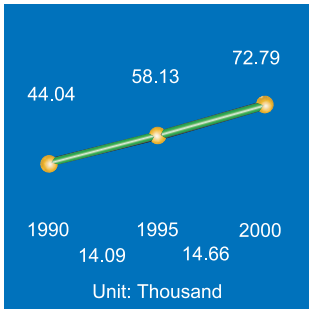


Social Indicator - Population

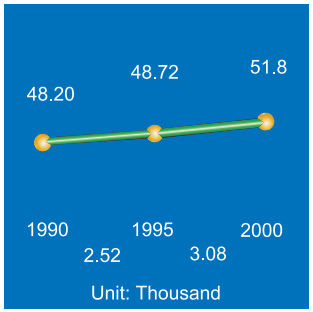
Guam



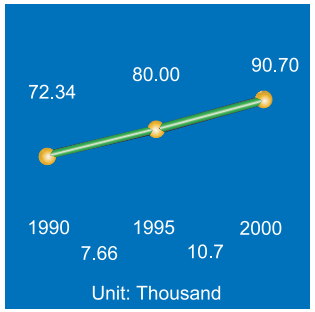
Northern Mariana Islands



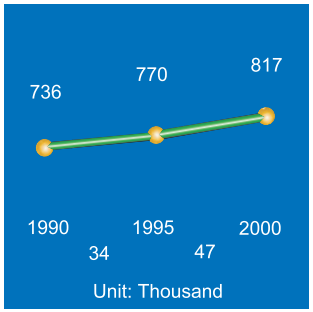
Marshall Islands



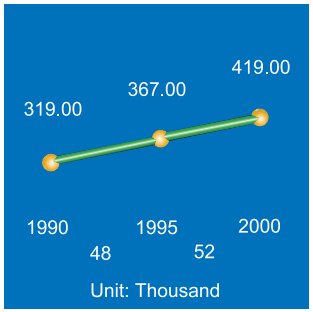
Kiribati



Fiji

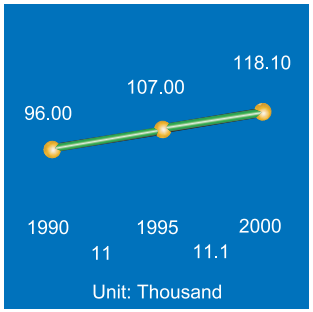


Solomon Islands

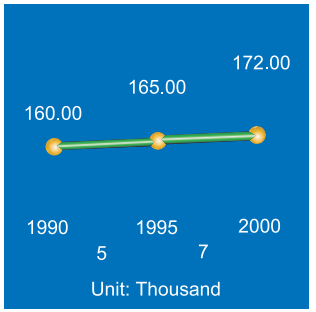


Social Indicator - Population

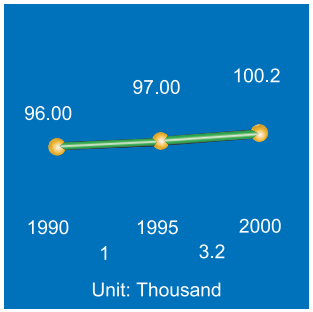
Micronesia



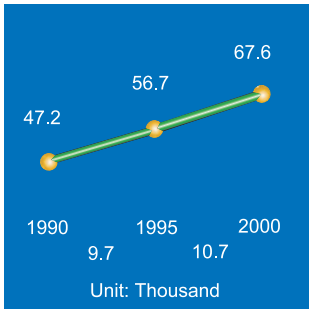
Samoa

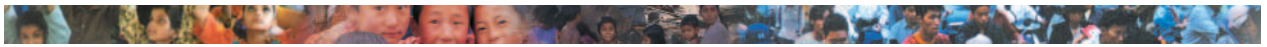


Tonga



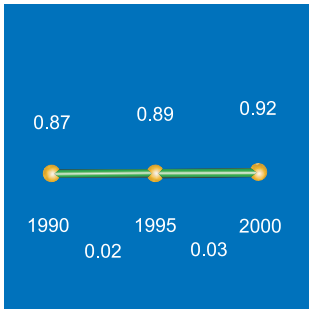
American Samoa



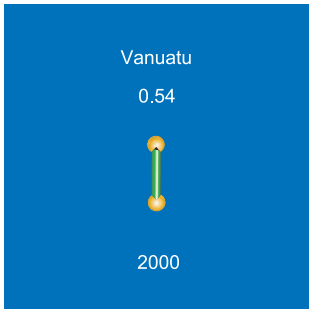


Social Indicator - Human Development Index

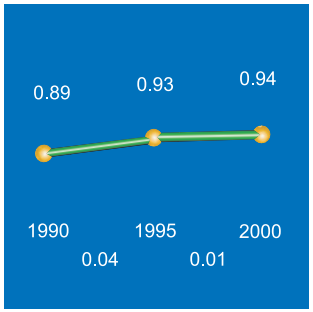
New Zealand



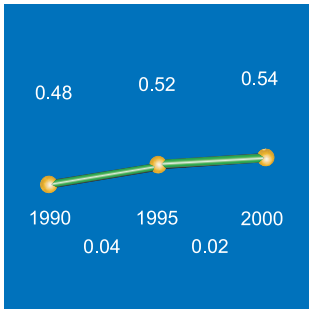
Vanuatu



Australia



Papua New Guinea

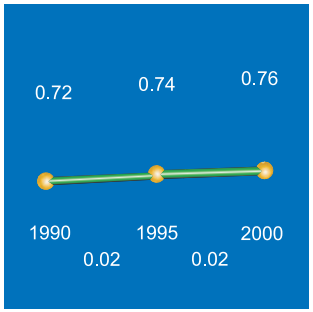


Note: HDI information is not available for most of the smaller Pacific Island Countries (PIC). Australia and New Zealand are classified as highly developed countries.

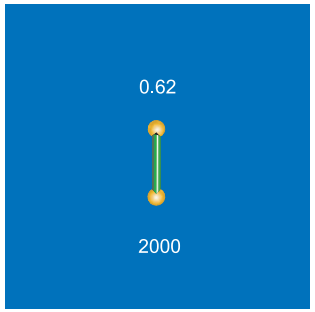
Source: UNDP HDR 2002

Social Indicator - Human Development Index

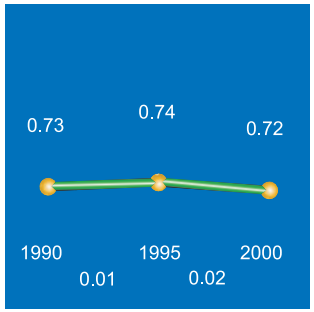
Fiji



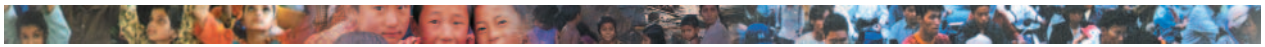
Solomon Islands



Samoa

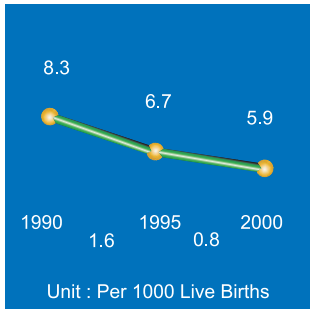


REGIONAL RESOURCE CENTRE FOR ASIA AND THE PACIFIC



Social Indicator - Infant Mortality Rate

New Zealand



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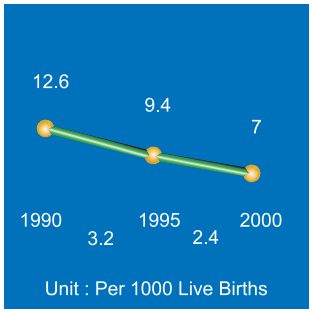

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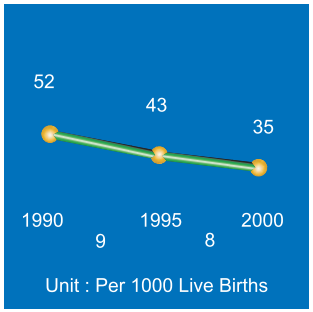

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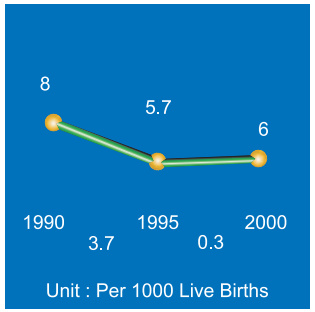
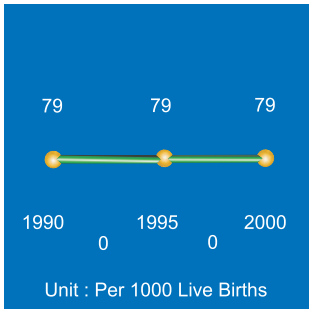
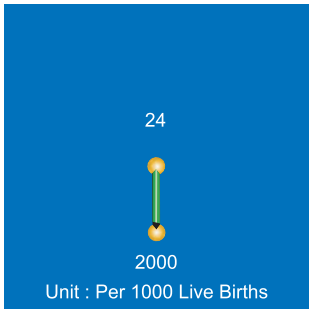


Papua New Guinea



Palau

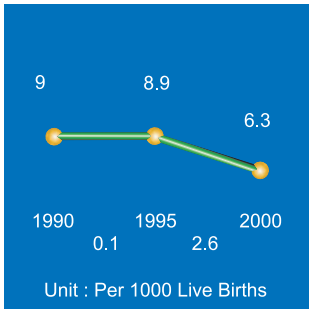


Note: The lowest infant mortality rate in the sub-region is of Australia at six per 1000 live births, while the highest is of PNG at 79 per 1000 live births. The infant mortality rates have decreased for all countries during the last decade.

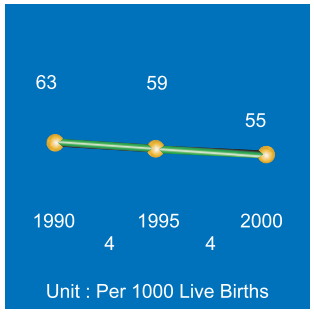
Source: GEO-3 GRID data, UNEP-UNDP, WDI 2002

Social Indicator - Infant Mortality Rate

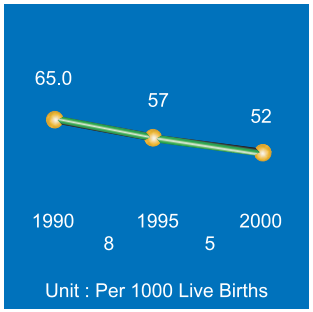
Guam



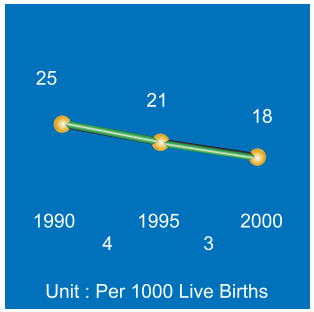
Marshall Islands

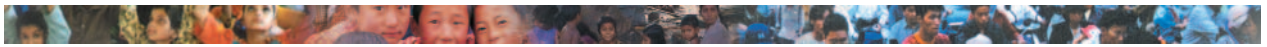


Kiribati



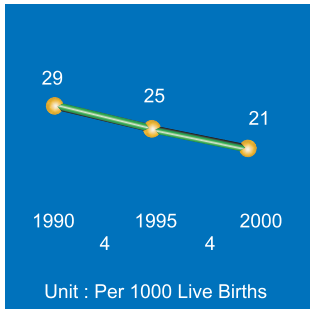
Fiji



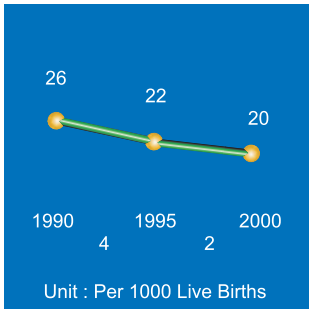


Social Indicator - Infant Mortality Rate

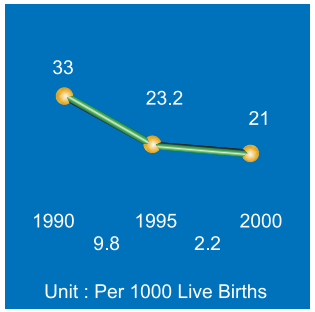
Solomon Islands



Micronesia



Samoa



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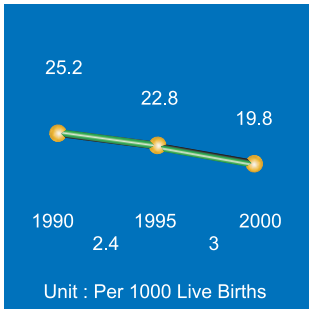
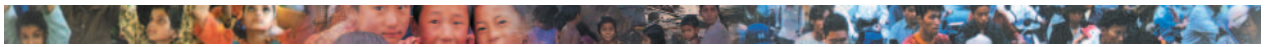
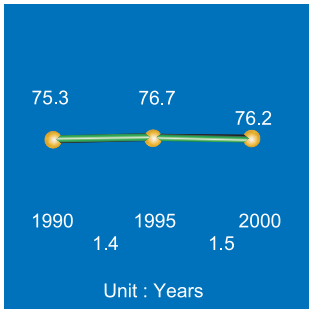


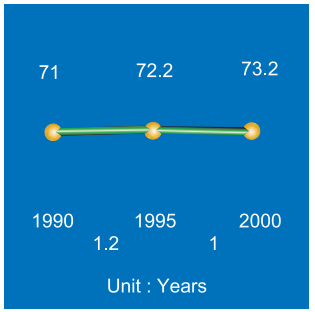


Social Indicator - Life Expectancy at Birth

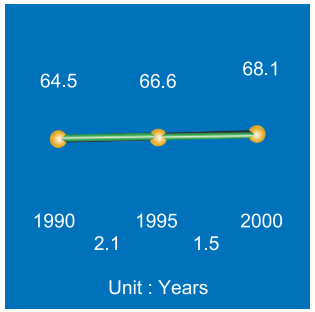
New Zealand



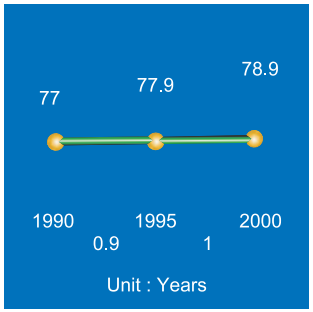
New Caledonnia



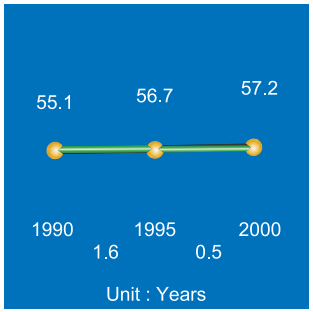
Vanuatu



Australia

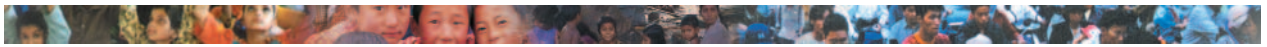


Papua New Guinea



Note: Australia has the life expectany at birth at 78.9 years while Kiribati has the lowest at 61.9 years in the year 2000. All countries in the region have shown an increase in life expectancy at birth during the past decade. An exception is Marshall Island, which has shown a decrease in life expectancy during the last decade.

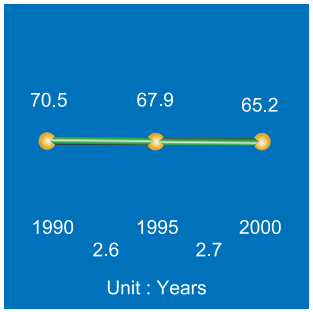
Source: WDI 2002, World Bank



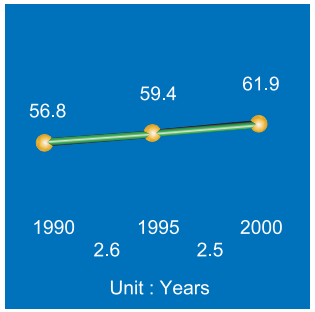
Social Indicator - Life Expectancy at Birth

Guam

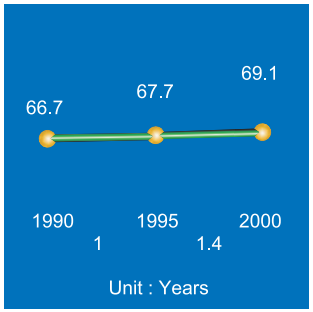
Marshall Islands



Kiribati

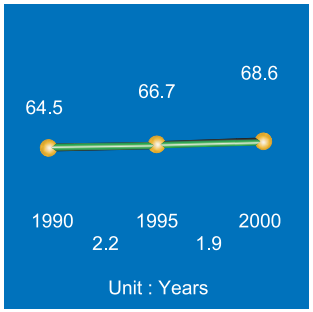


Fiji

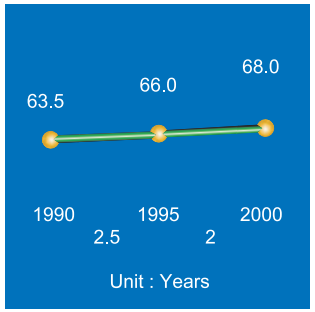


Social Indicator - Life Expectancy at Birth

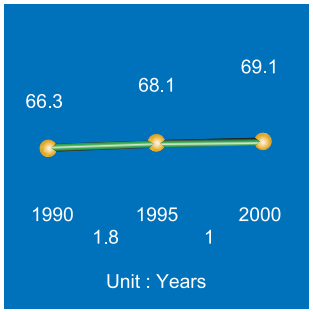
Solomon Islands



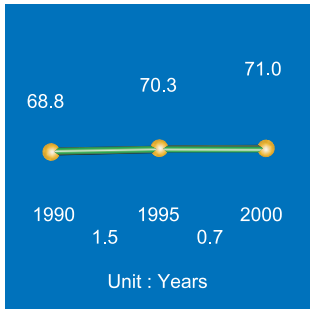
Micronesia

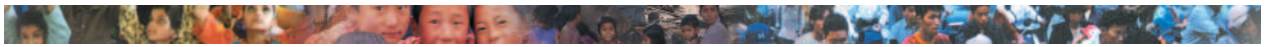


Samoa



Tonga





Economy Indicator

Australia and New Zealand are classified as highly developed countries and enjoy robust economies. In the past decade, the Australian economy has grown faster than the OECD average. Sufficient data is not available for the Pacific Island Countries (PIC), but there are indications of rising unemployment and declining GDP per capita. Poverty is thus emerging as an important issue in a number of PICs. Moreover, rapid urban growth and consumerism is exerting increasing pressure on the region's resources, leading to environmental problems.

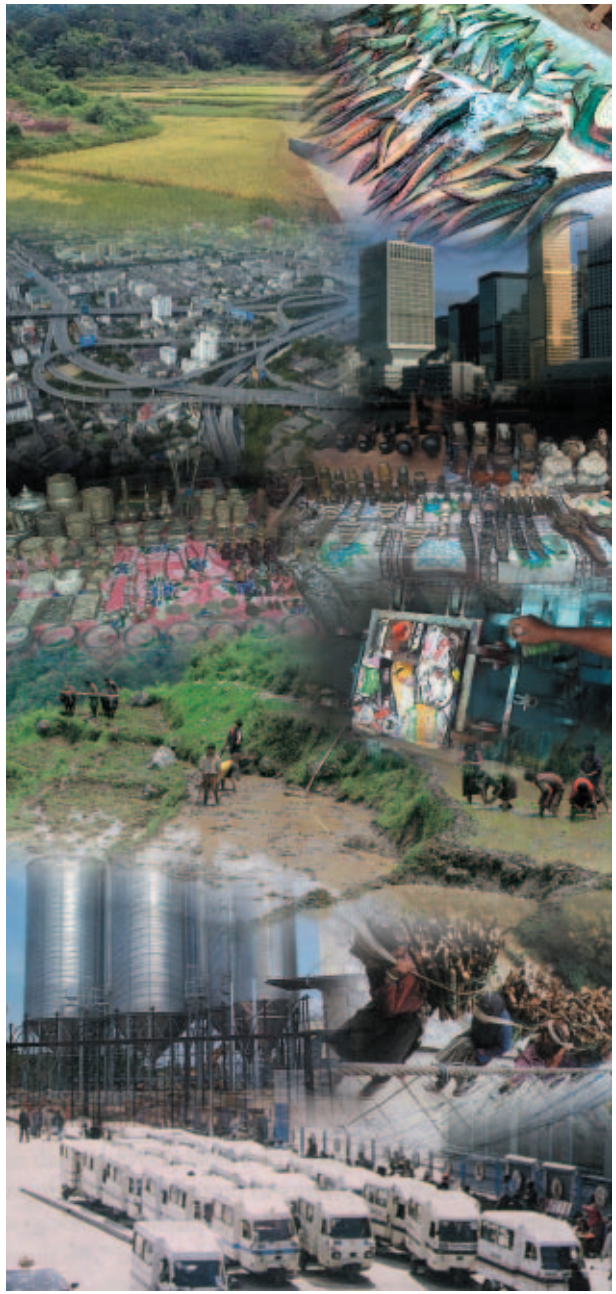
Steady economic growth is needed to counter rising poverty. Over the past decade, growth has been very low in the PICs, leading to general decline in the standard of living. Many communities however still enjoy a high degree of subsistence affluence from traditional, non-monetary resource management systems. And the standard of living for the Pacific Island urban dwellers is relatively high when compared with those in other developing countries. But this urban development has come at the cost of the environment and the loss of traditionally sustainable systems. The population has gradually moved towards a consumerist lifestyle, which has further strained the environment in these countries. Many communities of the Pacific share a close, intricate relationship with their environment. This relationship stems out of not only cultural roots but also out of economic reasons. Environmental degradation thus affects these communities at many levels and worsens their economic conditions.

Agriculture remains the principal source of employment in most of the PICs. Tourism is one of the fastest growing sectors of the economy in the Pacific. Populations in PICs are also dependent on the coastal and marine environment for subsistence. Many of the small and remote islands of the Pacific have essentially no industry at all, while other countries in the Pacific have small industries related to food or beverage processing, clothing and minor machinery assembly or repair. Most PICs have meager resources and in order to harmonize their population growth and urbanisation trends with higher human development, they need to establish policy mechanisms to integrate environment preservation and economic growth.

Marine resources such as fisheries, corals and sand from beach mining are a source of livelihood in this region. The commercial exploitation of oceans has lead to unsustainable trends in marine resources. Fish stocks are being depleted, coral reefs have been destroyed and sand-mining is proving to be detrimental to the local ecology. It is important to reverse the trend of over-exploitation of marine resources. The sensible management of marine resources signifies a strong opportunity for substantial economic development, especially for the atoll states such as the Marshall Islands, Kiribati, Niue and Tuvalu.

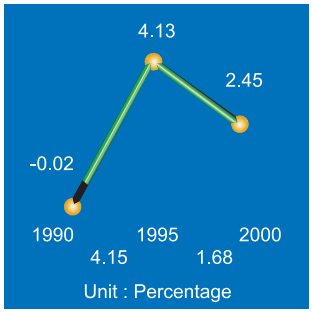
GDP growth during the last decade was quite erratic for most of the sub-region. Countries showed high GDP rates followed by negative growth rates. Few countries showed sustained growth over the last decade.

The Gross National Income showed a positive trend, with the GNI increasing in all countries over the decade. The GNI per capita was highest in Australia at US$20.12 thousand, while the lowest was in Solomon Islands at US$0.64 thousand.

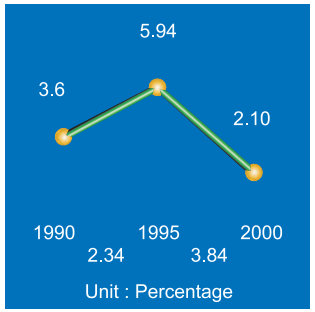


Economy Indicator - Gross Domestic Product Annual Growth

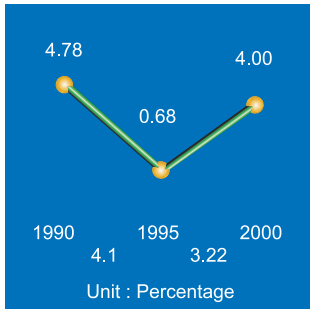
New Zealand



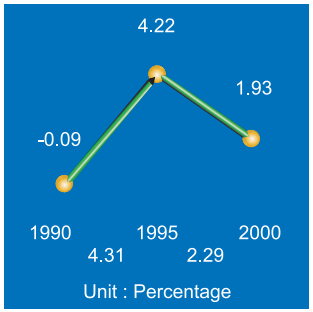
New Caledonnia



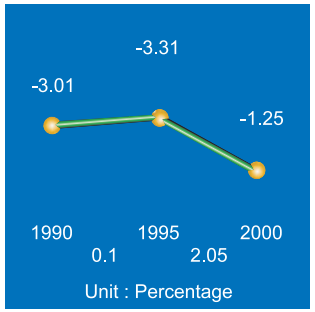
Vanuatu



Australia



Papua New Guinea

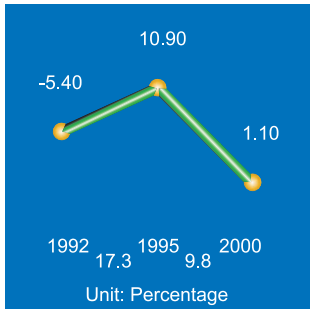


Note: GDP growth has been erratic in the past decade – with high growth in some years and negative growth in some. Australia and New Zealand have shown respectable growth in the last decade. Among the PICs, Tonga and PNG have shown steady growth over the past decade.

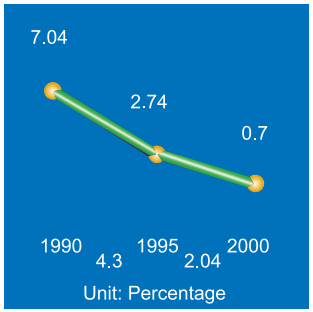
Source: World Bank

Economy Indicator - Gross Domestic Product Annual Growth

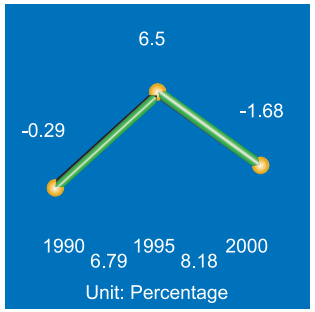
Palau



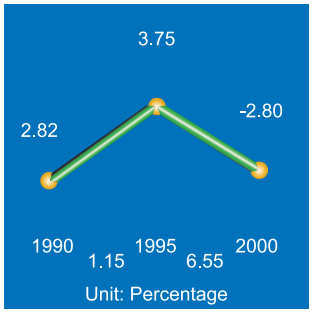
Marshall Islands

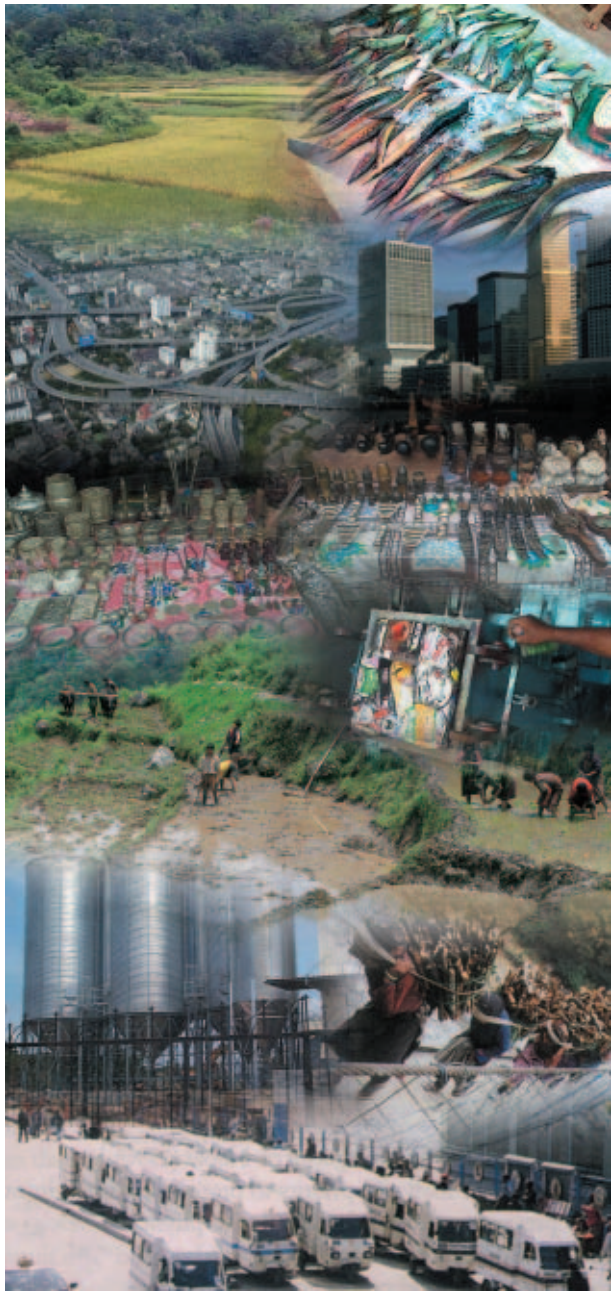


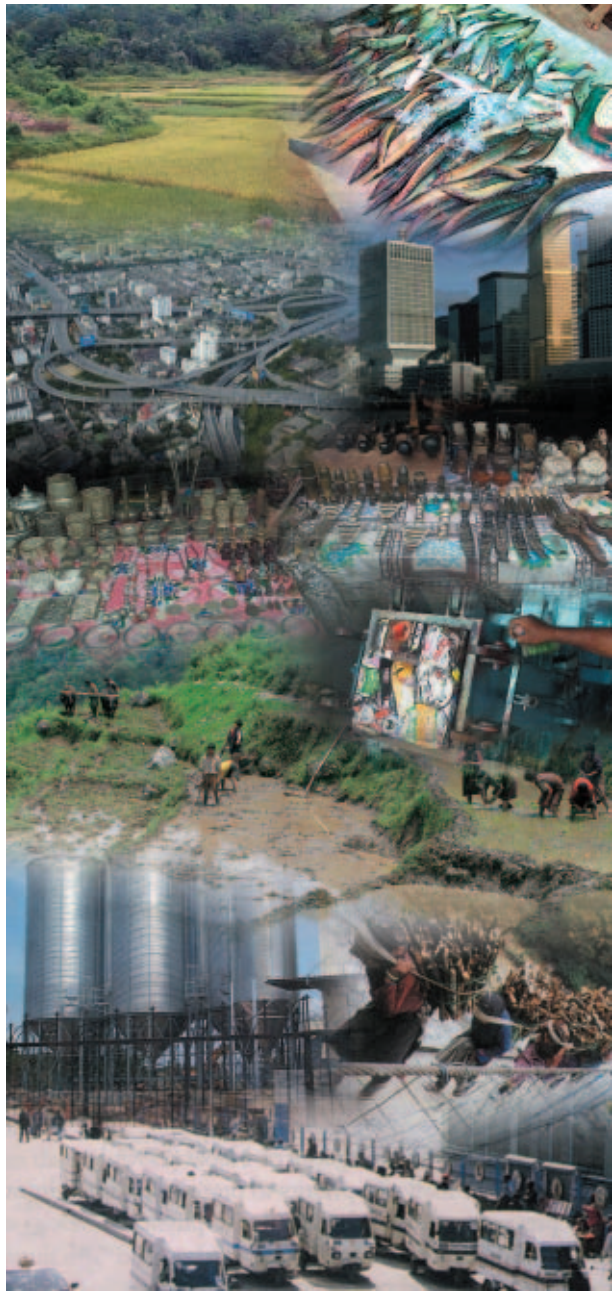
Kiribati



Fiji

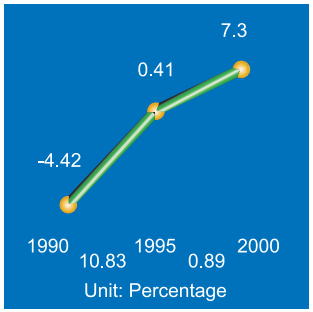




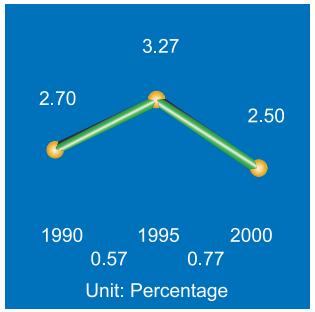


Economy Indicator - Gross Domestic Product Annual Growth

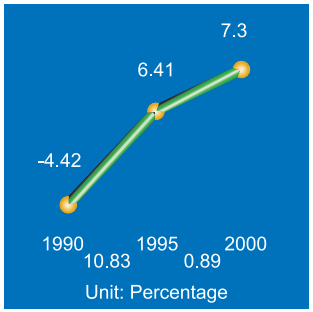
Solomon Islands



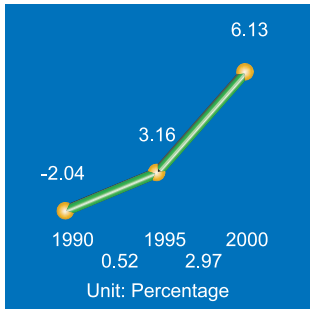
Micronesia



Samoa

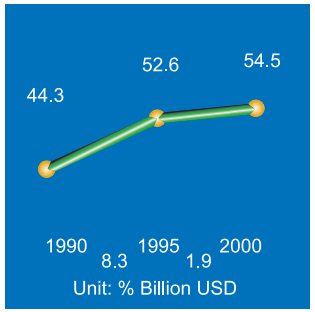


Tonga

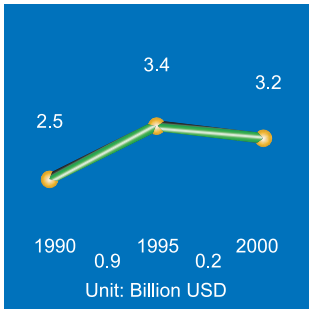


Economy Indicator - Gross National Income

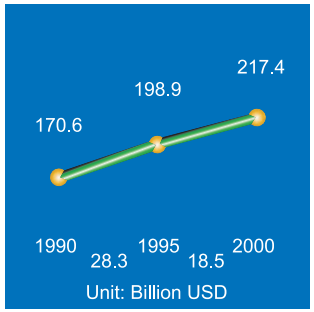
New Zealand



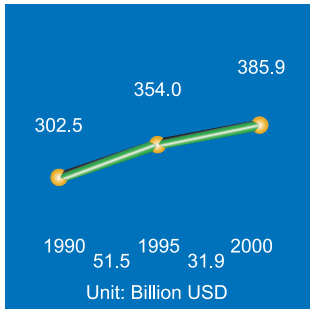
New Caledonnia



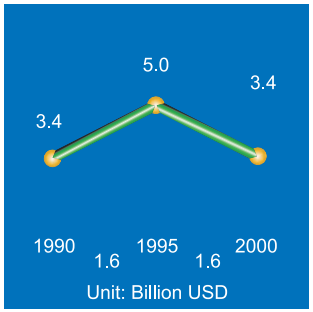
Vanuatu



Australia

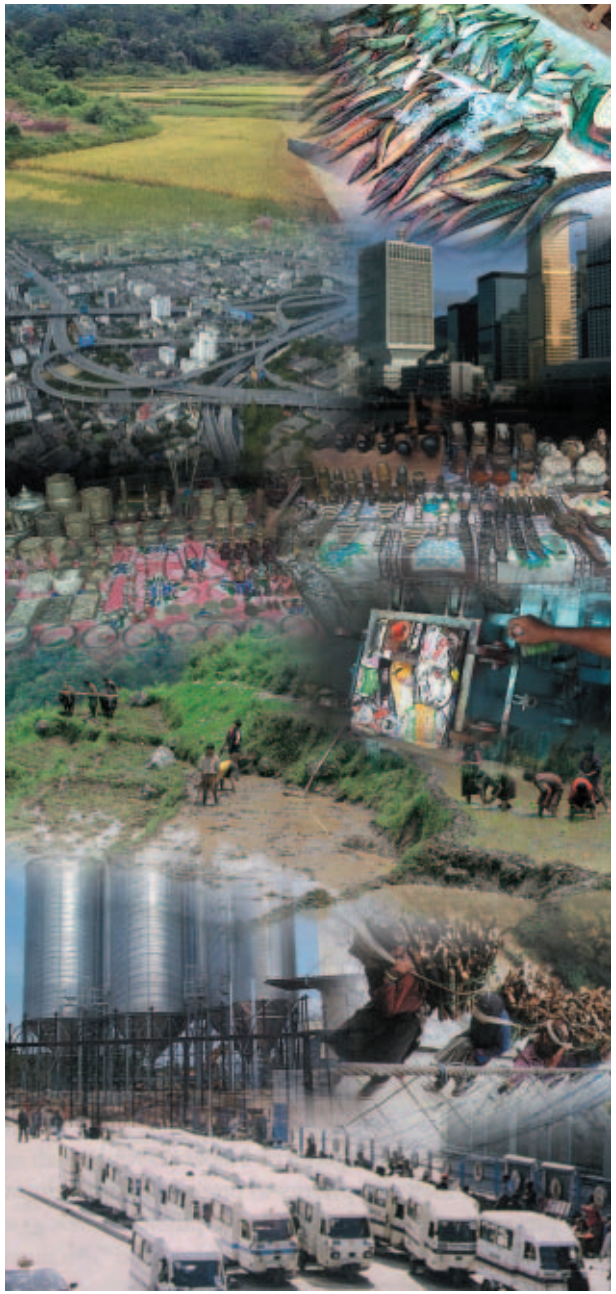


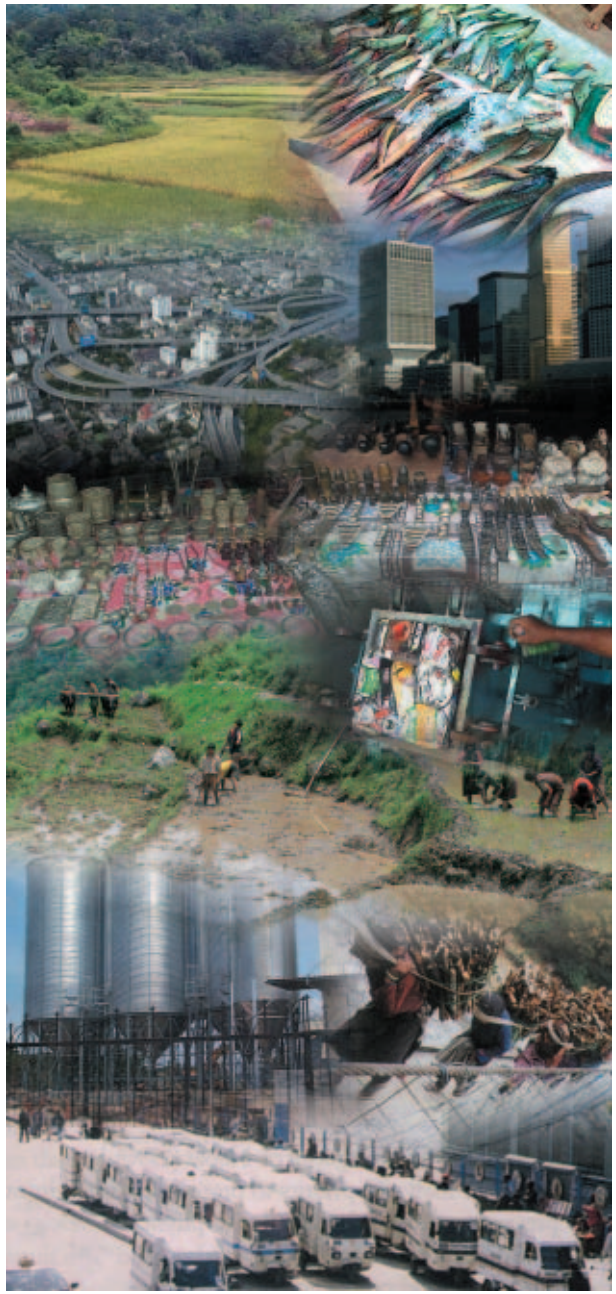
Papua New Guinea



Note: The Gross National income showed a positive trend, with the GNI increasing in all the countries over the decade except Solomon Islands where it decreased and Papua New Guinea where it remained constant. Australia has the highest GNI of US$385.9 billion and the lowest is Fiji at US$1.8 billion.

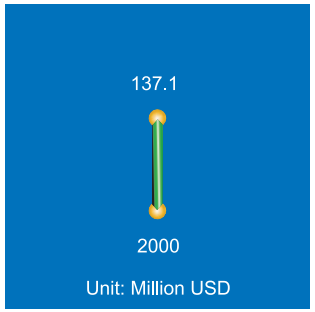
Source: WDI 2002



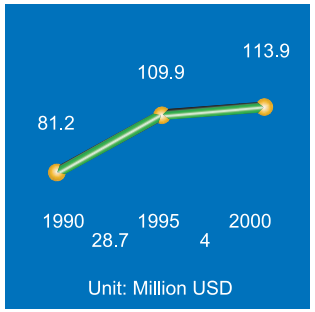


Economy Indicator - Gross National Income

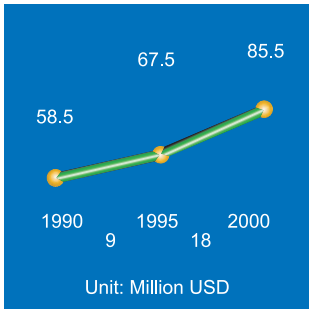
Palau



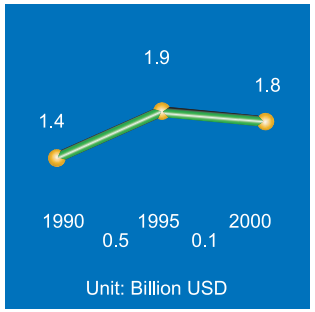
Marshall Islands



Kiribati

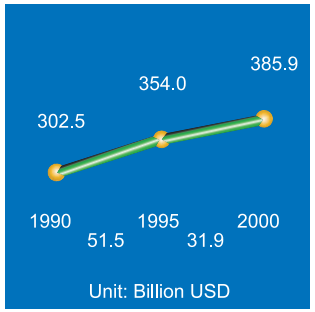


Fiji

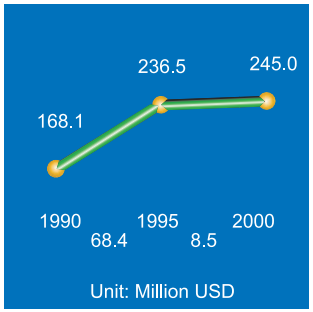


Economy Indicator - Gross National Income

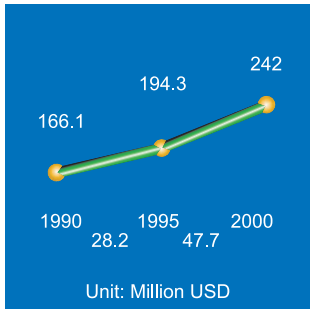
Solomon Islands



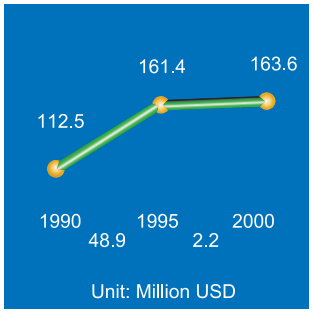
Micronesia

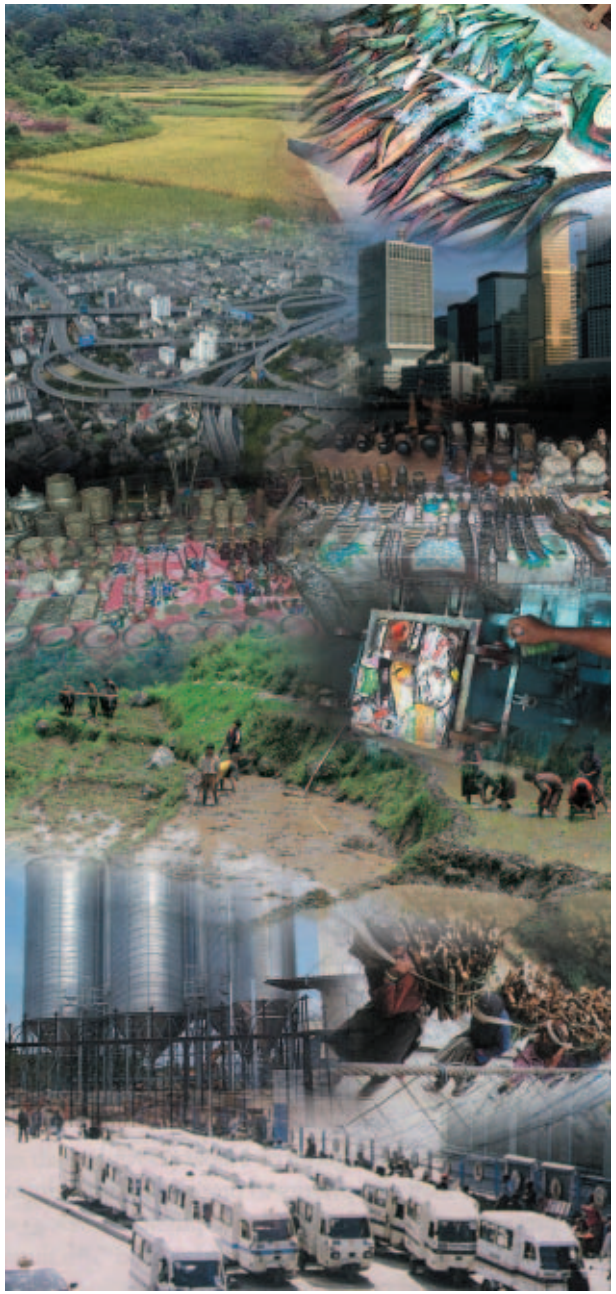


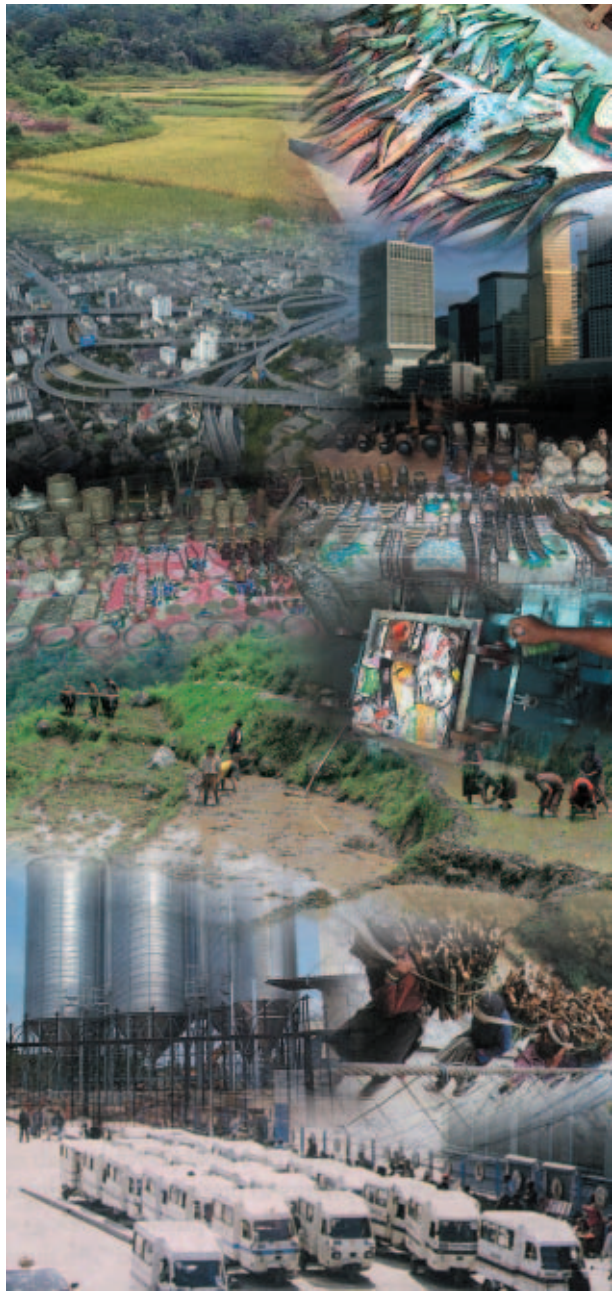
Samoa



Tonga

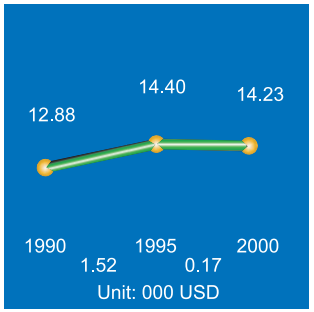




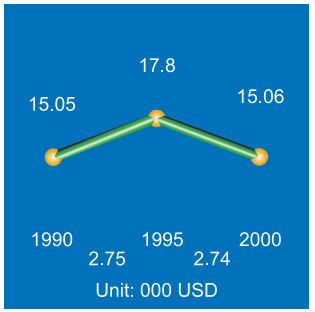


Economy Indicator - Gross National Income Per Capita

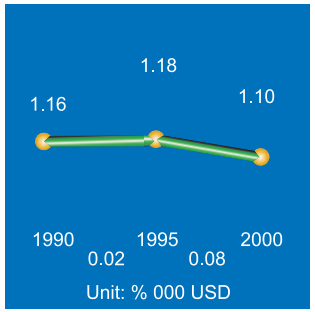
New Zealand



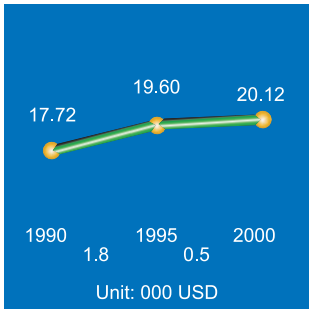
New Caledonnia



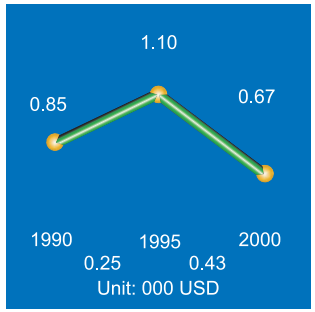
Vanuatu



Australia



Papua New Guinea

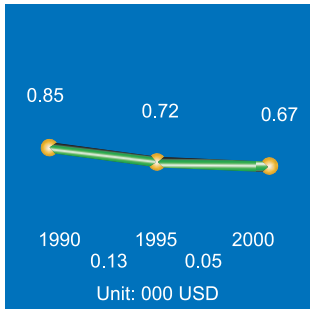


Note: The GNI per capita was highest in Australia at US$20.12 thousand, while the lowest was in Solomon Islands at US$0.64 thousand. The GNI per capita has increased for all the countries in the subregion except for New Caledonia where it decreased slightly in the latter half of the 1990s.

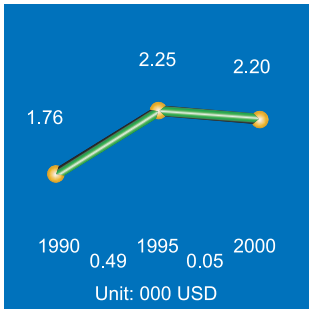
Source: WDI 2002

Economy Indicator - Gross National Income Per Capita

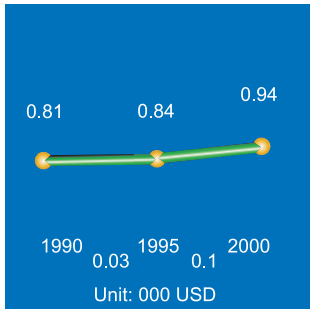
Palau



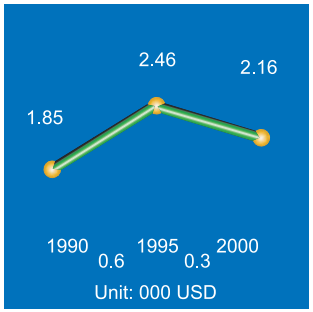
Marshall Islands

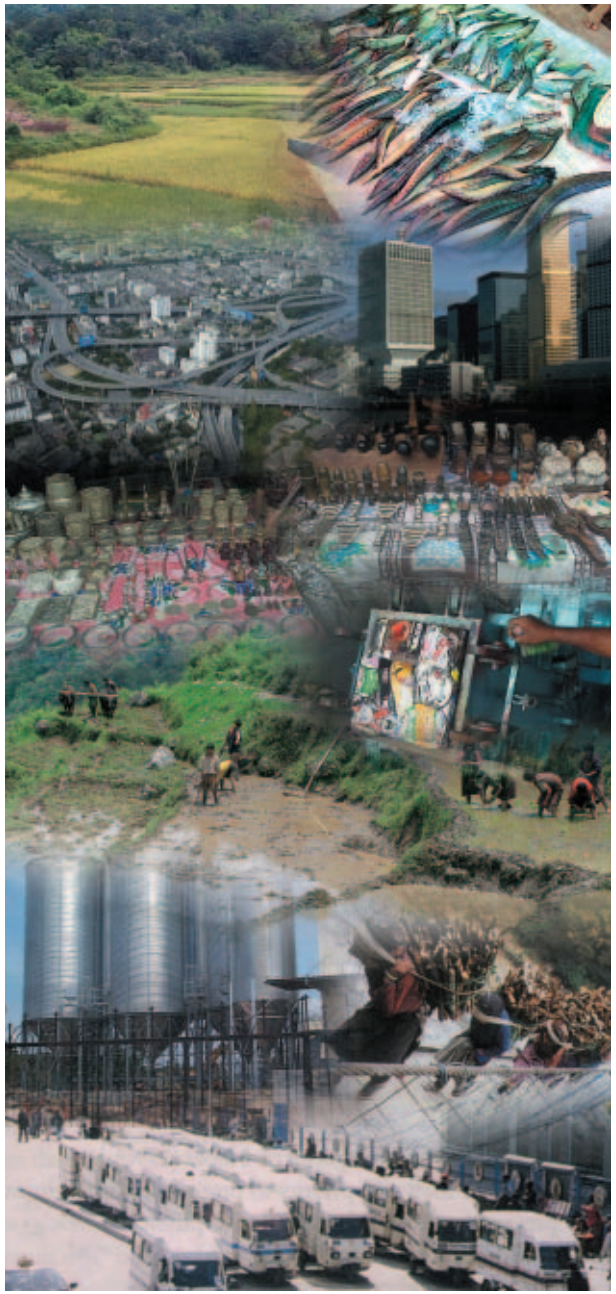


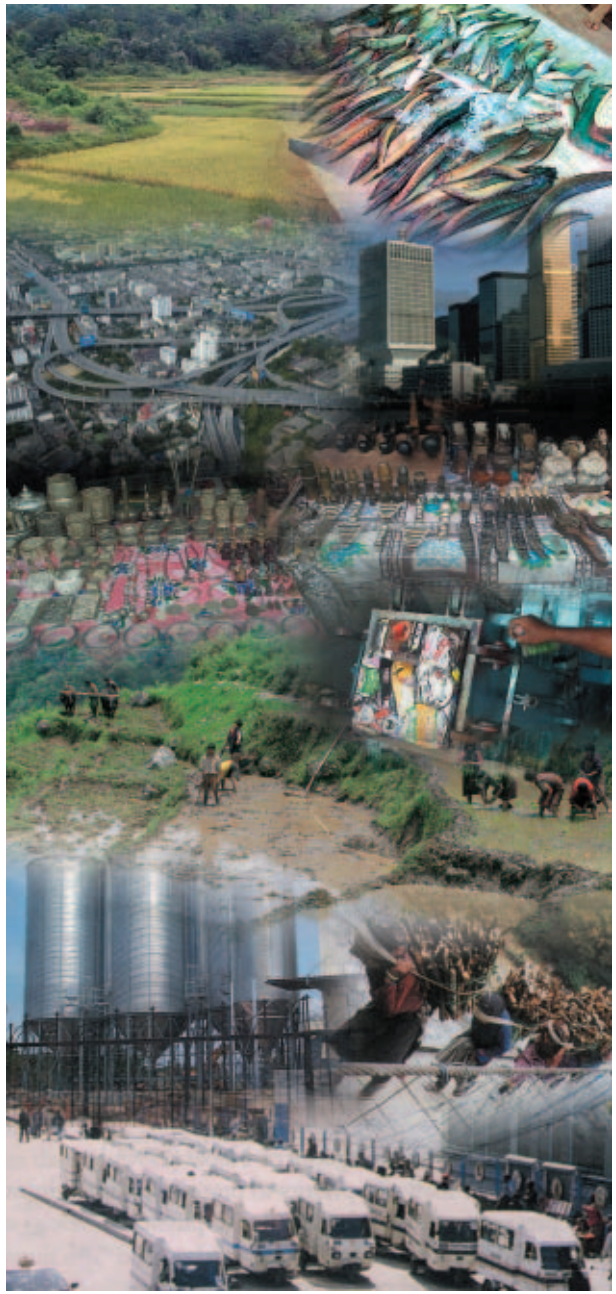
Kiribati



Fiji

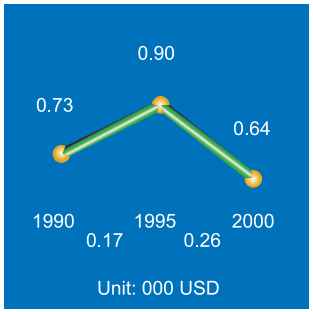




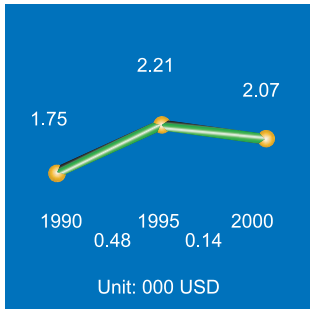


Economy Indicator - Gross National Income Per Capita

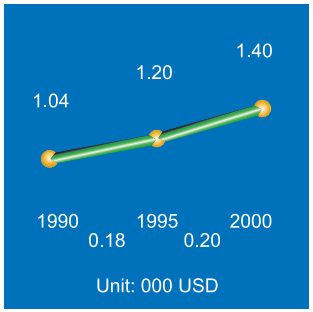
Solomon Islands



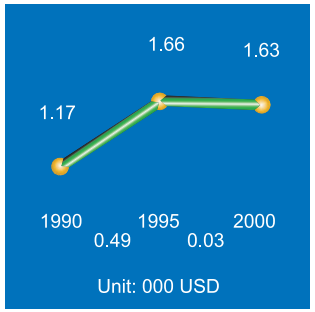
Micronesia



Samoa

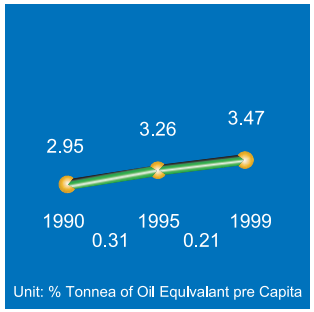


Tonga

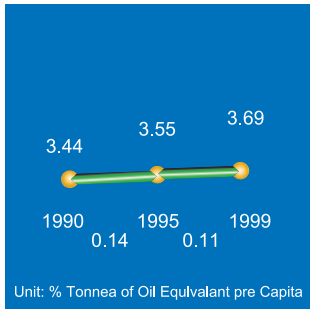


Economy Indicator - Energy Consumption Per Capita

New Zealand

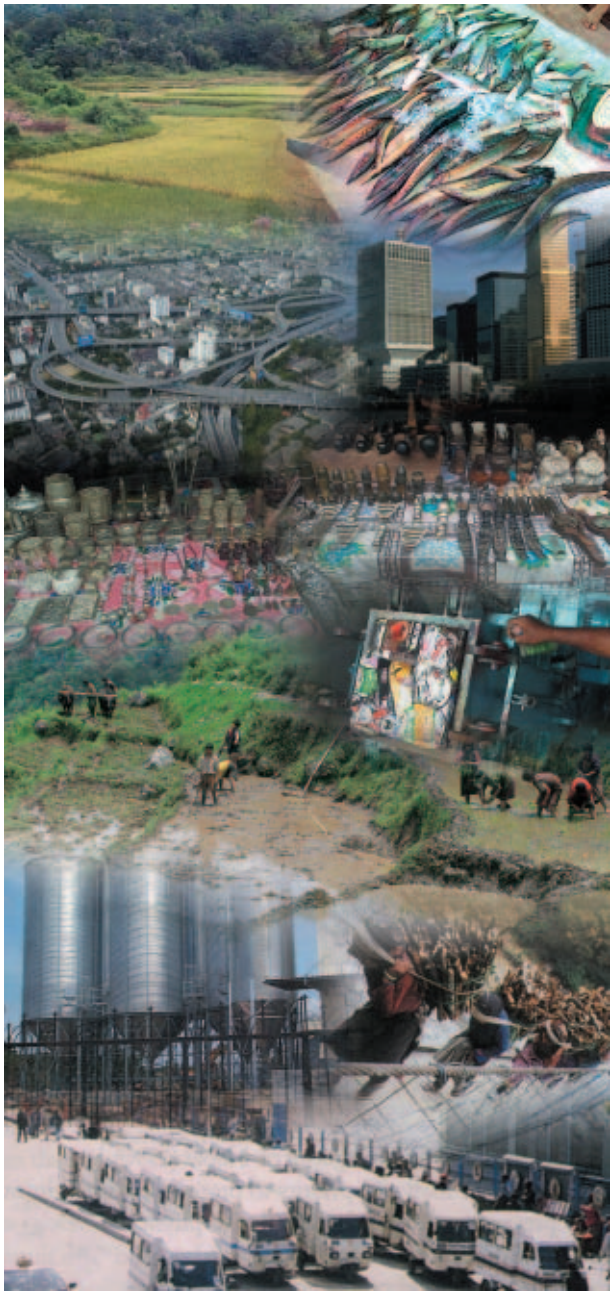


Australia



Note: Data is not available for any of the smaller Pacific island countries. From the data available for New Zealand and Australia, it is seen that energy consumption has increased for both the countries during the last decade. Australia and New Zealand had comparable energy consumption per capita figures for the year 2000.

Source: GEO III Grid data UNEP



Land Indicator

Land is an increasingly meager and precious resource in the Pacific islands. Burgeoning population and deteriorating land quality have increased the pressure on the land. Widespread overgrazing in the larger countries and water and wind erosion in the smaller islands are common causes of land degradation. The use of chemicals in commercial agriculture is degrading both land and water resources. Urbanization, development in the coastal regions, agriculture and deforestation are also straining the land.

Australia in particular is facing severe land salinization. Excessive extraction of groundwater, freshwater withdrawal and inappropriate irrigation systems has increased soil salinity. Serious soil contamination problems are prevalent in parts of Australia and New Zealand. The contaminants include heavy metals and carcinogens. Soil contamination can lead to serious health problems. Community initiatives have been taken to tackle the problem of land degradation. A notable one is the land management programme called Landcare, jointly undertaken by the National Farmers' Federation and Australian Conservation Foundation in Australia.

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. Urban expansion at a rapid rate has contributed to land-stress. Also, military nuclear testing has lead to contamination of soil by radioactive material. Changing weather patterns such as El Nino may increase occurrence of drought and consequently exacerbate land degradation.

Coastal areas are especially vulnerable to land degradation, as these areas are ecologically sensitive zones.

Deteriorating land quality decreases the amount of arable land per capita, which could pose a threat to food security in the region. In the last decade, arable land per capita has decreased in most of the sub-region. The highest arable land per capita was in Australia – 2.52 ha/capita.

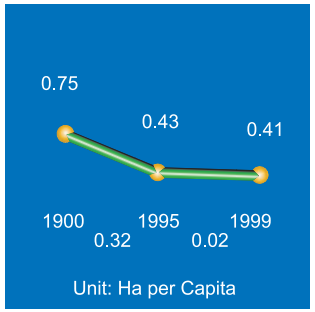
It is essential that countries of the sub-region develop and implement land-use policies that incorporate indigenous knowledge of sustainable land management.

Deforestation is an emerging issue in the region. Forest and tree cover is diminishing in PICs due to a combination of population pressures, loss of traditional systems, shifting cultivation, pasture development, mining and logging activities. Coastal and lowland forests have been converted to large-scale commercial coconut, cocoa and banana plantations on many islands. Forest area has decreased in all countries of the region. Solomon Islands has the highest land under cover at 90.6 per cent while Tonga has the lowest at 5.6 per cent in the year 2000.

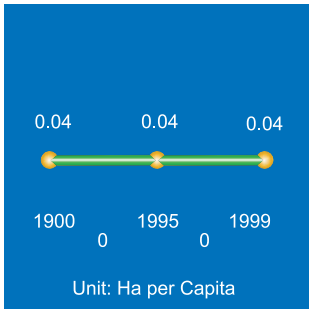
Forests are critically important to the region – socially, economically and ecologically. It is imperative that appropriate polices are promulgated for conservation and preservation of these forests.

Land Indicator - Arable Land Per Capita

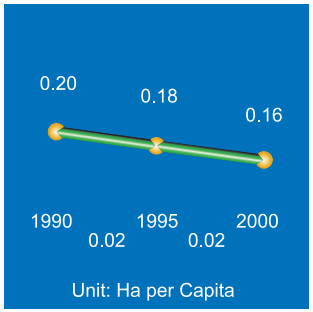
New Zealand



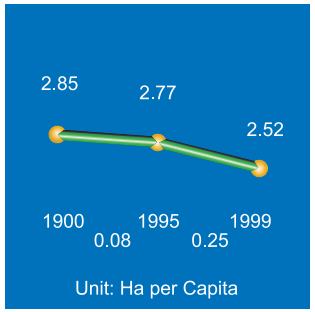
New Caledonia



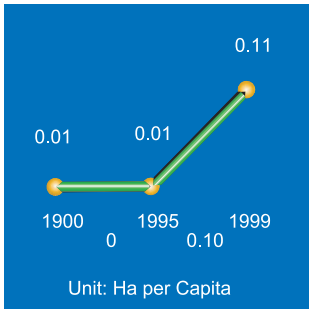
Vanuatu



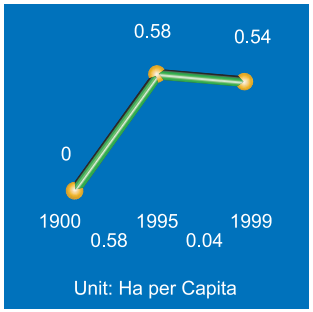
Australia



Papua New Guinea

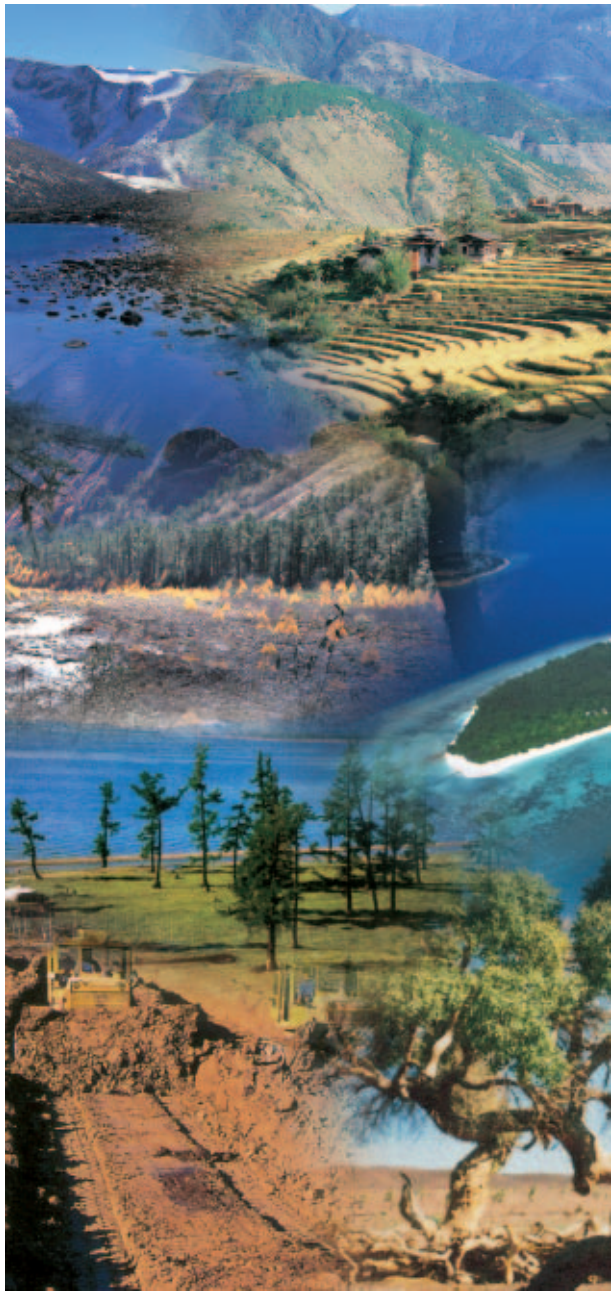


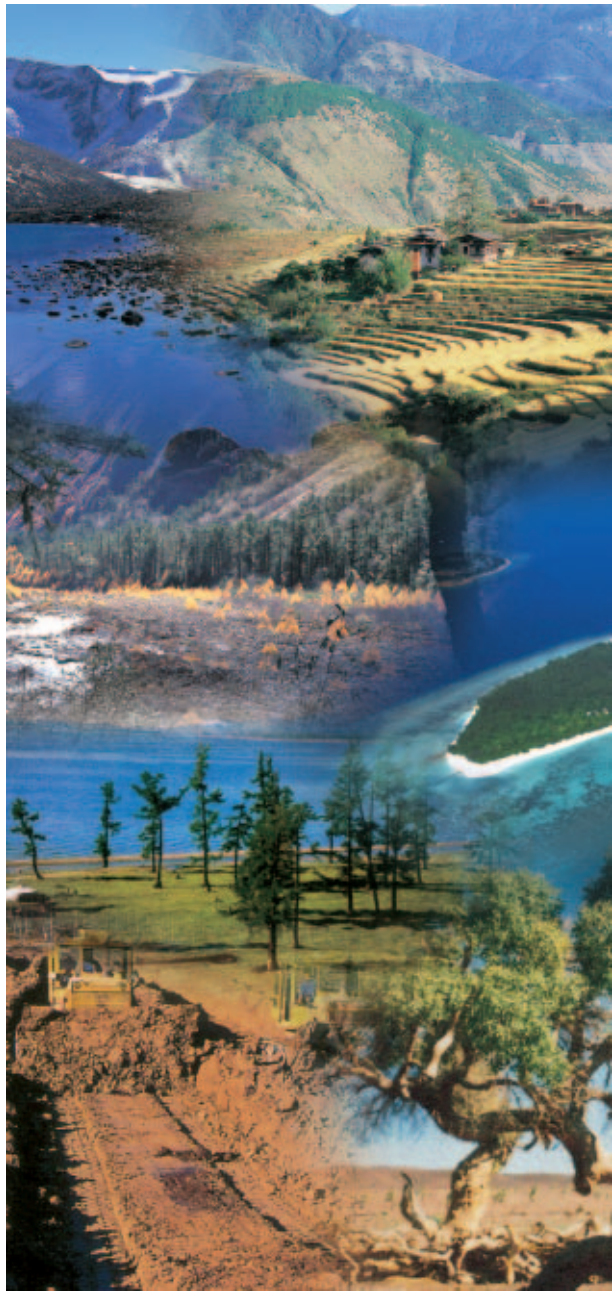
Palau



Note: Highest amount of arable land was 2.52 ha/capita in Australia and the lowest was 0.03 ha/capita in American Samoa. Arable land per capita has slightly increased in some PICs but this increase could be because marginal and coastal lands may have been brought into cultivation.

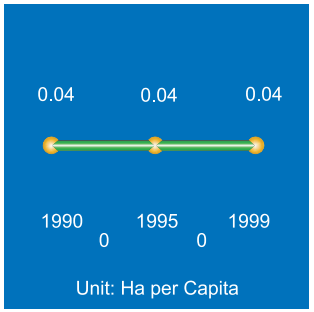
Source: GEO-3 GRID data, UNEP



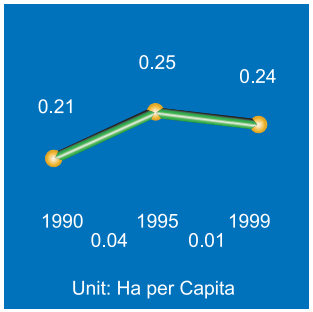


Land Indicator - Arable Land Per Capita

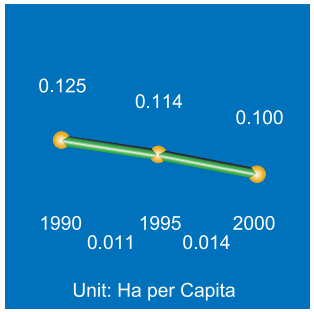
Guam



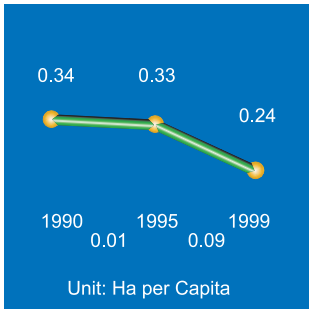
Fiji



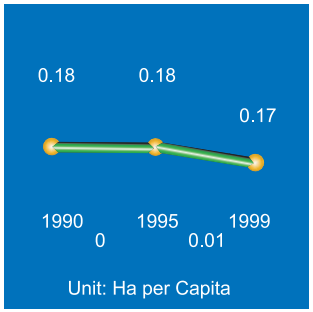
Solomon Islands



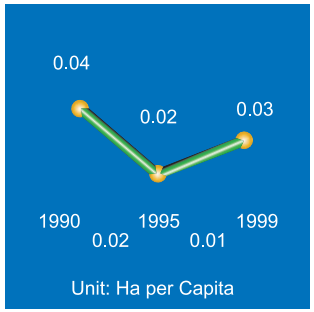
Samoa



Tonga

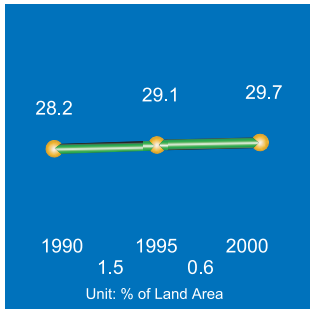


American Samoa

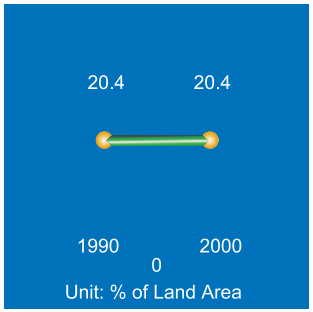


Land Indicator - Forest Area

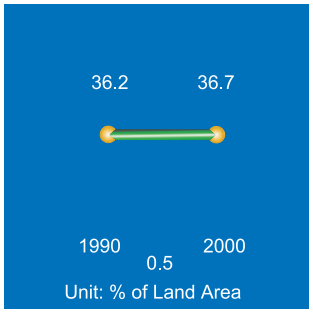
New Zealand



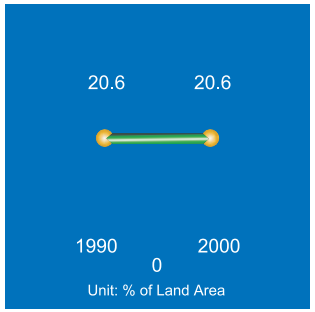
New Caledonia



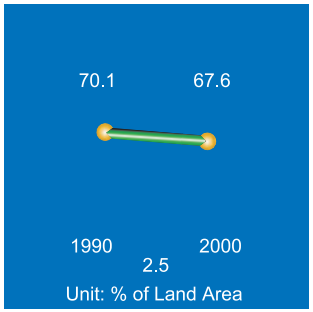
Vanuatu



Australia

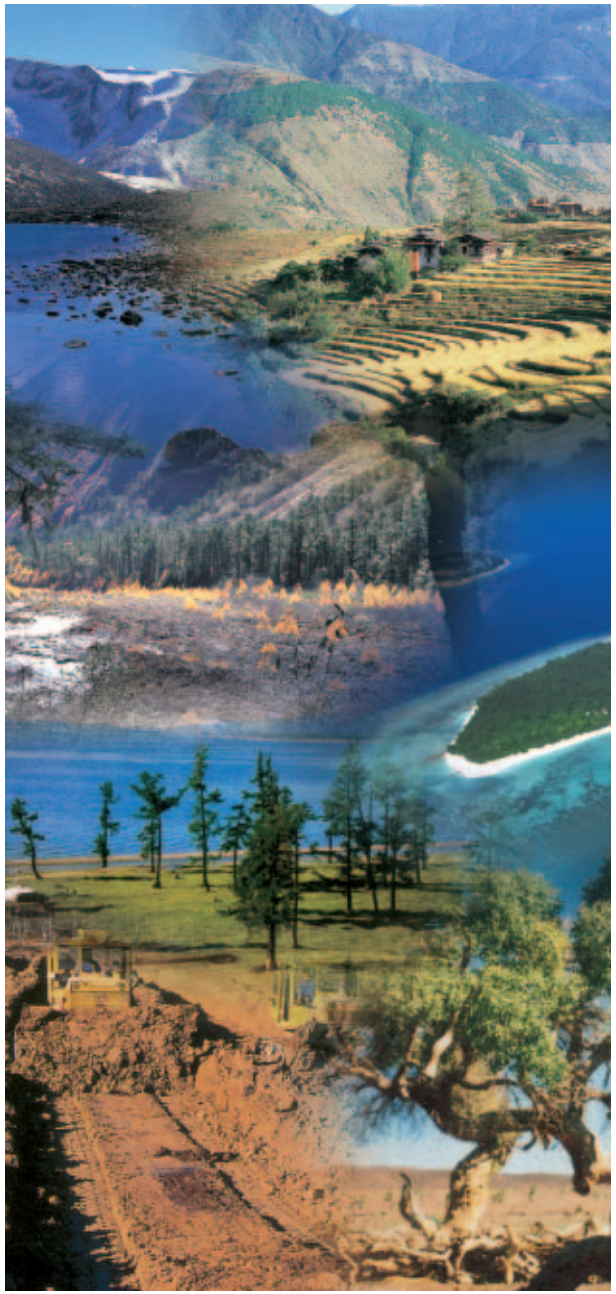


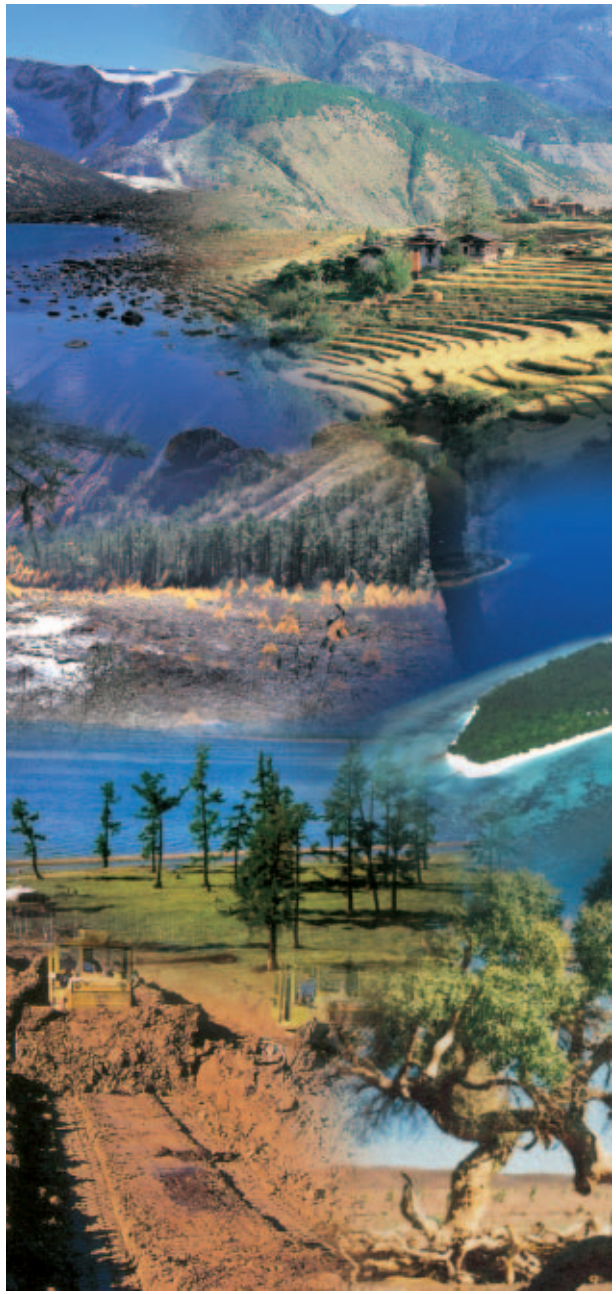
Papua New Guinea



Note: Forest area has been decreasing in all countries of the region. Solomon Islands has the highest land under forest cover at 90.6 per cent while Tonga has the lowest at 5.6 per cent in the year 2000.

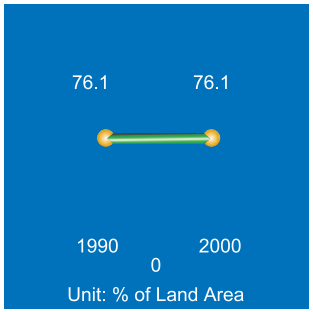
Source: WDI 2002, FAO



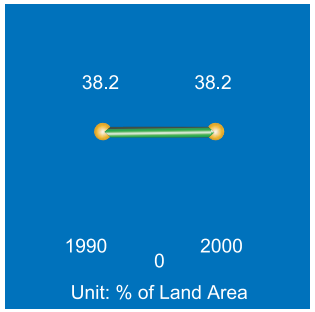


Land Indicator - Forest Area

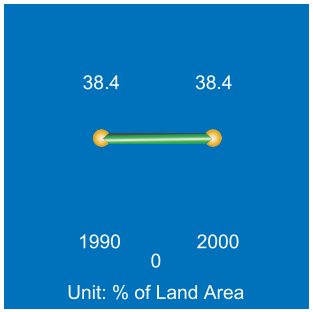
Palau



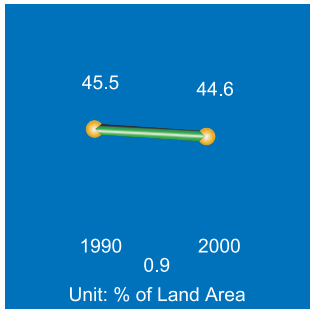
Guam



Kiribati

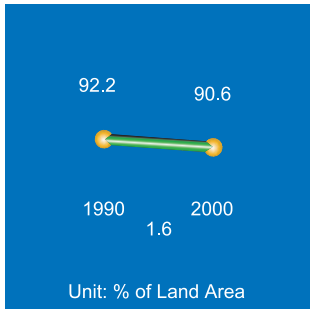


Fiji

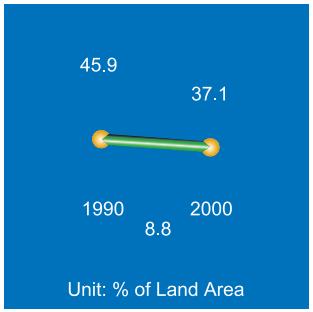


Land Indicator - Forest Area

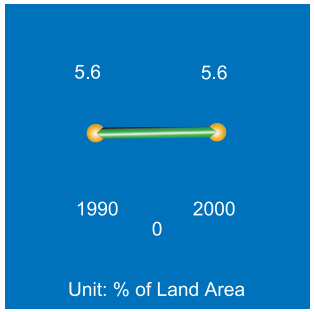
Solomon Islands



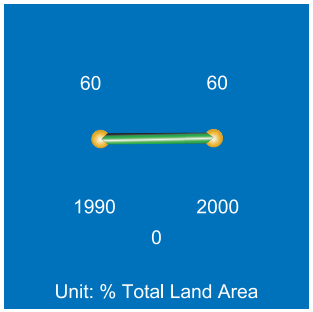
Samoa

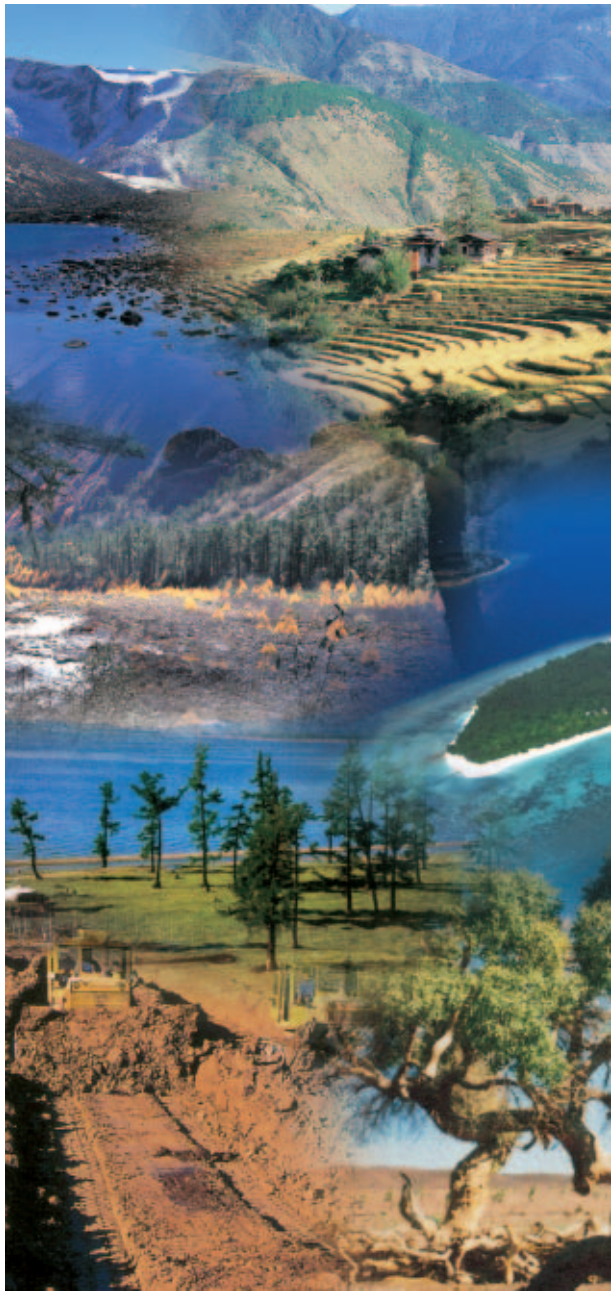


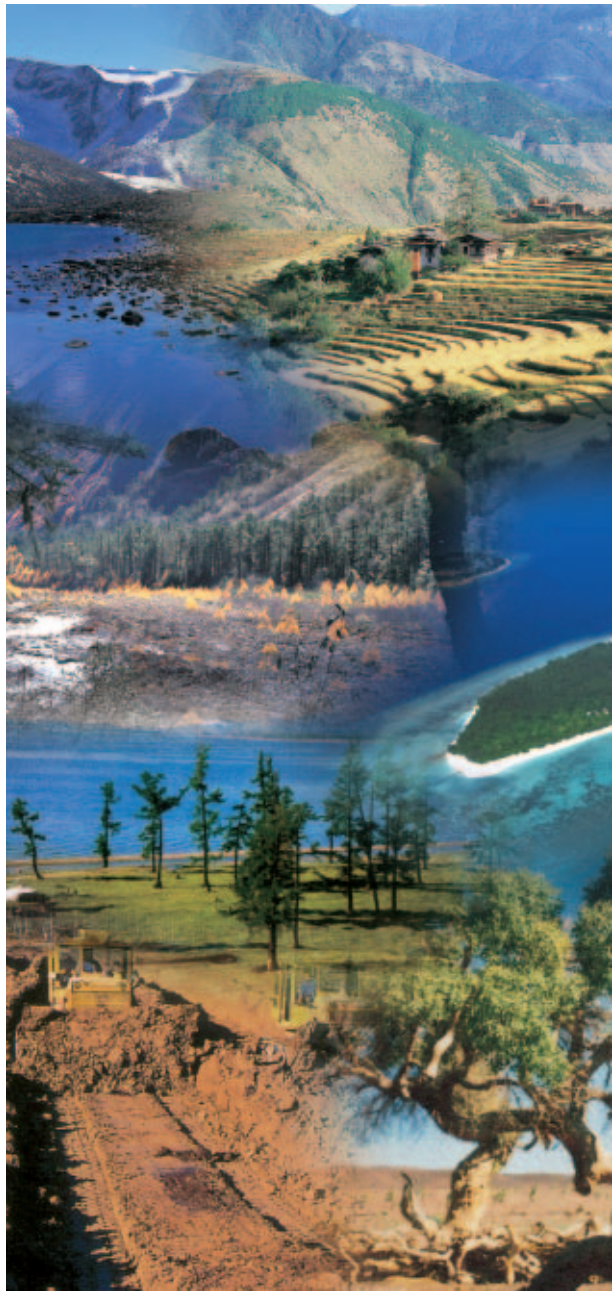
Tonga



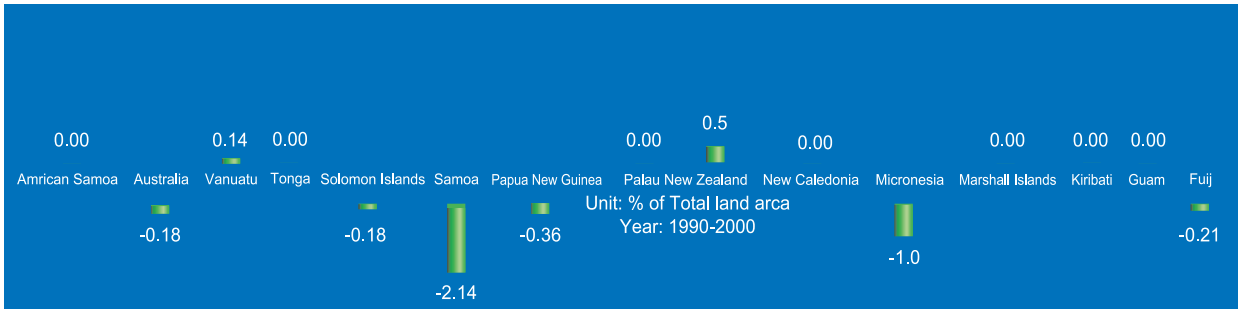
American Samoa







Land Indicator - Forest Cover Change



Note: The highest percentage of forest cover change is observed in Samoa where the forest cover has been reduced. New Zealand and Vanuatu shows positive forest cover change.

Source: FAO Forestry Country Profile

REGIONAL RESOURCE CENTRE FOR ASIA AND THE PACIFIC

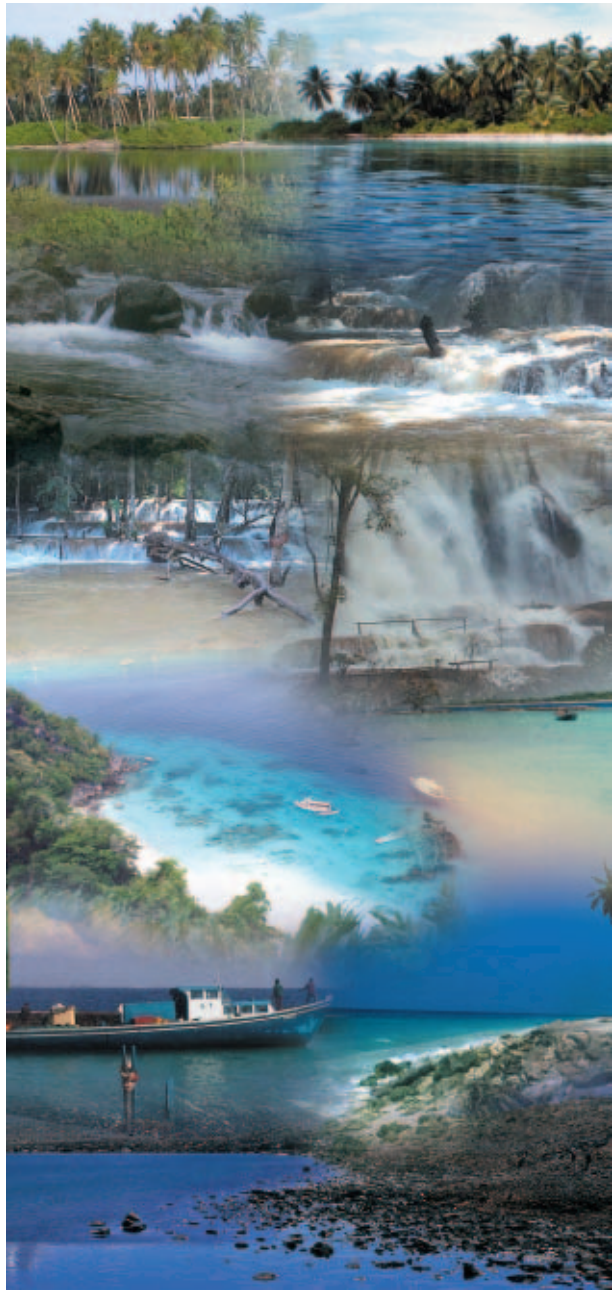
Water Indicator

Freshwater withdrawals from lakes, rivers, reservoirs and other sources, and groundwater extraction have increased in all parts of the world. Also, water quality is being increasingly threatened by growing population, urbanisation, industrialisation and other human activities. Access to safe drinking water and sanitation are strong indicators of the socio-economic development of a country. In the Pacific islands, most severe water shortages are 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 a steady freshwater lens has determined whether these islands have been able to sustain permanent inhabitation or not. In the high islands, despite high levels of total rainfall, water shortages are experienced because of the seasonality of the rainfall. Pollution, excessive sedimentation and water wastage are common problems reported in Fiji, Samoa and Solomon Islands. Water shortage may force people to use contaminated water for drinking purposes, leading to diseases such as diarrhoea and hepatitis. Water quality in the high islands is usually acceptable by WHO standards, though anthropogenic activities are increasingly polluting the water sources. Overuse, over-pumping, waste disposal and fertilizer and pesticide residues are adversely affecting the water quality.

Of all the continents, Australia has the least river water, the lowest percentage of rainfall as run-off and the smallest area of wetlands. The impacts of water shortage have become more pronounced in some parts of New Zealand as demand for water has increased. Moreover climate change phenomenon such as El Nino caused reduction in rainfall leading to one of the sub-region's worst droughts. El Nino intensified water shortages in some areas in New Zealand.

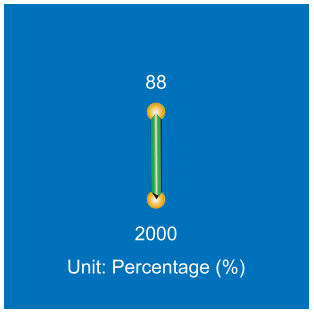
Drinking water quality on the whole, is generally good in Australia with the entire population having access to safe drinking water. Most of the PICs have high coverage of safe drinking water. Though countries like Papua New Guinea and Fiji have low coverage with only 42 and 47 per cent of the population having access to safe drinking water. Migration to urban centres and rapid urbanization has strained the infrastructure available in the island nations, leading to safe water and sanitation problems. Even within urban areas, there are pockets of posh neighbourhoods that have better and more reliable access to safe drinking water and sanitation, in comparison to the slum dwellings. Increasing urbanization rates have fueled an increase in demand for freshwater. Higher standards of living also demand more water.

Water and sanitation are vital to the socio-economic progress of any country. Population growth, urbanization, inappropriate usage, pollution and damage to water catchments are going to adversely affect water supply. The protection and conservation of the supply and quality of water is expected to become an important issue in the Pacific especially if global climate change patterns lead to increasing rainfall variability in the region. In many of the Pacific countries, the challenge facing water management is the better management of existing resources rather than the identification of new water sources. Appropriate policy, technical knowledge, effective legislation and better water use practices will need to be integrated to address the problem of water quality and availability.

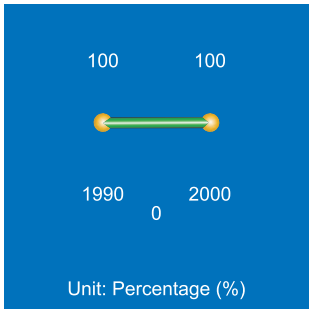


Water Indicator - Access to Safe Drinking Water

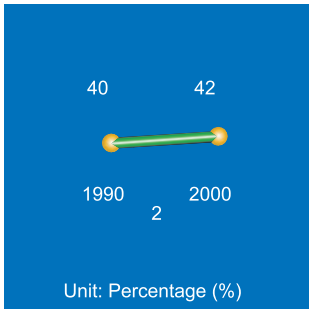
Vanuatu



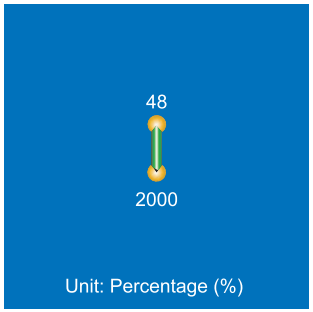
Australia



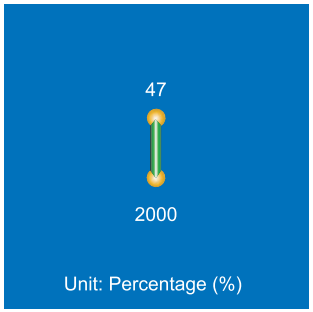
Papua New Guinea



Kiribati

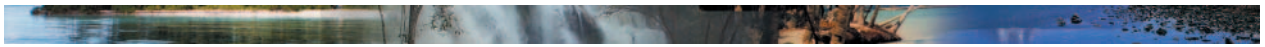


Fiji



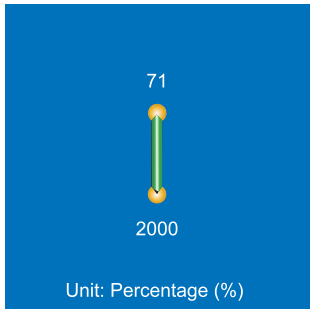
Note: Data is not available for most PICs. Australia, Tonga and American Samoa boast of full coverage of safe drinking water while Samoa has 99 per cent coverage. Access to safe drinking water is important to prevent outbreaks of waterborne diseases.

Source: World Bank

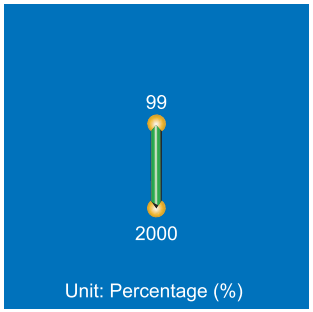


Water Indicator - Access to Safe Drinking Water

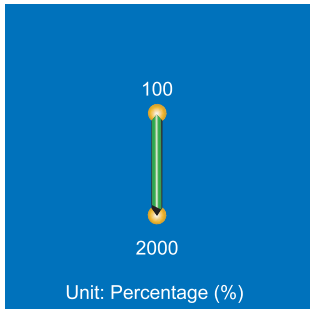
Solomon Islands



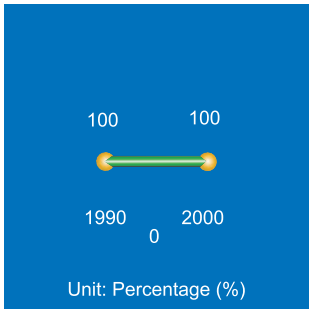
Samoa

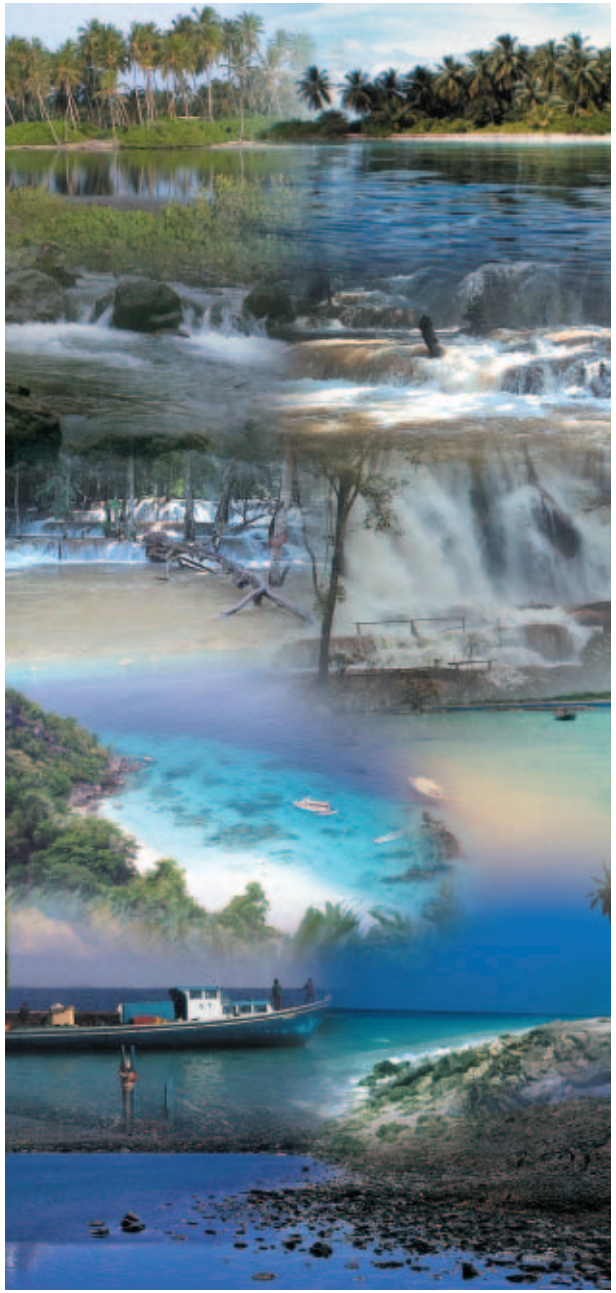


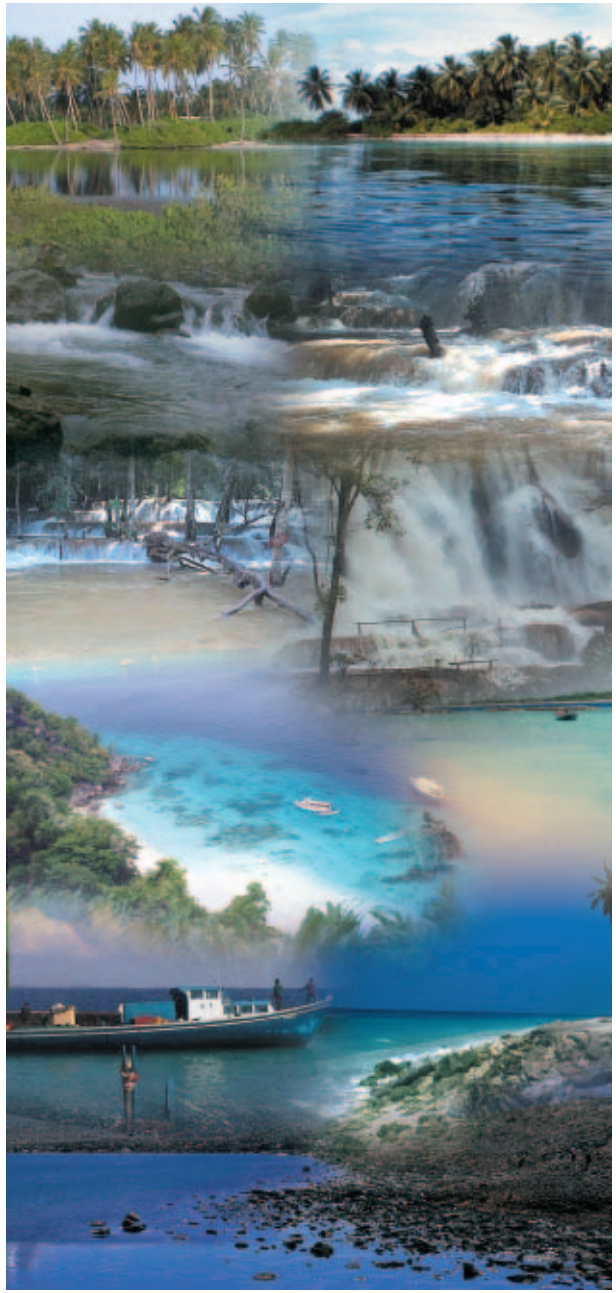
Tonga



American Samoa

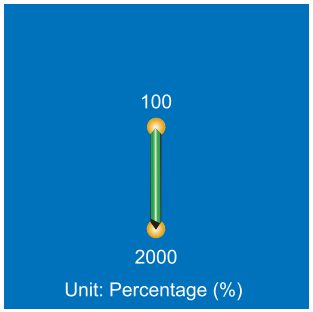




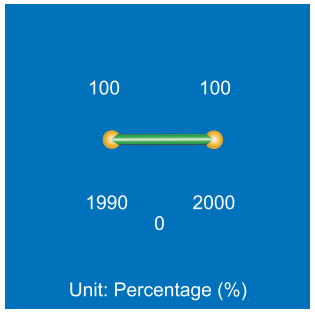


Water Indicator - Access to Safe Sanitation

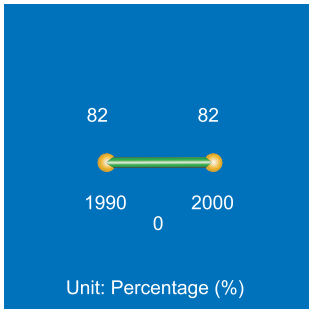
Vanuatu



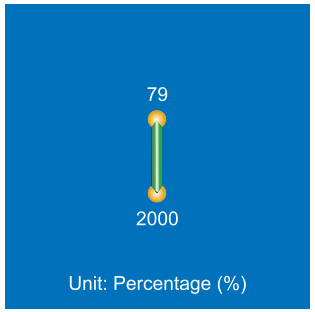
Australia



Papua New Guinea



Palau

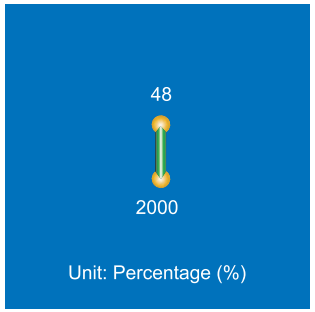


Note: Solomon Islands has the lowest coverage of sanitation at 34 per cent. Australia and Palau have full coverage.

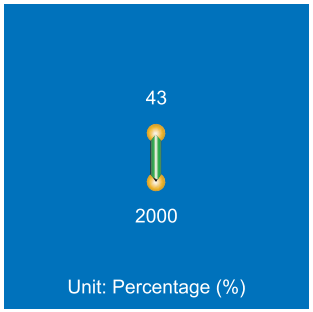
Source: World Bank, WRI 98-99

Water Indicator - Access to Safe Sanitation

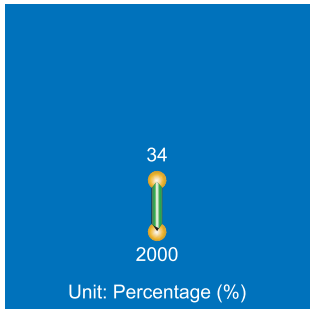
Kiribati



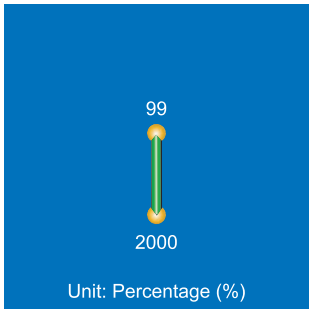
Fiji

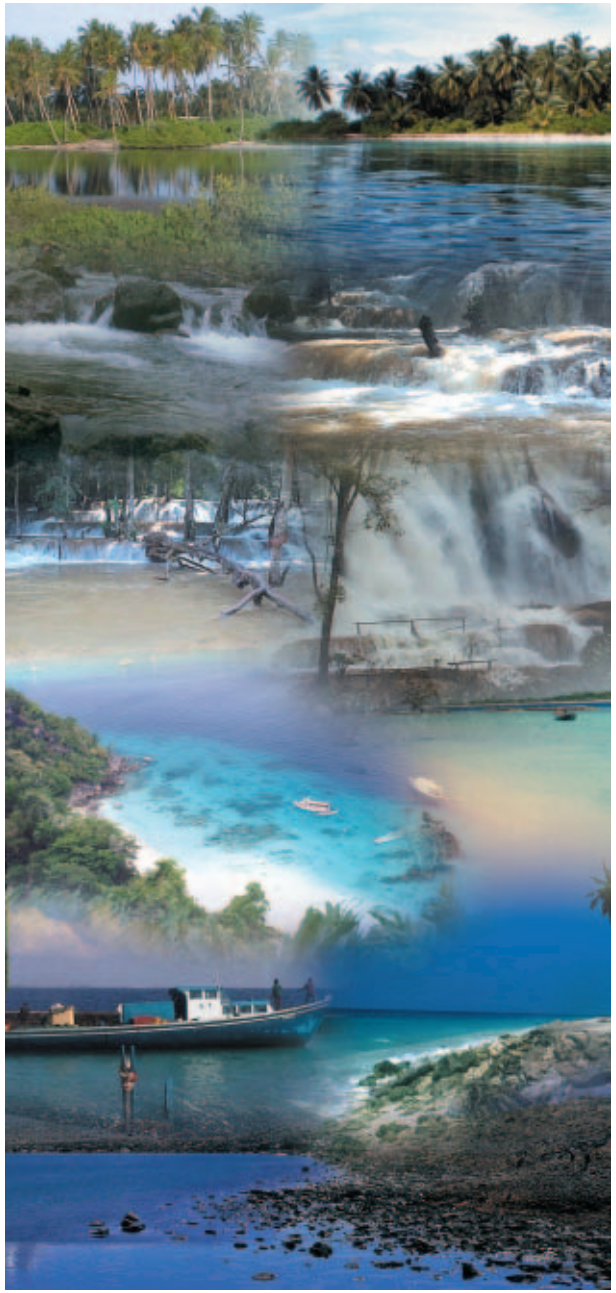


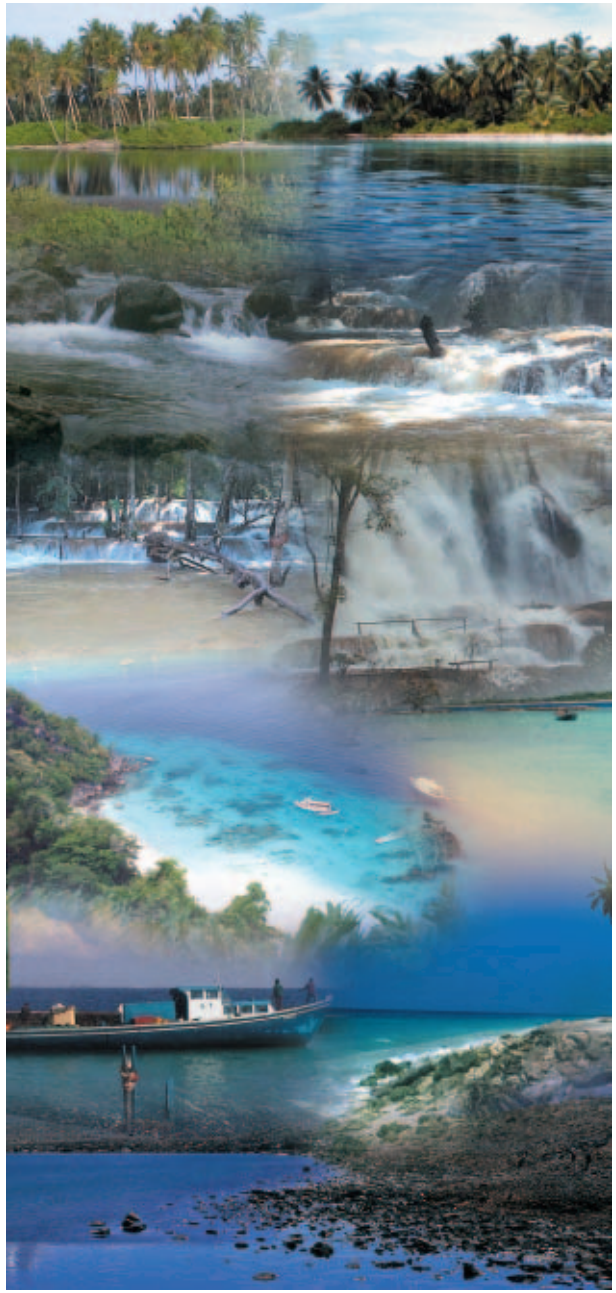
Solomon Islands



Samoa

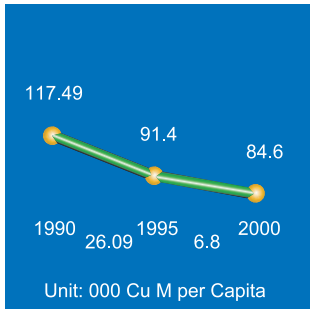




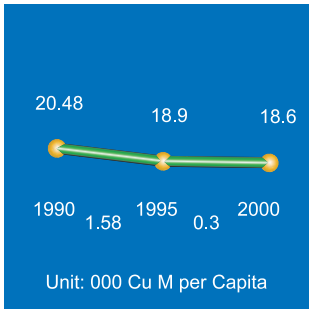


Water Indicator - Total Water Availability Per Capita

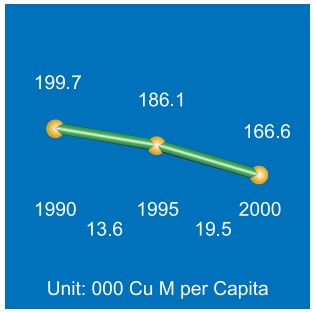
New Zealand



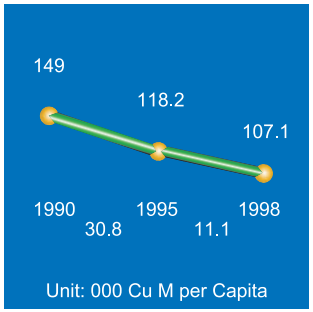
Australia



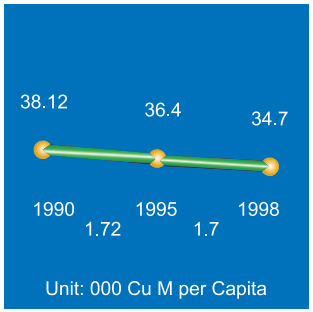
Papua New Guinea



Solomon Islands

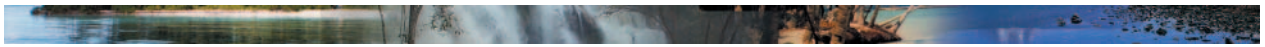


Fiji



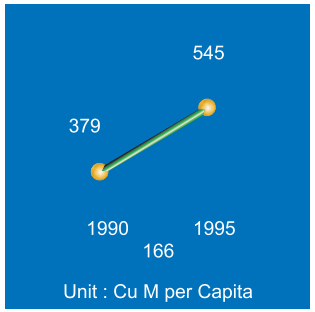
Note: Data is not available for most of the PICs, but indications are that water availability is an emerging issue in South Pacific. Australia has the lowest water available per capita at 18.6 cub m/ capita, while Papua New Guinea has the highest at 166.6 cub m/capita. In all the countries for which data is available, the quantity of water available per capita has decreased over the decade.

Source: WRI

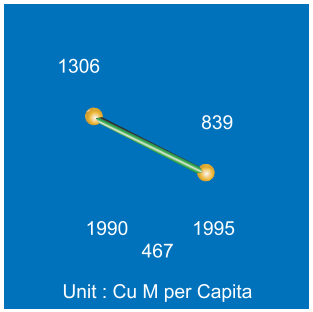


Water Indicator - Total Water Withdrawal

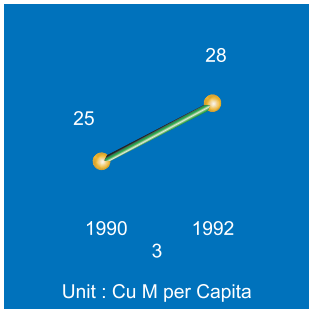
New Zealand



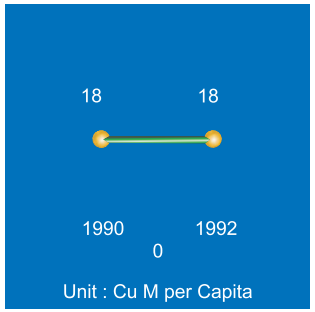
Australia



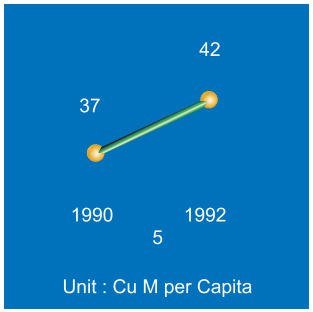
Papua New Guinea



Solomon Islands

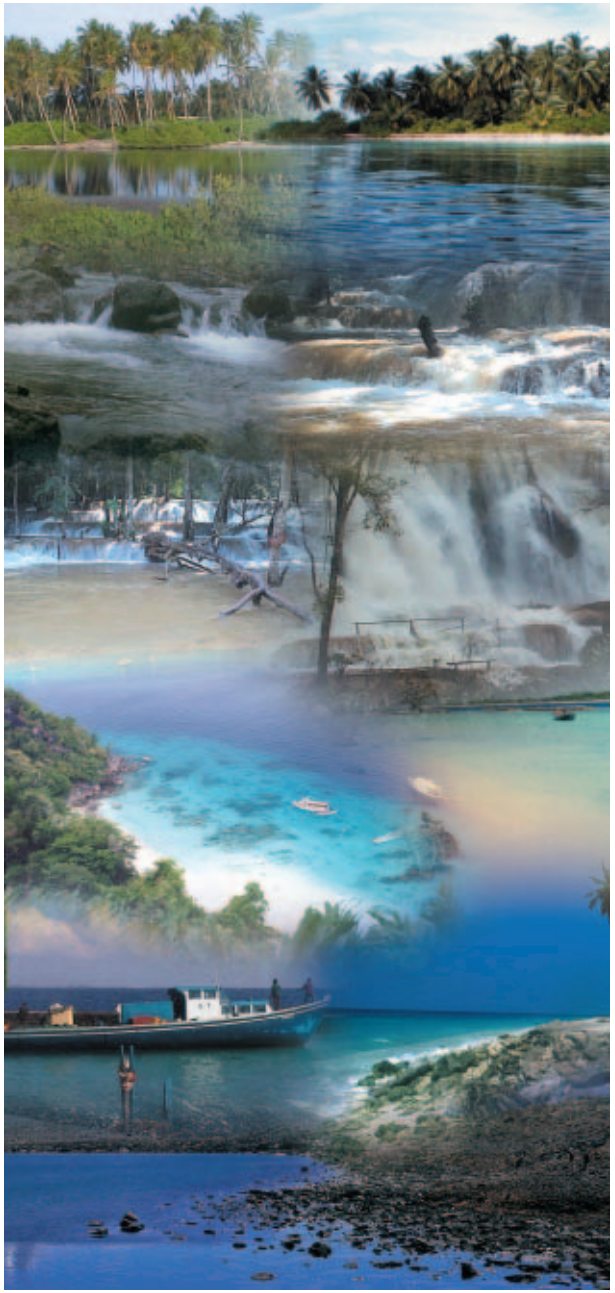


Fiji



Note: From the data available, Australia has the highest water withdrawal per capita at 839 cub m/capita, while Solomon Islands has the lowest at 18 cub m/ capita for the year 2000.

Source: WRI



Air Indicator

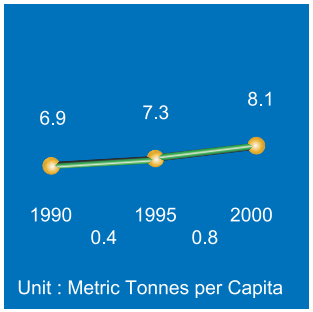
Atmospheric pollution is not a grave concern in this sub-region yet. Especially in the PICs as they are not highly industrialized. Though in some of the urban centers in the islands, there is some concern over levels of local air pollution because of vehicular emissions. Vehicular exhaust is also the main source of air pollution in Australia and New Zealand.

But increasing global emission of carbon dioxide and concomitant global warming has serious consequences for this sub-region especially for the low-lying islands. Global warming leads to sea level rise, which can inundate and destroy the low-lying lands. Also, the changing weather pattern phenomena such as El Nino have had disruptive and adverse effects on the local ecology. Climate change has also brought about an increase in some natural disasters such as storms, floods and droughts.

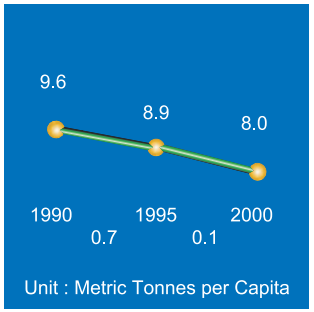
Thus, though carbon dioxide emissions in the region are low, increase in global carbon dioxide levels can spell serious damage for the sub-region.

Air Indicator - CO_2 Emissions Per Capita

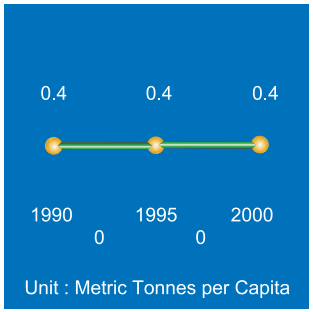
New Zealand



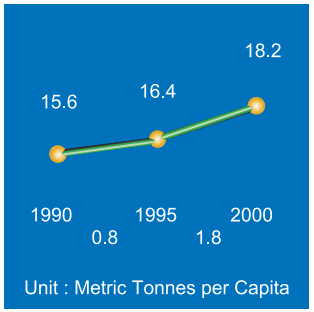
New Caledonia



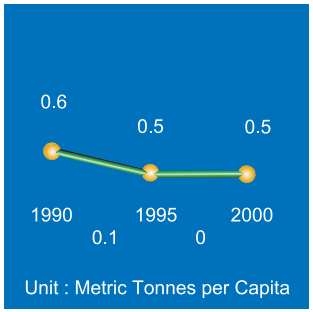
Vanuatu



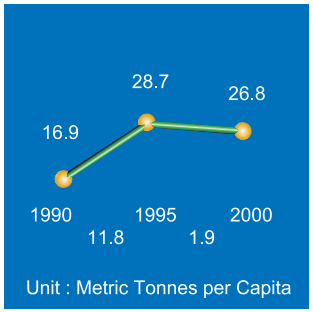
Australia



Papua New Guinea

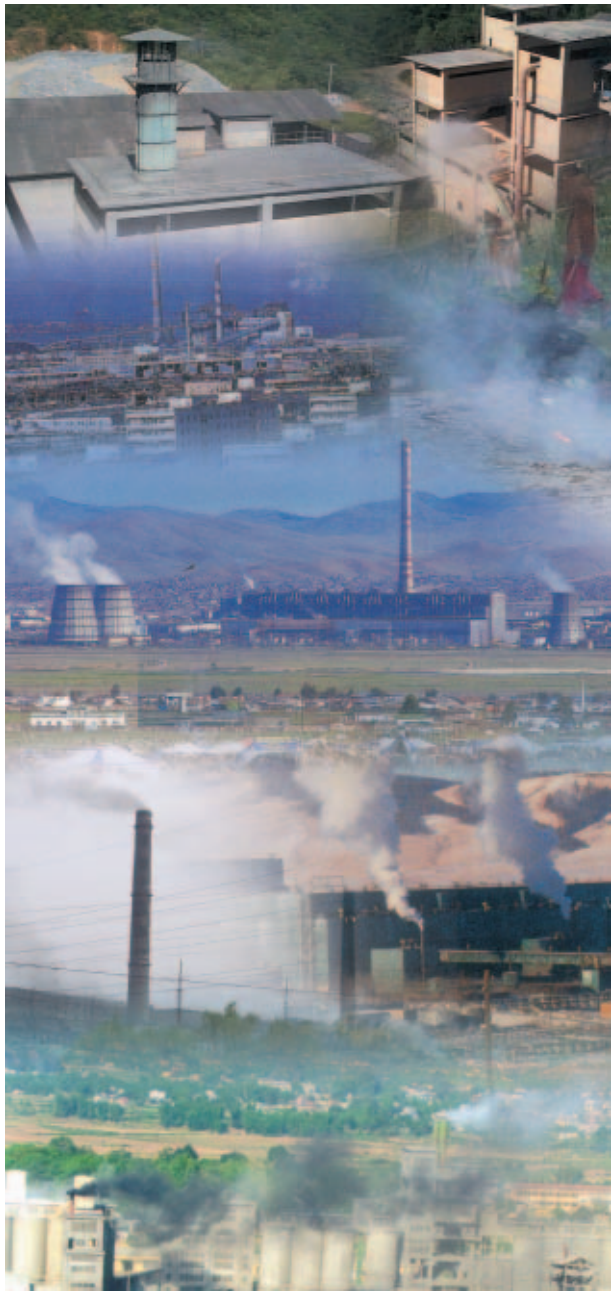


Guam



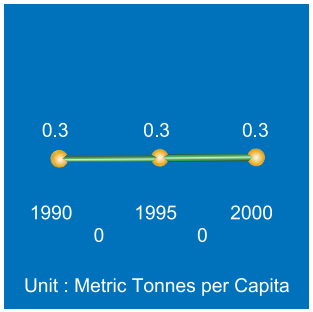
Note: Though the per capita CO2 emissions of most countries of the sub-region remain low, global CO2 emissions can have serious consequences for the region. Australia has the highest per capita emissions of 18.2 metric tonnes/capita in the year 2000, while Kiribati has the lowest at 0.3 metric tonnes/capita in the same year.

Source: WDI 2002, GEO-3 GRID data, UNEP, UNDP

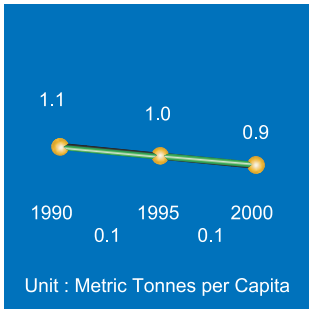


Air Indicator - CO_2 Emissions Per Capita

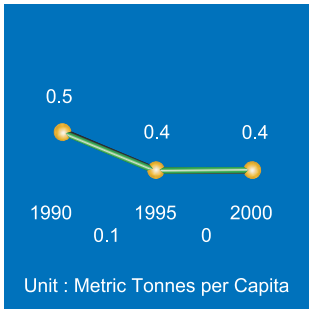
Kiribati



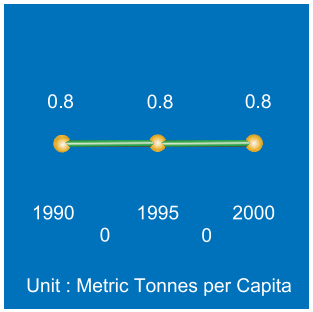
Fiji



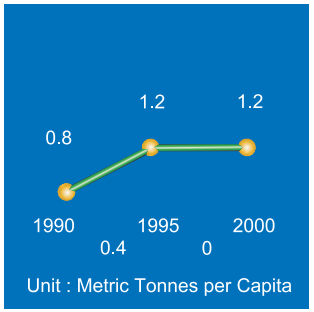
Solomon Islands



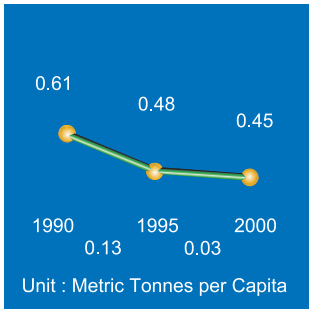
Samoa



Tonga

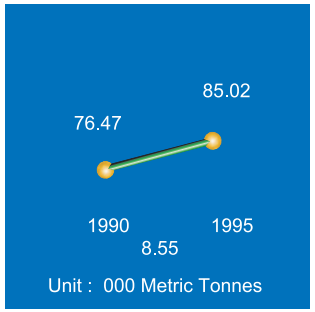


American Samoa

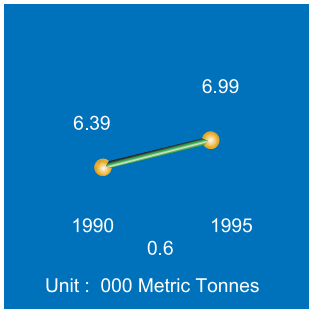


Air Indicator - SO_2 Emissions

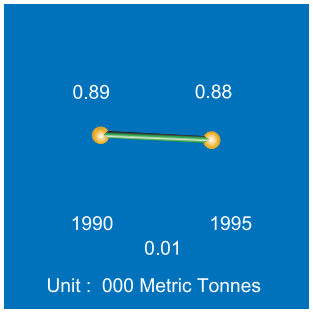
New Zealand



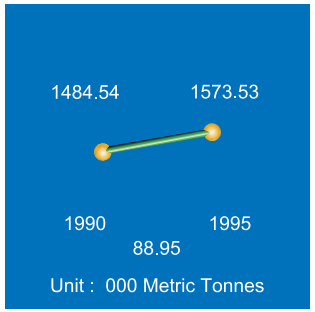
New Caledonia



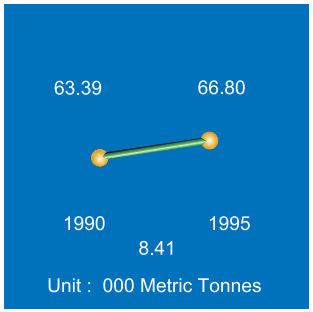
Vanuatu



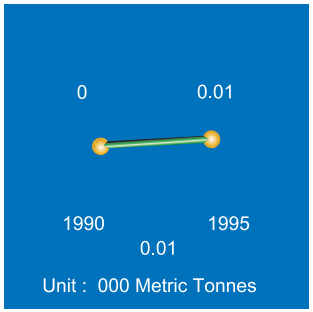
Australia



Papua New Guinea

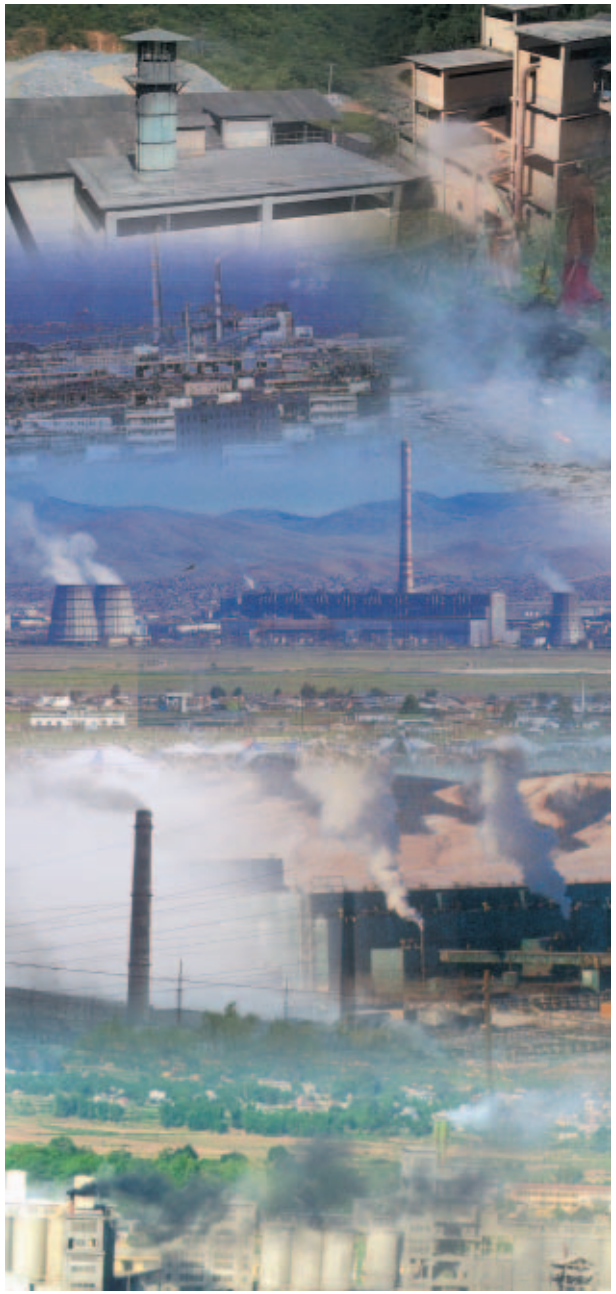


Palau



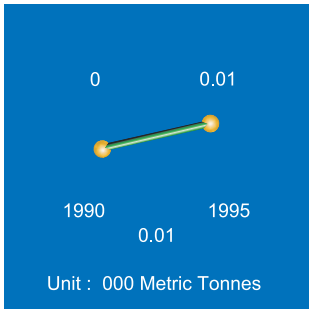
Note: Australia has the highest emissions in the region – 1573.53 thousand metric tonnes. The emissions of the other countries is considerably lower. Papua New Guinea and New Zealand fall in the middle category, New Caledonia and Fiji in the low, Solomon Islands, American Samoa, Vanuatu, Micronesia and Samoa in the lower and the rest in the lowest category.

Source: GEO-3 GRID data, UNEP

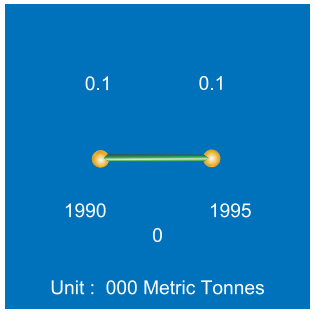


Air Indicator - SO_2 Emissions

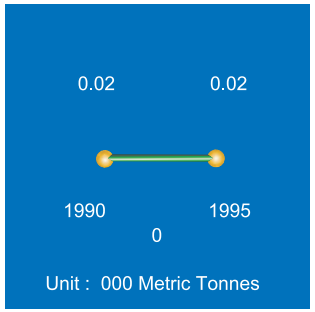
Guam



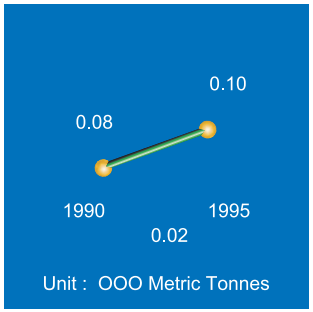
Northern Marianal Islands



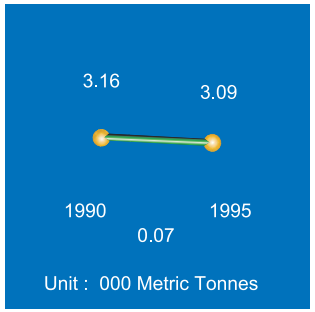
Marshall Islands



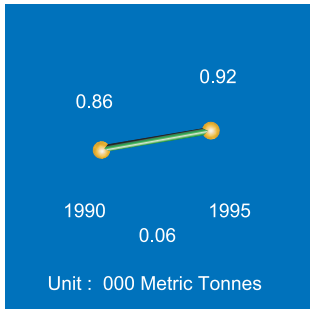
Kiribati



Fiji



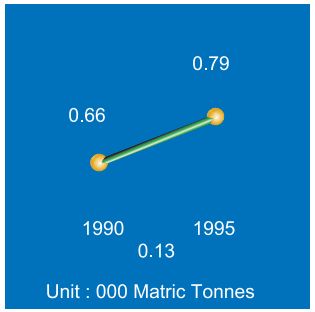
Solomon Islands



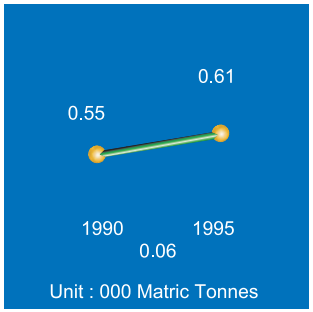
REGIONAL RESOURCE CENTRE FOR ASIA AND THE PACIFIC

Air Indicator - SO_2 Emissions

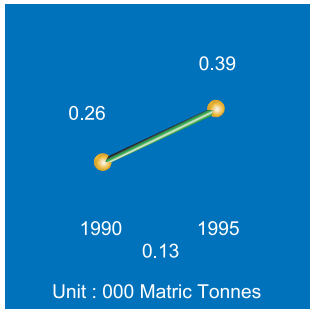
Micronesia



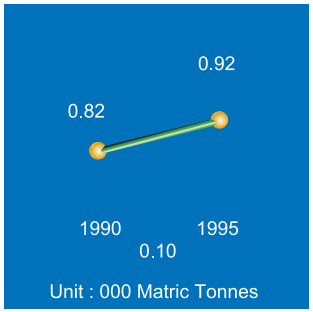
Samoa

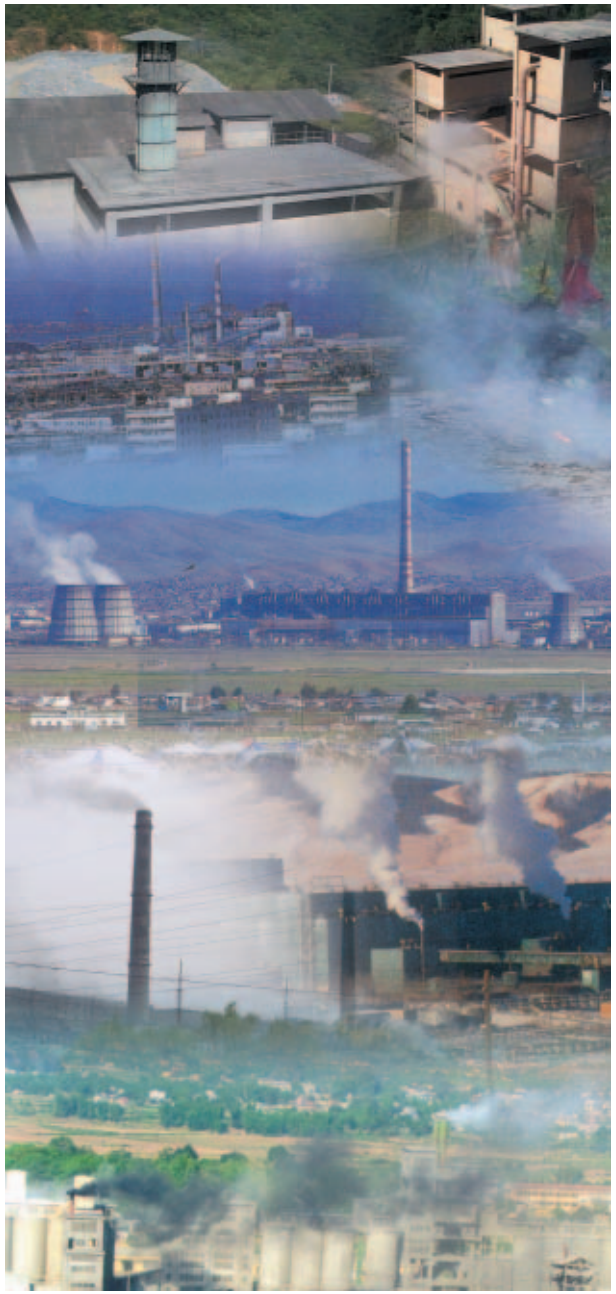


Tonga



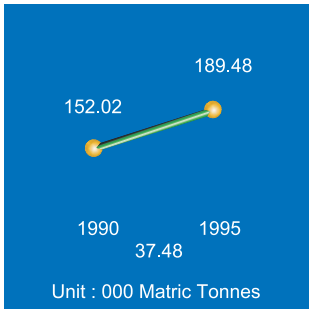
American Solomon



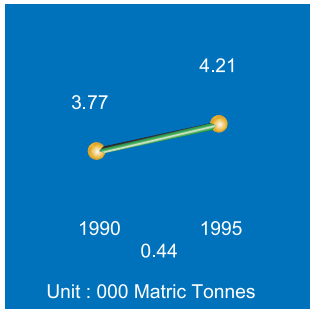


Air Indicator - NO_x Emissions

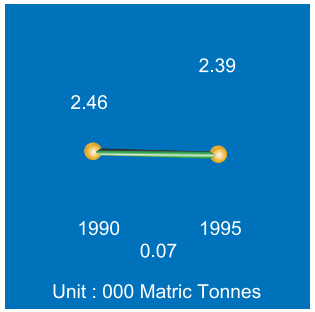
New Zealand



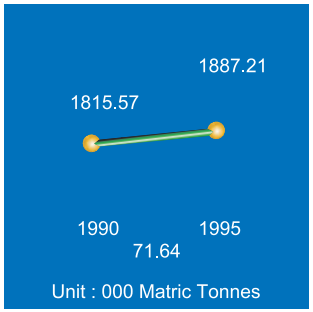
New Caledonia



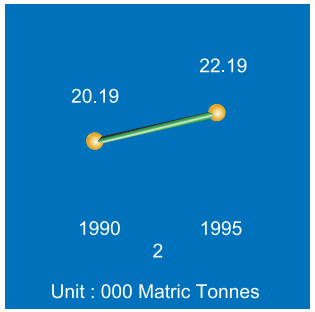
Vanuatu



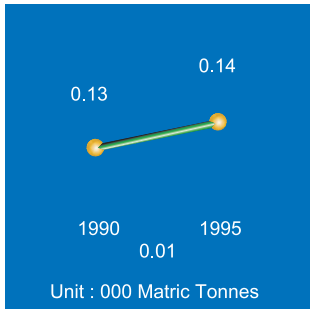
Australia



Papua New Guinea



Palau

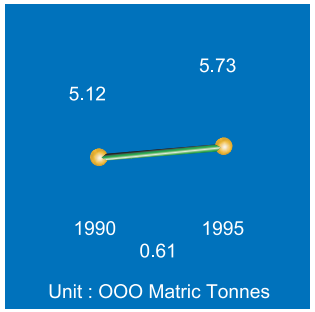


Note: Australia has the highest emissions in the region – 1887.21 thousand metric tonnes and Palau has the lowest – 0.14 thousand metric tonnes. The emissions of the rest of the region fall between these two values. Thus there is considerable difference in the emissions of the various countries of the region.

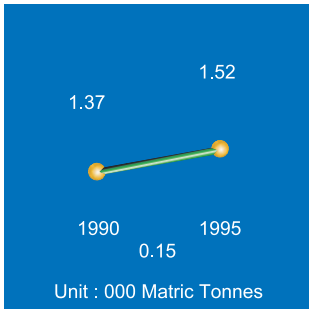
Source: GEO-3 GRID data, UNEP

Air Indicator - NO_x Emissions

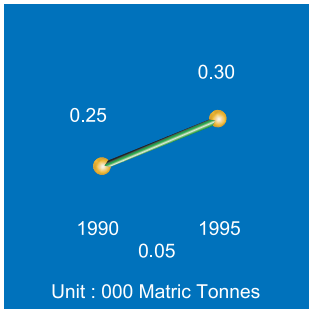
Guam



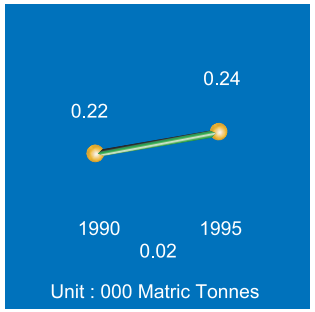
Northern Mariana Islands



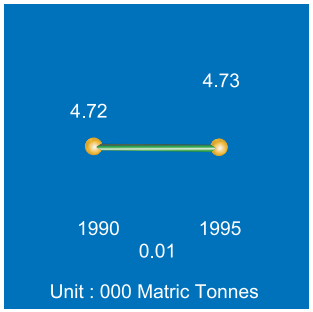
Marshall Islands



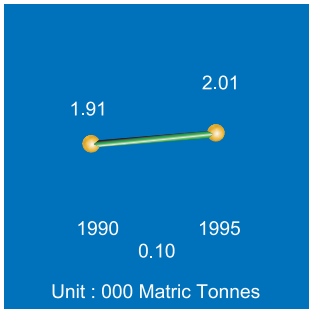
Kiribati

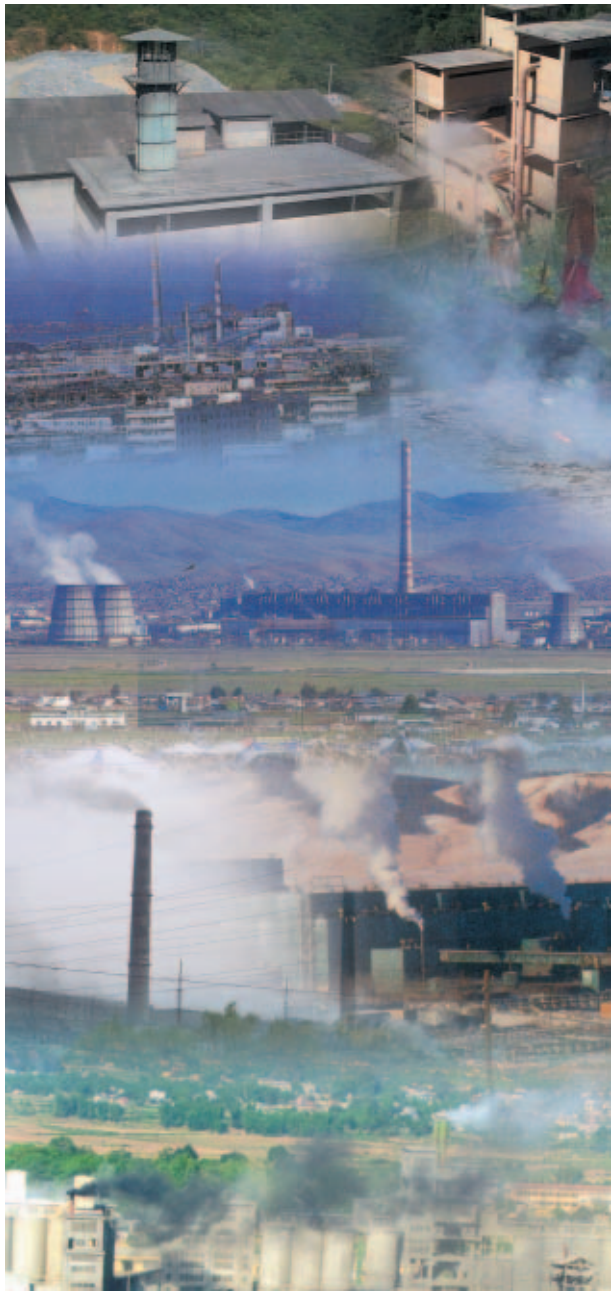


Fiji



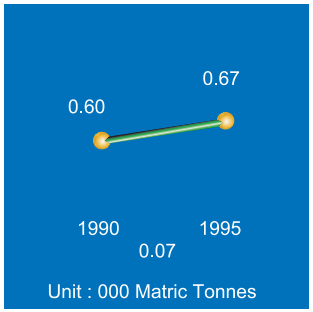
Solomon Islands



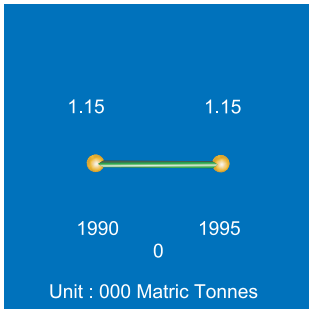


Air Indicator - NO_x Emissions

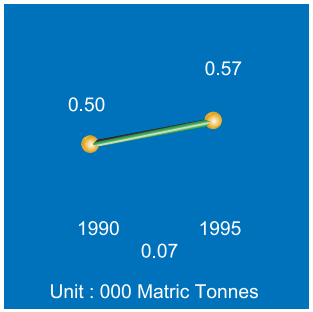
Micronesia



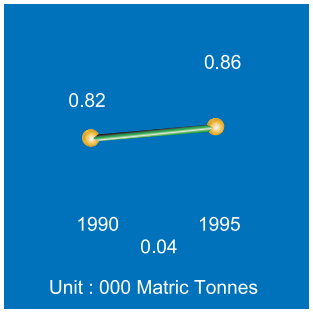
Samoa



Tonga



American Solomon



REGIONAL RESOURCE CENTRE FOR ASIA AND THE PACIFIC

Bio-diversity Indicator

The Pacific region is one of the world's richest biodiversity spots with the South Pacific having some of the highest marine diversity in the world – up to 3000 species may be found on a single reef. The many islands are surrounded by a rich coastal ecosystem including mangroves (around ten per cent of the world's total habitat), seagrass beds, and estuarine lagoons.

This biodiversity is being threatened by large scale deforestation and pressures exerted by growing population and changing lifestyles. In the Pacific, the people and environment share a close relationship with livelihoods and traditional lifestyles being subsistence and environment based. Land based sources of marine pollution, introduction of invasive species, habitat destruction, dynamiting are all taking a toll on the region' s biodiversity. Natural disasters also have disturbed the fragile ecosystem of this region.

Coral reefs are among the most biologically diverse ecosystems on the planet, and some living coral reefs may be as old as 2.5 million years. Many of these ecosystems have been irreparably damaged by human activities in the past few decades. The Great Barrier Reef (GBR) is the largest system of coral reefs in the world and is about 2,500 kms in length and comprises 2,900 separate reefs and 940 islands. The GBR is one of the least disturbed coral reef systems in the world and much of it is in relatively good condition. Though the GBR faces pressure from declining water quality, increased sediment and nutrient deposition, trawler fishing and potential oil and chemical spills.

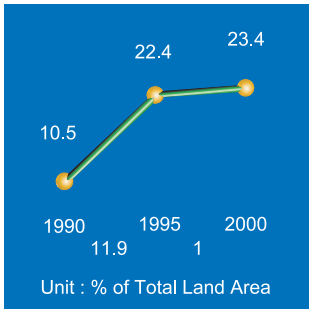
Australia has been at the forefront of regional initiatives to protect the marine environment through the regulation of international navigation. In 1990, the GBR was the first area in the world designated as 'Particularly Sensitive Area' by the International Maritime Organization.

From the data available, biodiversity is most threatened in New Zealand. The highest number of threatened birds is in Australia at 45 in the year 2000. In terms of percentage of birds threatened, New Zealand has the highest percentage – 32. 67. Similarly for threatened mammals, while the highest number of threatened mammals is in Australia at 58 in the year 2000, in terms of percentage of mammals threatened, New Zealand has the highest percentage – 80 per cent.

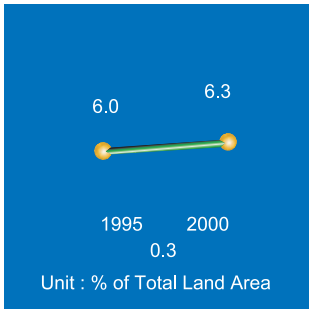
The percentage of protected land has increased in all countries (for which data is available) in the 1990s. At the same time, the number of threatened plants, birds and mammals has also increased in the region over the last decade.

Bio-diversity Indicator - Protected Area

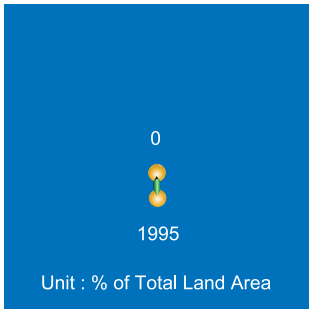
New Zealand



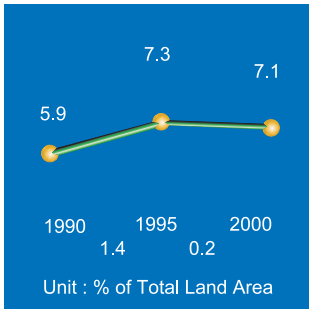
New Caledonia



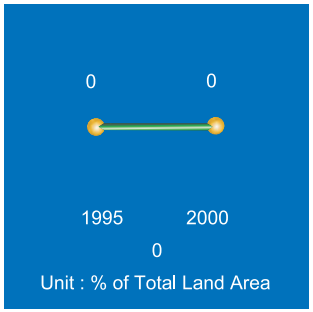
Vanuatu



Australia



Papua New Guinea

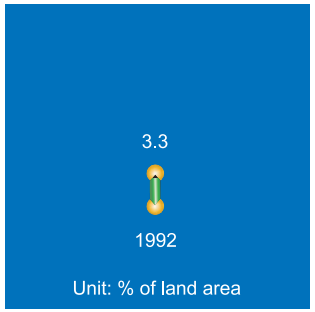


Note: The Pacific region is one of the world's centres of biological diversity. The western Pacific has the highest marine diversity in the world. But the biodiversity of this region is also among the most threatened. Kiribati has the highest percentage of protected land. The percentage of protected land has increased in all countries (for which data is available) in the 1990s.

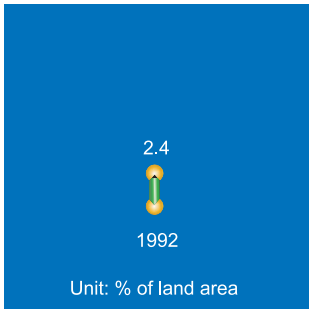
Source: WDI 2002, WRI, UNEP

Bio-diversity Indicator - Protected Area

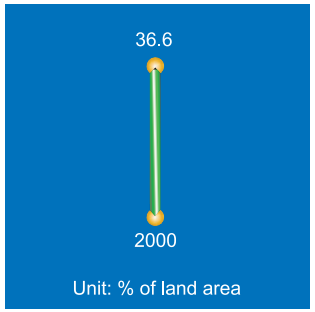
Palau



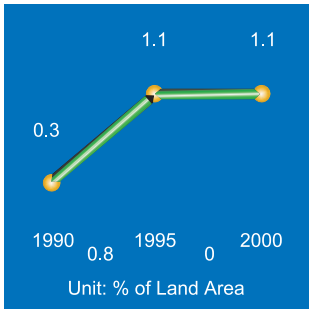
Northern Mariana Islands



Kiribati



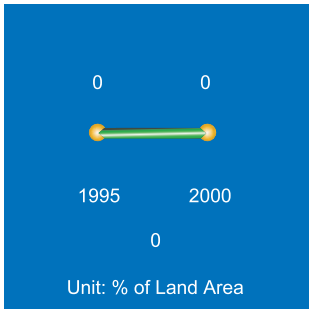
Fiji



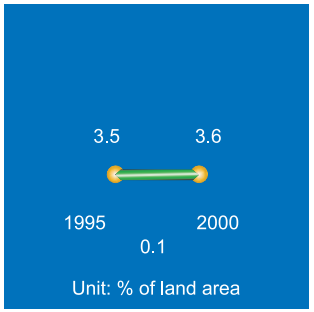
REGIONAL RESOURCE CENTRE FOR ASIA AND THE PACIFIC

Bio-diversity Indicator - Protected Area

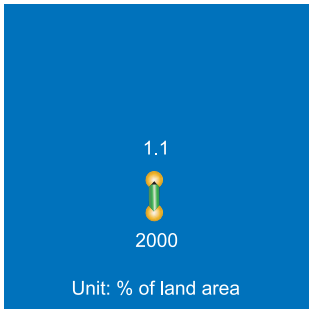
Solomon Islands



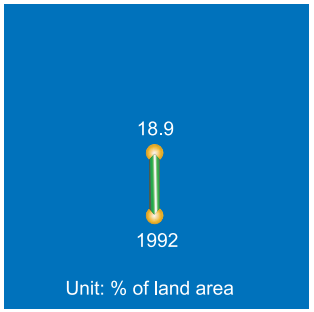
Samoa



Tonga

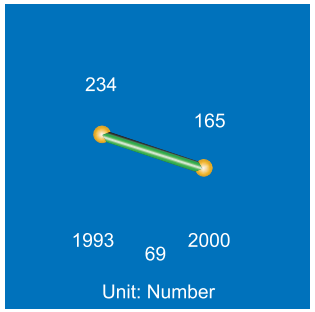


American Samoa

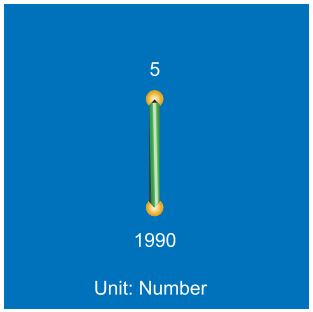


Bio-diversity Indicator - Threatened Plants

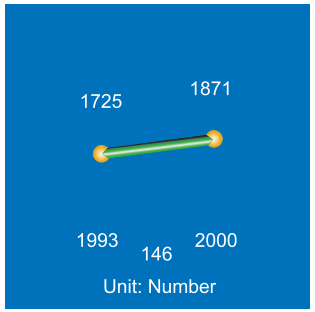
New Zealand



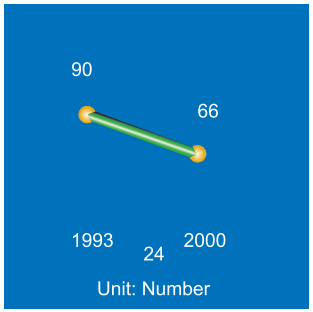
New Caledonia



Australia



Papua New Guinea

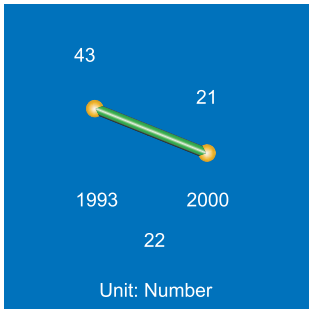


Note: The highest number of threatened plants is in Australia at 1871 in the year 2000. The number of threatened plants has increased in the countries (for which data is available) of the subregion.

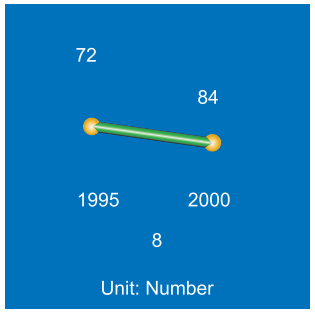
Source: WRI, SoE ESCAP 1995, Environmental Data 1993-94

Bio-diversity Indicator - Threatened Birds

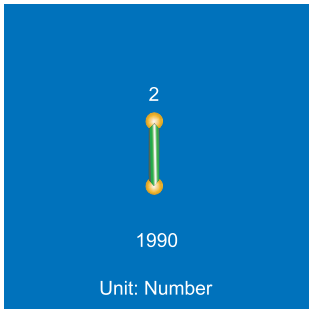
Solomon Islands



Fiji



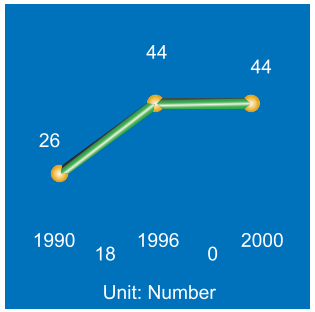
Samoa



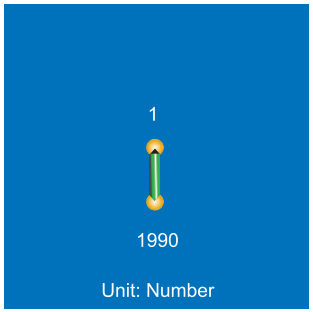
American Samoa

Bio-diversity Indicator - Threatened Birds

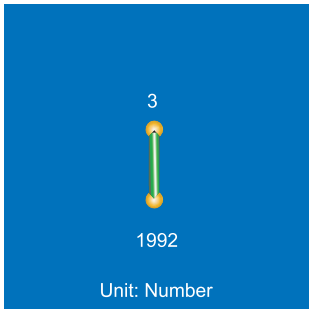
New Zealand



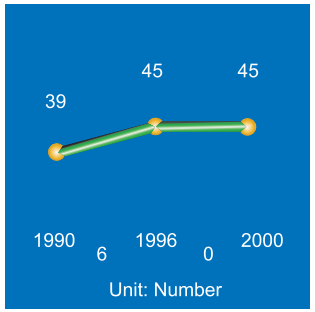
New Caledonia



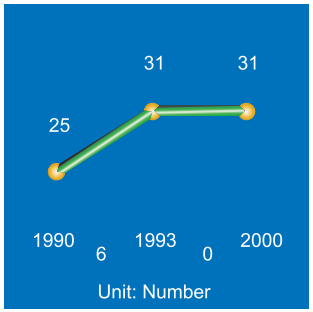
Vanuatu



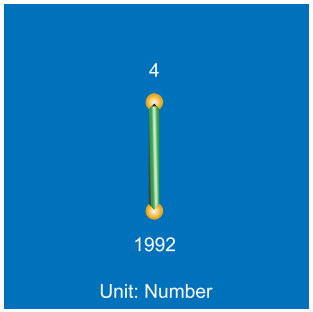
Australia



Papua New Guinea



Guam

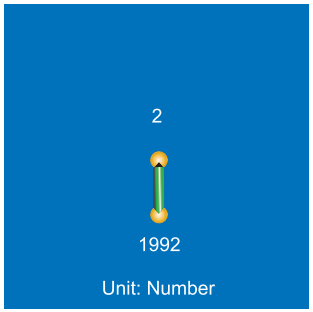


Note: The highest number of threatened birds is in Australia at 45 in the year 2000. In terms of percentage of birds threatened, New Zealand has the highest percentage – 32. 67. The number of threatened birds has increased in the countries (for which data is available) of the subregion.

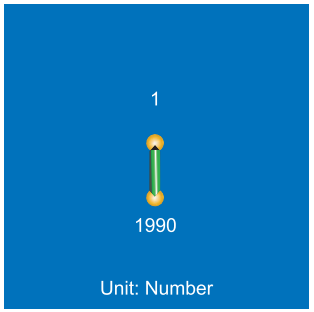
Source: WRI, Environmental Data 1993-94

Bio-diversity Indicator - Threatened Birds

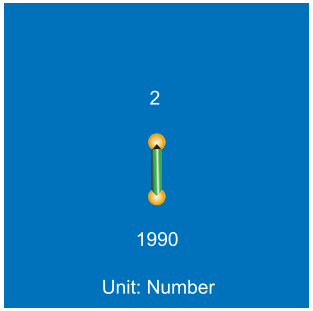
Northern Mariana Islands



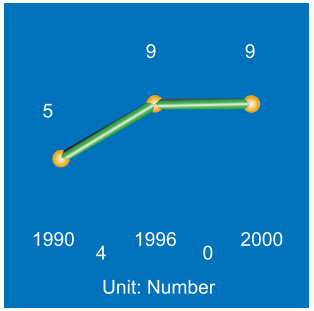
Marshall Islands



Kiribati



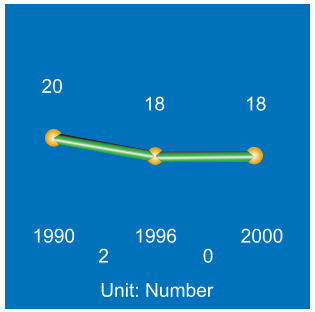
Fiji



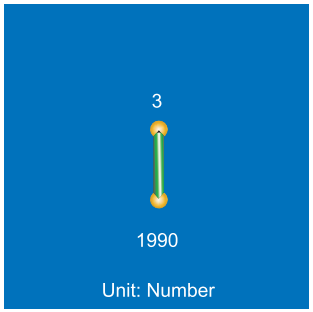
REGIONAL RESOURCE CENTRE FOR ASIA AND THE PACIFIC

Bio-diversity Indicator - Threatened Birds

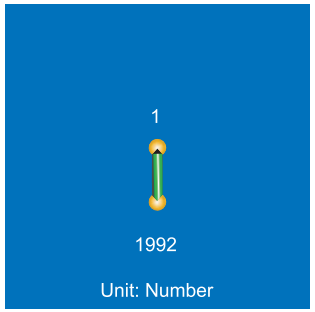
Solomon Islands



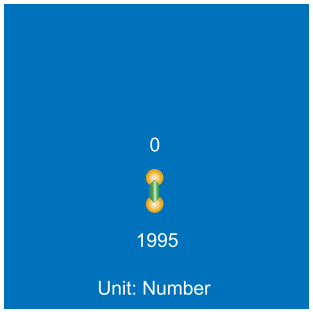
Micronesia



Tonga

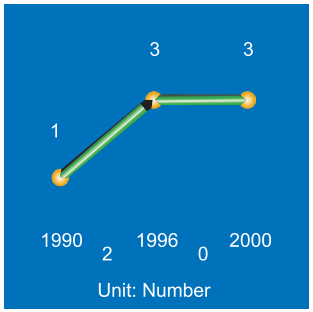


American Samoa

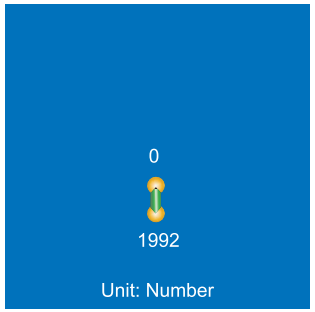


Bio-diversity Indicator - Threatened Mammals

New Zealand

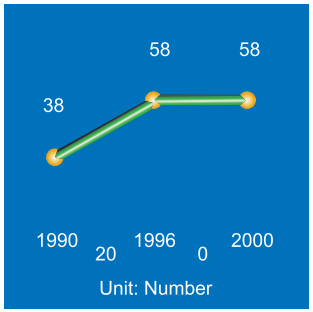


New Caledonia

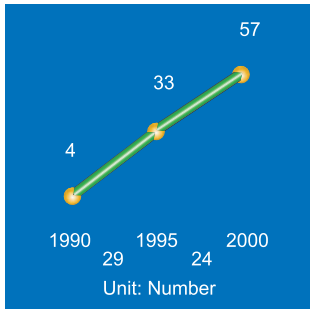


Vanuatu

Australia



Papua New Guinea

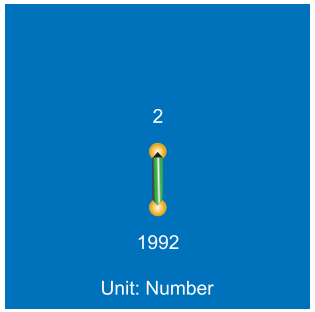


Note: The highest number of threatened mammals is in Australia at 58 in the year 2000. In terms of percentage of mammals threatened, New Zealand has the highest percentage – 80.00. The number of threatened mammals has increased in the countries (for which data is available) of the subregion.

Source: WRI, Environmental Data 1993-94

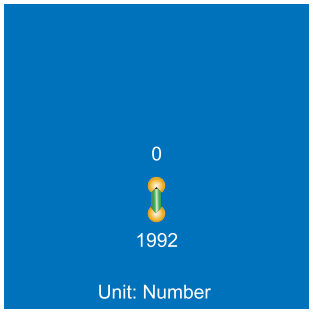
Bio-diversity Indicator - Threatened Mammals

Guam

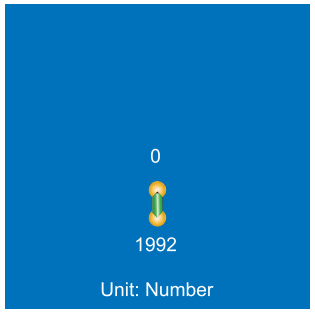


Northern Mariana Islands

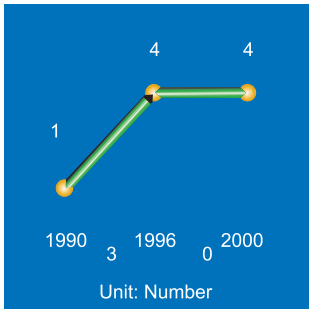
Marshall Islands



Kiribati



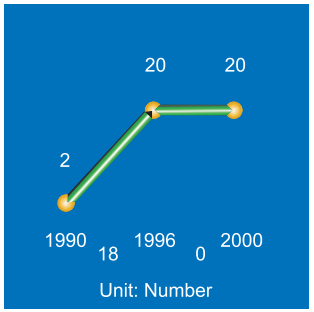
Fiji



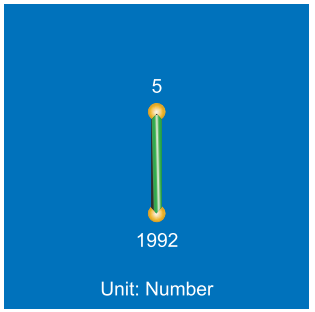
REGIONAL RESOURCE CENTRE FOR ASIA AND THE PACIFIC

Bio-diversity Indicator - Threatened Mammals

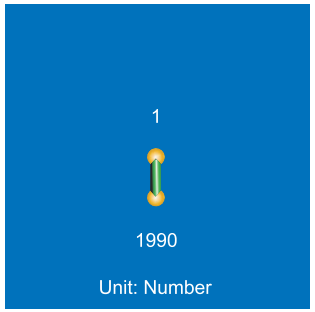
Solomon Islands



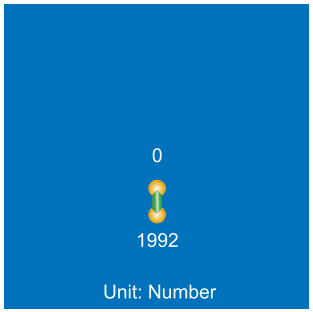
Micronesia



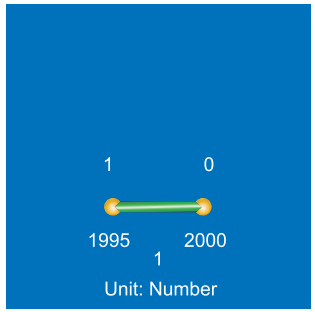
Samoa



Tonga

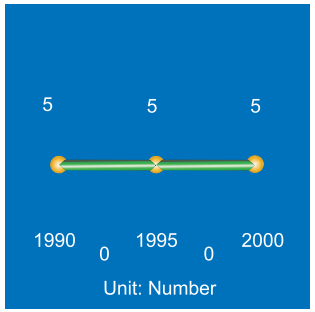


American Samoa

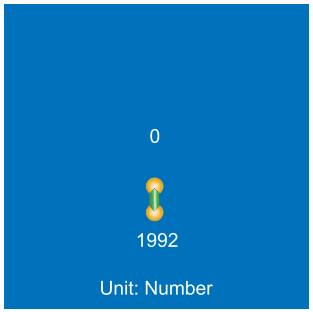


Bio-diversity Indicator - Wetlands of International Importance

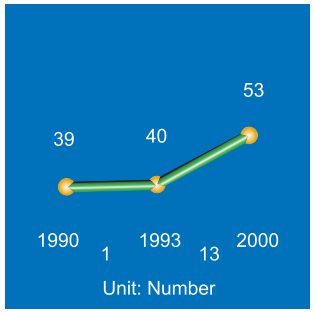
New Zealand



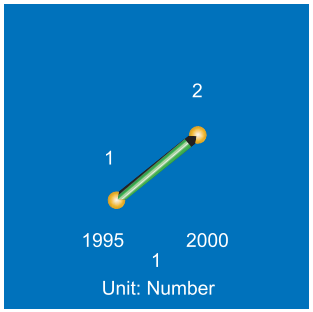
New Caledonia



Australia



Papua New Guinea



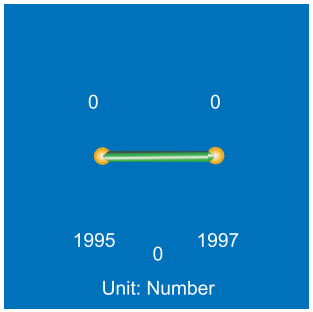
Note: The highest number of wetlands is in Australia - 53 in the year 2000.

Source: WRI, UNEP, Environmental Data 1993-94

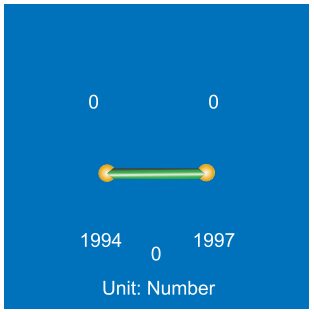
REGIONAL RESOURCE CENTRE FOR ASIA AND THE PACIFIC

Bio-diversity Indicator - Wetlands of International Importance

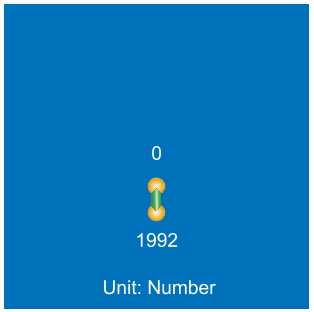
Fiji



Solomon Islands



American Samoa



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APPENDIX I

Definitions

The indicators in this publication are well-known and well-accepted. In the following section, the definition of some of the indicators used in this publication is given.

Total population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship--except for refugees not permanently settled in the country of asylum, who are generally considered part of the population of their country of origin.

Population below US$1 a day-is the percentage of the population living on less than US$1.08 a day at 1993 international prices (equivalent to US$1 in 1985 prices, adjusted for purchasing power parity). Poverty rates are comparable across countries, but as a result of revisions in PPP exchange rates, they cannot be compared with poverty rates reported in previous editions for individual countries.

Infant mortality rate is the number of infants dying before reaching one year of age, per 1 000 live births in a given year.

Life expectancy at birth-indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.

GNI (formerly GNP)-is the sum of value added by all resident producers plus any product taxes (less subsidies) not included in the valuation of output plus net receipts of primary income (compensation of employees and property income) from abroad. Data are in current U.S. dollars. GNI, calculated in national currency, is usually converted to U.S. dollars at official exchange rates for comparisons across economies, although an alternative rate is used when the official exchange rate is judged to diverge by an exceptionally large margin from the rate actually applied in international transactions. To smooth fluctuations in prices and exchange rates, a special Atlas method of conversion is used by the World Bank. This applies a conversion factor that averages the exchange rate for a given year and the two preceding years, adjusted for differences in rates of inflation between the country and the G-5 countries. The GNI data here follows the World Bank methodology.

GNI per capita (formerly GNP per capita)-is the gross national income, converted to U.S. dollars using the World Bank Atlas method, divided by the midyear population. GNI is the sum of value added by all resident producers plus any product taxes (less subsidies) not included in the valuation of output plus net receipts of primary income (compensation of employees and property income) from abroad. GNI, calculated in national currency, is usually converted to U.S. dollars at official exchange rates for comparisons across economies, although an alternative rate is used when the official exchange rate is judged to diverge by an exceptionally large margin from the rate actually applied in international transactions. To smooth fluctuations in prices and exchange rates, a special Atlas method of conversion is used by the World Bank. This applies a conversion factor that averages the exchange rate for a given year and the two preceding years, adjusted for differences in rates of inflation between the country and the G-5 countries.

Proportion of land area covered by forest-is land under natural or planted stands of trees of whether productive or not, as percentage total land area.

Access to an improved water source-refers to the percentage of the population with reasonable access to an adequate amount of water from an improved source, such as a household connection, public standpipe, borehole, protected well or spring, and rainwater collection. Unimproved sources include vendors, tanker trucks, and unprotected wells and springs. Reasonable access is defined as the availability of at least 20 litres a person a day from a source within one kilometre of the dwelling.

Access to improved sanitation facilities-refers to the percentage of the population with at least adequate excreta disposal facilities (private or shared, but not public) that can effectively prevent human, animal, and insect contact with excreta. Improved facilities range from simple but protected pit latrines to flush toilets with a sewerage connection. To be effective, facilities must be correctly constructed and properly maintained.

BOD level in Major Rivers – The biochemical oxygen demand (BOD) is used as a measure of the degree of water pollution.

Nationally protected areas-are totally or partially protected areas, as the percentage of total land area, of at least 1 000 hectares that are designated as national parks, natural monuments, nature reserves or wildlife sanctuaries, protected landscapes and seascapes, or scientific reserves with limited public access. The data do not include sites protected under local or provincial law.

Carbon dioxide emissions per capita-are those stemming from the burning of fossil fuels and the manufacture of cement. They include contributions to the carbon dioxide produced during consumption of solid, liquid, and gas fuels and gas flaring.

Wetlands of International Importance is defined under the Wetlands Convention, signed in Ramsar, Iran, in 1971. In order for an area to qualify as a Ramsar site, it has to have "international significance in terms of ecology, botany, zoology, limnology or hydrology."

APPENDIX II

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