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PACIFIC SUBREGIONAL REPORT

Asia-Pacific Forestry Sector Outlook Study II



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ASIA-PACIFIC FORESTRY COMMISSION

PACIFIC FORESTS AND FORESTRY TO 2020

SUBREGIONAL REPORT OF
THE SECOND ASIA-PACIFIC FORESTRY SECTOR OUTLOOK STUDY

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Bangkok, 2011

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Cover design: Chanida Chavanich

For copies, write to:

Patrick B. Durst
Senior Forestry Officer
FAO Regional Office for Asia and the Pacific
39 Phra Atit Road
Bangkok 10200
Thailand
Tel: (66-2) 697 4000
Fax: (66-2) 697 4445

E-mail: patrick.durst@fao.org

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FOREWORD

Twelve years after the publication of the first Asia-Pacific Forestry Sector Outlook Study in 1998, FAO welcomes this opportunity to once again contribute, at the behest of the Asia-Pacific Forestry Commission, to the regional forestry dialogue. Countries and their forestry sectors are becoming ever more closely linked as economic liberalization and regional integration accelerate. Since the first outlook study, it has become increasingly clear that a regional perspective is essential in negotiating a better position for forestry and the values with which it is associated. With the advancement of globalization some of the most important effects on forests and forestry in many countries in the region are the result of international and regional developments.

Heightened awareness of the values of forests and their greater inclusion in international climate change agreements has increased the importance of linking spatial levels and broadening understanding of issues and opportunities likely to affect forestry in the coming years. Identification of key trends in forestry – both physical and political – and construction of scenarios for the future add a valuable dimension to regional forestry discussions. Building responsiveness into institutional mechanisms and adapting to change constitute two of the most important steps in creating a robust sector in a fast evolving world.

Great changes have occurred and major advances have been made in Asia-Pacific forestry since the first outlook study was published. Significant challenges remain in many parts of the region and it is increasingly evident that countries cannot develop forestry policies in isolation – rights and responsibilities are increasingly spilling across borders and across sectors as populations increase, demands on resources heighten and economies integrate. The collegial nature of the process through which this outlook study was developed gives credence to the success of collaborative regional action and sharing in a common future. By openly contributing information, the countries and organizations involved in the outlook study have demonstrated their commitment to the future of forests and forestry and their desire to improve upon the benefits from forests that the current generation has received.

Many organizations and individuals have put huge effort into this study and have gone to considerable lengths to share the fruits of their experiences. In bringing together this subregional report, four country reports and over 15 thematic studies have been prepared. The first Asia-Pacific Forestry Sector Outlook Study provided a benchmark in regional and global forestry and was followed by a series of regional outlook studies around the world. We hope that this subregional study will be as well received and that this contribution to the region's forestry sector is both timely and appropriate and will challenge countries to build forests that future generations will value.



Hiroyuki Konuma

Assistant Director-General and Regional Representative for Asia and the Pacific.
Food and Agriculture Organization of the United Nations



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ACRONYMS AND ABBREVIATIONS

AAU	Assigned Amount Unit
ACIAR	Australian Centre for International Agricultural Research
ACP	African, Caribbean, Pacific Group of States
ADB	Asian Development Bank
ANZCERTA	Australia New Zealand Closer Economic Relations Trade Agreement
APEC	Asia-Pacific Economic Cooperation
APFC	Asia-Pacific Forestry Commission
APFSOS	Asia-Pacific Forestry Sector Outlook Study
AusAID	Australian Agency for International Development
BoP	Balance of Payments
CBD	Convention on Biological Diversity
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora.
CPI	Corruption Perception Index
CPRS	Carbon Pollution Reductions Scheme
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DNA	Designated National Authority
ETS	Emissions Trading Scheme
FAO	Food and Agriculture Organization of the United Nations
GDP	Gross Domestic Product
GEF	Global Environment Facility
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome
ICE-PAC	Integrated Clean Energy for Peace and Climate
IFP	Industrial Forestry Plantations
ITTO	International Tropical Timber Organization
LDC	Least Developed Country
LPG	Liquid Petroleum Gas
LSP	Local Supply Plantations
LVL	Laminated Veneer Lumber
MAFF	Ministry of Agriculture, Forestry and Fisheries (Vanuatu)
MAFFF	Ministry of Agriculture, Food, Forests and Fisheries (Tonga)
MELAD	Ministry of Environment, Lands and Agriculture (Kiribati)
MDF	Medium Density Fibreboard
MoFEC	Ministry of Forests, Environment and Conservation (Solomon Islands)
MoNRE	Ministry of Natural Resources and Environment (Samoa)
NAFI	National Association of Forest Industries
NGO	Non-Governmental Organization
NWFP	Non-Wood Forest Product
NZAID	New Zealand Agency for International Development
NZMAF	New Zealand Ministry of Agriculture and Forestry
NZU	New Zealand Unit
OECD	Organisation for Economic Co-operation and Development
PACER	Pacific Agreement on Closer Economic Relations
PAS	Pacific Alliance for Sustainability

PICTA	Pacific Island Countries Trade Agreement
PIF	Pacific Islands Forum
PIFACC	Pacific Island Framework for Action on Climate Change
PNG	Papua New Guinea
PNGFA	Papua New Guinea Forest Authority
PNGFRI	Papua New Guinea Forest Research Institute
PPP	Purchasing Power Parity
PREP	Pacific Renewable Energy Program
RAMSI	Regional Assistance Mission to the Solomon Islands
REDD	Reducing Emissions from Deforestation and Forest Degradation
R-PIN	REDD Readiness Plan Idea Note
RFA	Regional Forest Agreement
SIDS	Small Island Developing States
SPARTECA	South Pacific Regional Trade and Economic Cooperation Agreement
SPC	Secretariat of the Pacific Community
SPREP	South Pacific Regional Environment Programme
SWIFT	Solomon Western Islands Fair Trade
TIMO	Timber Industry Management Organization
VCCP	Vanuatu Carbon Credits Project
UNCCD	United Nations Convention to Combat Desertification
UNCED	United Nations Conference on Environment and Development
UNFCCC	United Nations Framework Convention on Climate Change
UNDP	United Nations Development Programme
WTO	World Trade Organization

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EXECUTIVE SUMMARY

The Pacific subregion for the purposes of this report comprises the ten Pacific member countries of the Asia-Pacific Forestry Commission (APFC) – Australia, Fiji, Kiribati, New Zealand, Papua New Guinea, Samoa, the Solomon Islands, Tonga, Tuvalu and Vanuatu. The subregion encompasses 847 million hectares with a population of 33.5 million people.

Natural forests in the Pacific cover an area of 186 million hectares, while planted forests cover slightly more than 4 million hectares. In total, forests cover 22 percent of the subregion's land area. Australia dominates forest area statistics in the Pacific; 91 percent of the subregion's forest area is in Australia and another 8 percent is accounted for by Papua New Guinea and New Zealand. However, the Melanesian countries are generally the most-forested nations: Fiji, Papua New Guinea, the Solomon Islands and Samoa all have forest cover in excess of 50 percent of their land area. At a subregional level, the large forest resource allied with very low populations make the Pacific one of the world's most forest-rich areas on a per capita basis, with more than 5 hectares of forest per person. Nonetheless, in some localities forests are under intense population pressures, particularly in the small island countries of Kiribati, Tonga and Tuvalu.

The Pacific has been a region of net forest loss during the past 20 years. In the period 2005-2010 annual forest loss is estimated at 1.08 million hectares. Most of the loss occurred in Australia, largely as a result of dieback due to drought. Papua New Guinea and the Solomon Islands have also lost significant forest area during the past 20 years. Conversely, Fiji, New Zealand and Samoa have increased their forest areas, while forested areas in other countries have remained relatively constant.

Forest industries in the Pacific are strongly export-oriented. A high proportion of forest products are exported as relatively unprocessed logs (especially from New Zealand, Papua New Guinea, the Solomon Islands) and woodchips (Australia and Fiji). The vast majority of forest product exports from Papua New Guinea and the Solomon Islands are unprocessed logs. Australia and New Zealand export a broad range of more processed wood products including sawntimber, wood pulp, paper and paperboard, panel products and remanufactured items. A log export ban in Fiji encourages export of, especially, valuable mahogany sawntimber. Merchantable forests in Samoa, Tonga and Vanuatu have been largely exhausted and little industrial forestry occurs in these countries. Wood from planted forests is increasingly dominating harvests. In New Zealand almost all logging is in planted forests, while in Australia and Fiji the majority of logs are sourced from plantations. Conversely, almost all wood harvested in Papua New Guinea and the Solomon Islands comes from natural forests.

Wood remains an important source of energy in all Pacific countries. In the Pacific island countries most of the largely rural population is dependent on wood for cooking and heating. In urban areas, electricity, coconut shell charcoal and liquid petroleum gas (LPG) have substituted to a certain extent for wood. A number of industrial plants burn wood for electricity co-generation in Australia, New Zealand and Fiji.

A wide range of non-wood forest products (NWFPs) is used for subsistence purposes in the Pacific island countries, although a relatively narrow range is sold commercially in the subregion. Tree crops such as coconut, banana, pandanus and breadfruit are dietary staples in the island countries, while wild and feral animals constitute important sources

of bushmeat. Forests also provide a wide variety of ecosystem services. Many – including soil, watershed, coastal and salt spray protection – are vitally important, particularly in Samoa, Tonga, Kiribati and Tuvalu. Forests constitute important recreational sites, especially in Australia and New Zealand; throughout the region, a large number of forest sites provide valuable ecotourism opportunities or provide a landscape backdrop to more general tourism. In terms of conservation, Kiribati, Tonga and New Zealand significantly exceed the World Conservation Union’s threshold of having 10 percent of their land areas in protected areas, while Australia exceeds the target and Papua New Guinea is on the border of achieving the target. However, in some of the island countries, very little active management is applied in many conservation areas.

Climate change is a critical issue affecting Pacific countries and forestry in the subregion. For better, or worse, climate change and related policies will likely be the most important driver of change in forestry in the Pacific over the next decade. Many of the smaller island countries have major concerns about potential sea-level rise and inundation of low lying islands and atolls. In the larger developing island countries, Reducing Emissions from Deforestation and Forest Degradation (REDD) or other forest-based carbon funding mechanisms hold prospects for vital funding of forest conservation and development. New Zealand has implemented an Emissions Trading Scheme (ETS) that encompasses forestry, while Australia is presently considering a similar scheme.

Forest policy development in the Pacific subregion is largely directed at an overarching objective of sustainable forest management, but also specifically focuses on topical concerns including: conservation, improved rural livelihoods, deforestation and forest degradation, plantation development, industrial development, watershed management, land-use planning, climate change and people’s participation.

Against the backdrop of these existing conditions, various drivers of change will define future scenarios. In the medium term some of the strongest drivers will be climate change (especially policy development), economic conditions, agricultural changes driving land-use change (including conversion of forest lands to oil-palm), the economic rise of India and China (and other export markets), the strength of the green movement and natural disasters. Notably, most of these strong drivers of change are external to the forestry sector, which itself has little influence over them.

Scenarios to 2020

A variety of future scenarios has been developed for different parts of the subregion.

A *business-as-usual scenario* is charted for all countries. This scenario provides a point of reference and comparison against which the implications of significant changes described in alternative scenarios can be measured. The business-as-usual scenario assumes no changes in existing policies, that sectoral trajectories remain constant and that recent data trends can simply be extrapolated over the forecast period (to 2020).

A scenario describing the effects of a *severe and protracted economic recession* is outlined for Australasia and the Polynesian and Micronesian countries. This scenario describes the impacts on forests and forestry of a protracted recession of similar length and severity of the Great Depression. The scenario envisages an economic decline extending through to a low in 2013, embracing high unemployment, plummeting consumer spending and commodity prices, falling asset prices and minimal capital investment. In Australia and New Zealand such a scenario is envisaged to cause major disruption to forest-based industries via mill closures and heavy redundancies.

In the smaller island countries the key impacts are in terms of potential changes towards subsistence demands on forests. Essentially, this represents a worst-case economic scenario, in which the severity of effects is magnified compared with expectations for the current global recession being both shorter and shallower in magnitude.

A *rapid economic recovery and growth scenario* is described for Polynesia and Micronesia. Key dimensions of this scenario include significant increases in national revenues in small island countries from increased demand for exports and tourism, increased migrant remittances, higher international aid budgets and improved conditions for special international arrangements. Prospects are good for expansion of formal economic sectors and reduced dependence on informal and subsistence livelihoods, thereby reducing livelihood pressures on forests.

An industrial forestry scenario is envisaged for Melanesia under which buoyant international demand for wood drives an acceleration in harvesting. The additional harvest is mainly exported as logs (Papua New Guinea and the Solomon Islands) and chips or sawntimber (Fiji) as harvests outstrip processing capacities. The accelerated harvest exceeds sustainable levels and intensifies detrimental environmental and social effects including hastening the demise of industrial forestry in the Solomon Islands.

A *green economy scenario* targets the Australasian and Melanesian countries. In Australia and New Zealand a green economy scenario anticipates a substantial shift towards enhanced forest conservation, natural forest regeneration and rehabilitation, and accelerated plantation establishment. These activities are most likely to be maximized if both countries have established ETS that favourably incorporate scope for forest carbon offsets. A broader green economy scenario also incorporates pursuit of an inclusive approach that addresses social and ecological problems, paving the way for the development of green economies. Considerable thrust is given to human resource development and improving the efficiency of energy and raw material use. In Melanesian countries the most likely stimulus for an abrupt shift towards a green scenario would come from rapid international progress in putting in place workable, accessible and well-resourced REDD (and other carbon-related) funding mechanisms. The scenario envisages a significant shift in forestry focus covering forest conservation, forest rehabilitation and plantation establishment and a shift away from industrial forestry.

Forestry to 2020

The broad social, economic, political and institutional diversity in the region, allied with the many sometimes conflicting drivers of change suggest that what actually emerges will most likely be a mix of all scenarios, depending on the policies pursued at the local, national and international levels.

In the developed Australasian countries the future for forestry to 2020 is likely to be relatively constant. Forest policy directions are generally well established, stable and mature, with marked changes highly unlikely. While some scope exists for expansion of planted forest estates, little change is expected in natural forest areas. Ecosystem services and values are well recognized and adequately catered for. Forest industries are well established and generally robust enough to weather all but the worst economic storms. Climate change policies are the most likely driver of significant change, but any marked variance from business-as-usual scenarios will only occur in the latter part of the decade.

The immediate futures for forestry in Melanesian countries are more variable. In Fiji, the foresight that led to establishment of significant and valuable planted forest resources provides a firm foundation for continued forestry development. In Papua New Guinea business-as-usual – in the form of continued natural forest harvesting and log exporting – is likely to prevail unless forest carbon funding is sufficient to make conservation an economically attractive alternative. In the Solomon Islands, the logging industry is entering its final throes and a significant decline in harvesting is expected as the merchantable forests are exhausted. Considerable uncertainty exists as to what happens in the country and to its forestry sector henceforth. In Vanuatu, a shift is already occurring away from industrial forestry and towards ecotourism and provision of forest ecosystem services and this shift should continue to evolve, possibly aided by carbon funding.

The small island countries of Polynesia and Micronesia will remain vulnerable to the winds of global change. These countries will maintain significant dependence on development assistance, remittances and special arrangements. Forestry in these countries is now largely focused on provision of ecosystem services and subsistence products such as fuelwood, NWFPs and rough timbers. Most industrial wood and paper products are sourced from abroad and there is little scope for this to change in the foreseeable future. Some forest rehabilitation and planted forest establishment may occur in larger island areas.

Priorities and strategies

A range of technical recommendations is summarized as priorities and strategies in the Pacific context. They include:

- Rebuilding natural resource bases and conservation of existing resources;
- Rural development, employment generation and poverty alleviation;
- Enhancing efficiency of raw material/energy use;
- Governance;
- Improving policy, legal and institutional frameworks;
- Building capacities for grassroots forestry;
- Strengthening science and technology capacities;
- Improving education and awareness;
- Developing societal consensus; and
- Strengthening leadership and communication.

In Australia and New Zealand, the forestry sectors are evolving into mature entities within developed economies. These countries generally need little help or advice – and where such assistance is needed they are well placed to seek or purchase it.

In the Pacific island countries, greater efforts are needed to clean up perceptions of political instability, imbalances and misuse of power, corruption and lack of security. Isolation, underdevelopment, lack of infrastructure, scarcity of capital and reliance on aid are other weaknesses in many Pacific localities.

A major challenge for Pacific forestry is to build elements of comparative advantage. It seems evident this should be in terms of developing niche products; though it is significantly less obvious what these niches might be. People – including family and community units and the unique ways they work together – are clearly a key strength

that should be invested in, although community structures can also be a key weakness, where collective approaches penalize the productive.

In the Pacific island countries, especially those with significant forest resources, a key challenge for policy-makers and stakeholders is to understand why so much advice cannot be effectively implemented or goes astray and why so many initiatives fail to make a difference. In part, it may be that those putting forth solutions need to blend their advocacy with a healthy dose of realism. For these countries, part of the solution may be to select what is sensible and practical and stick with it; to concentrate efforts on achieving the core parts of their forest policies. The people of the Pacific know their own situations best, and need to be thinking of 'Pacific-specific' solutions to the challenges. The key is to ensure that all of the policies, plans, institutional structures and budgets align with the overall vision and can place that future within reach.

1

INTRODUCTION

1.1. Background

In 1998, through endorsement of the Asia-Pacific Forestry Commission (APFC), FAO completed the first Asia-Pacific Forestry Sector Outlook Study (APFSOS), which considered status, trends and prospects for the regional forestry sector towards 2010. Approximately ten years later, the world and the region are faced with socio-economic, biophysical and political changes occurring at an unprecedented pace.

In order to better prepare the forestry sector for the future and fulfill future expectations, forestry sector proponents will first need to be equipped with skills and capacity to understand the changes taking place in the larger society outside the sector, and then to analyse and identify sector priorities and strategies. Against this backdrop the second APFSOS 'Asia-Pacific Forestry Towards 2020' was commissioned at the recommendation of the Twenty-first session of the APFC in April 2006.

1.2. Scope and coverage

The Pacific region is a large and geographically dispersed region encompassing the subregional groupings of Micronesia, Melanesia, Polynesia and Australasia. These descriptive groupings – Micronesia ('small islands'), Melanesia ('dark islands' referring to the darker complexions of the inhabitants), Polynesia ('many islands') and Australasia ('south of Asia') – are generally attributed to Dumont d'Urville and Charles de Brosses (Australasia). Geopolitically, these groupings comprise the following:

Micronesia: Palau, Guam, Mariana Islands, Caroline Islands, Marshall Islands, Kiribati (Gilbert and Phoenix Islands) and Nauru.

Melanesia: Papua New Guinea, Solomon Islands, Vanuatu, New Caledonia and Fiji

Polynesia: Hawaii, Kiribati (Line Islands), Tuvalu, Tokelau, Samoa, Tonga, Cook Islands, Marquesas Islands, Tuamotu Islands, Society Islands, Austral Islands, Pitcairn Island and Easter Island.

Australasia: Australia and New Zealand.¹

However, the APFSOS limits its analysis to the member countries of the APFC that have actively participated in the APFSOS process. Consequently, this paper will confine its analysis to APFC member countries: Australia, Fiji, Kiribati, New Zealand, Papua New Guinea, Samoa, the Solomon Islands, Tonga, Tuvalu and Vanuatu.

¹ New Zealand is also considered part of Polynesia. However, for the purposes of this study, it is expedient to group it with its developed counterpart, Australia, rather than with the smaller island countries.

1.3. Objectives and key issues

The purpose of the report is to inform and assist the forestry sector in preparing for the forthcoming decade of change by identifying key challenges, likely issues, possible scenarios and forestry implications for each country.

Specifically, the report addresses the following objectives:

- Identify emerging drivers of change in society at large;
- Draw out the possible scenarios of societal development;
- Analyse the implications of the scenarios on the forestry sector; and
- Identify priority areas and strategies towards a better future in forestry.

Some key questions which the report attempts to address are:

- What overarching changes can be expected in Pacific forests and forestry to 2020?
- What major societal trends will affect forestry and how will forests be affected?
- What types of scenarios may unfold during the coming decade?
- What opportunities and risks may climate change and responses to climate change confer on forestry?
- Is there a path that encompasses a sustainable 'green economy' and how can the forestry sector get there?

1.4. The process

The APFSOS has progressed through several steps, contributing to the preparation of subregional studies (including for the Pacific) and the main regional overview study. The most important phase has been the establishment of national consultative processes culminating in the preparation of forestry sector outlook reports for most participating countries. In addition, a variety of specific thematic papers was commissioned. In October 2007, *The Future of Forests*, an international conference on the outlook for Asia-Pacific forests, was organized, with the papers presented and subsequent discussions providing a valuable source of materials contributing to the overall APFSOS. Information relevant to Pacific forestry has been collated from all of these reports and papers, and combined with information from a more general data and literature search, in the preparation of this subregional report for the Pacific.

1.5. Structure of the report

This report comprises five main chapters. The first main chapter (Chapter 2) reviews the current state of forests and forestry in the Pacific. It outlines and discusses the most important issues confronting the forest sector and provides an overall indication of the broad trends in the recent decades.

Chapter 3 identifies the key driving forces that will influence the future state of forests and forestry in the Pacific subregion. It discusses the changing characteristics of societies in the subregion and implications for values, perceptions and uses of forests, highlighting key trends.

Chapter 4 focuses on possible and likely scenarios for social, economic, political and institutional development through the next decade and discusses how social, economic and institutional situations are likely to evolve through 2020.

Chapter 5 addresses the implications of the scenarios developed in the preceding chapter to provide future snapshots of possible 'states of forests and forestry' in 2020 for the Pacific.

The final chapter discusses means to creating a better future for forestry in the subregion, including potential responses to changing societal needs and priorities within and outside the forest sector.

2

WHERE ARE WE NOW? CURRENT STATE OF FORESTS AND FORESTRY IN THE PACIFIC

The Pacific region houses an enormous diversity of ecosystems and forest types. The variety of ecosystems encompasses continental deserts, high alpine areas, plains, grasslands and savannah, and island and atoll ecologies. These ecosystems provide homes to a wide variety of forest vegetation types including cool and warm temperate rain forests, dry open forests, savannah shrublands, alpine forests, lowland tropical rain forests, dry evergreen forests, montane rain forests, cloud forests, mangrove swamps, beach strand forests and a variety of plantation forests of various species.

At the same time, the Pacific is also home to a wide range of human societies, at differing levels of economic development, with widely varying aspirations, and exerting markedly different demands on forests.

This diversity creates a myriad of present situations, emerging pressures and potential futures for the people and forests of the Pacific.

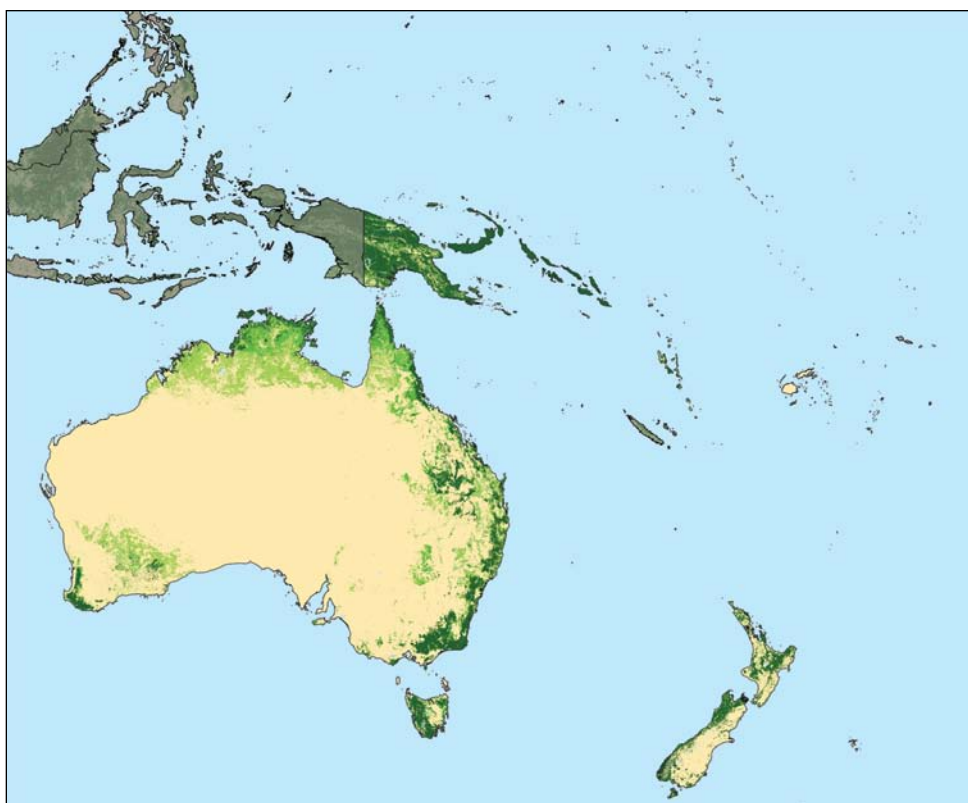


Figure 2.1: Forest cover in the Pacific 2000

Source: FAO forest mapping 2010

2.1. Trends in forest resources

Forest cover in the APFC member countries of the Pacific¹ totaled 846 600 hectares in 2005, with almost 91 percent of the forest area located in Australia alone, and more than 99 percent of the forest area found in the three largest countries; Australia, Papua New Guinea and New Zealand. However, this forest distribution is probably not reflective of the relative importance of forests to various societies in the subregion, with vast tracts of Australian forests comprising open eucalypt and dry acacia forests in isolated and sparsely populated regions. Conversely, very small areas of forests play an integral part in the daily lives of the people in some small, but densely populated Pacific islands.

Additionally, Other Wooded Land in Pacific countries exceeded 429 120 hectares in 2005. More than 98 percent of Other Wooded Land in the subregion is located in Australia. Forests and Other Wooded Land cover slightly less than 75 percent of all land in Pacific countries.

Table 2.1 lists base data relating to the extent of forest resources and management by country for 2010. Figure 2.1 shows shares of natural forest cover and forest plantations in the subregion while Figure 2.3 shows proportionate forest area by country in the context of overall land use.

(i) *Australia*

Australia's forests and wooded lands mainly extend in a broad crescent from the Kimberley Plateau in the north, around the eastern seaboard, and to Perth in the southwest. Tasmania is also heavily forested. Tracts of closed canopy forests are mainly located in relatively narrow coastal zones. Moving inland, these give way to open forests (mainly *Eucalyptus* forest), and, as annual rainfall declines further inland, *Eucalyptus-Acacia* associations form woodlands known as Mallee scrub. Most of the continent's central interior comprises arid desert or semi-arid desert with very sparse vegetation.

Australia has recently updated its forestry resource statistics and *Australia's state of the forests report 2008* notes that the best estimate of Australia's total forest area has declined from the 164 678 000 hectares reported to FAO's Global Forest Resources Assessment 2005, to 149 215 000 hectares. However, as the report makes clear, the change in estimated forest area is largely due to:

...the increasing availability of high resolution, remotely sensed data and improvements in forest typing methods. This largely explains the revision of estimated total forest area from 164 million hectares in 2003 to 149 million hectares reported here; little of the change is due to real forest loss. (MPIGA 2008).

Australia's National Carbon Accounting System estimates that between 2000 and 2004 a net area (clearing minus regrowth) of about 1 million hectares of woody vegetation was cleared; an average annual loss of about 260 000 hectares.

¹ Hereafter referred to as Pacific countries.

Table 2.1: Pacific countries: forest resources and management

Country	Forest area 2010				Area change 2005-2010 (total forest)			Forest under management plan		
	Land area	Natural forest	Forest plantation	Total forest cover	2005-2010	Other wooded land	Forest under management plan	000 ha	%	%
	000 ha	000 ha	000 ha	000 ha	000 ha/year	000 ha	000 ha	000 ha	%	%
Australia	768 228	147 397	1 903	149 300	19.4	7.08	135 367	17.6	31 781	21
New Zealand	26 771	6 457	1 812	8 269	30.9	1.95	2 557	9.6	6 938	84
Fiji	1 827	837	177	1 014	55.5	1.20	78	4.3	6	1
Papua New Guinea	45 286	28 640	86	28 726	63.4	4.37	4 474	9.9	-	-
Solomon Islands	2 799	2 186	27	2 213	79.1	4.33	129	4.6	0	0
Vanuatu	1 220	440	-	440	36.1	1.88	476	39.0	-	-
Samoa	283	139	32 ²	171	60.4	0.96	22	7.8	-	-
Tonga	73	8	1	9	12.3	0.09	0	0.0	2	22
Kiribati	81	12	0	12	14.8	0.12	0	0.0	n.s.	2
Tuvalu	3	1	0	1	33.3	0.10	0	0.0	-	-
TOTAL	846 571	186 117	4 038	190 155	22.5	5.62	143 103	16.9	-1 077	-0.56

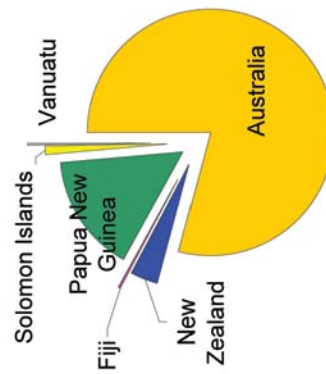


Figure 2.2a: Share of natural forest cover

Source: FAO (2010b)

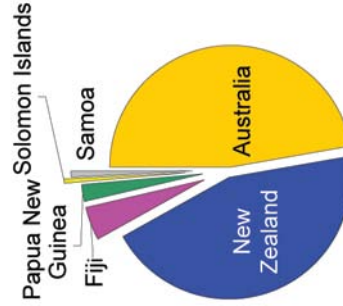
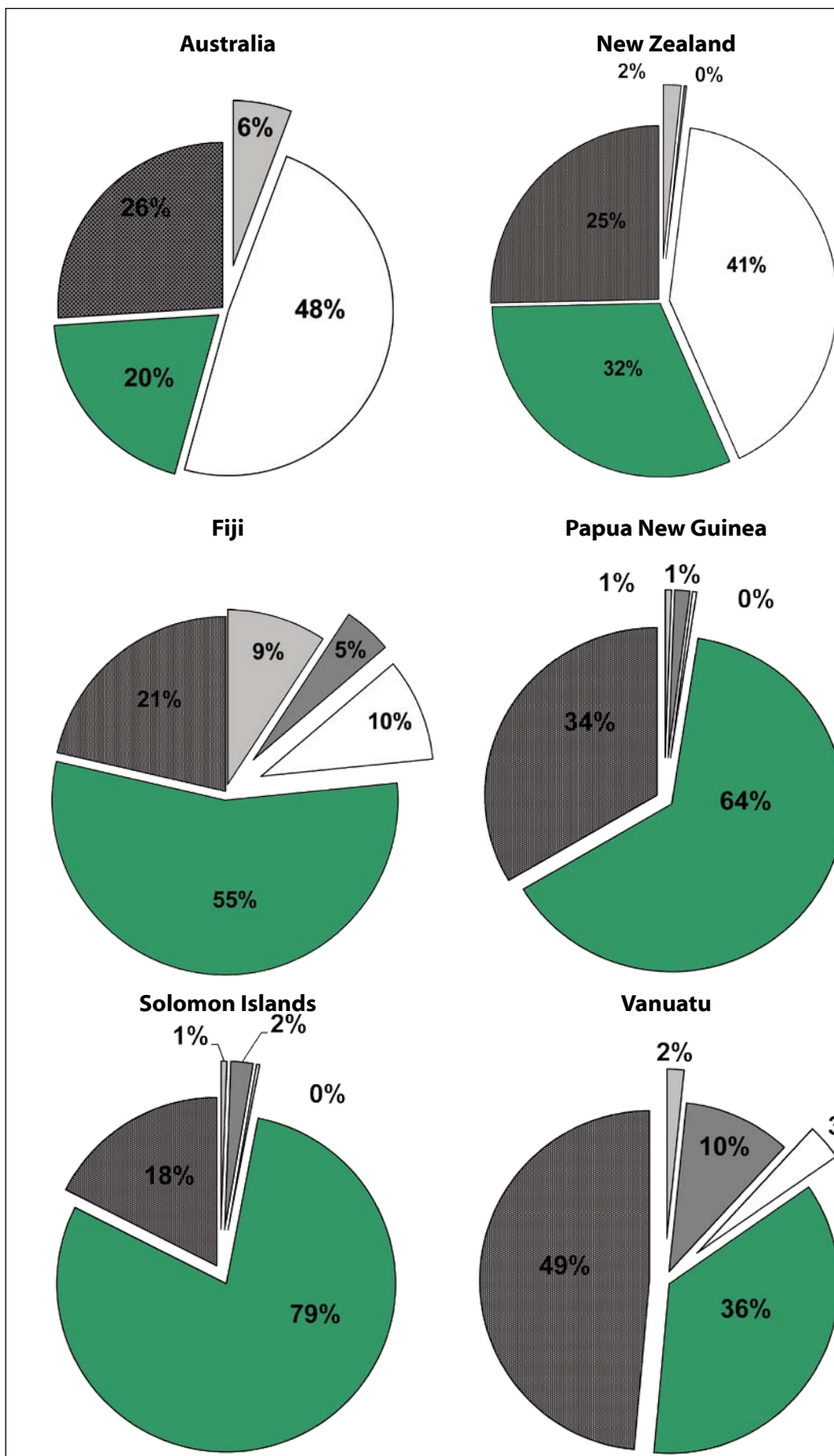


Figure 2.2b: Share of forest plantations

2 Sesega (2009) reports only 5 006 hectares of forest plantations according to the Samoa Forest Resource Information System 2004.



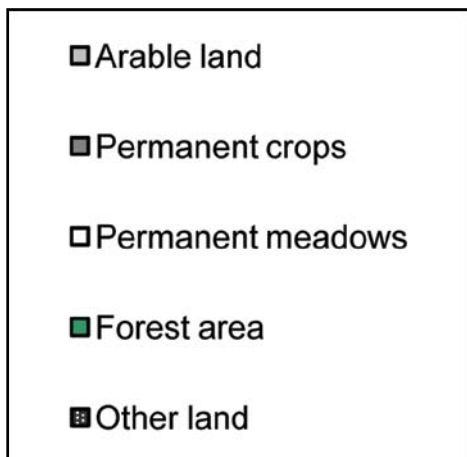
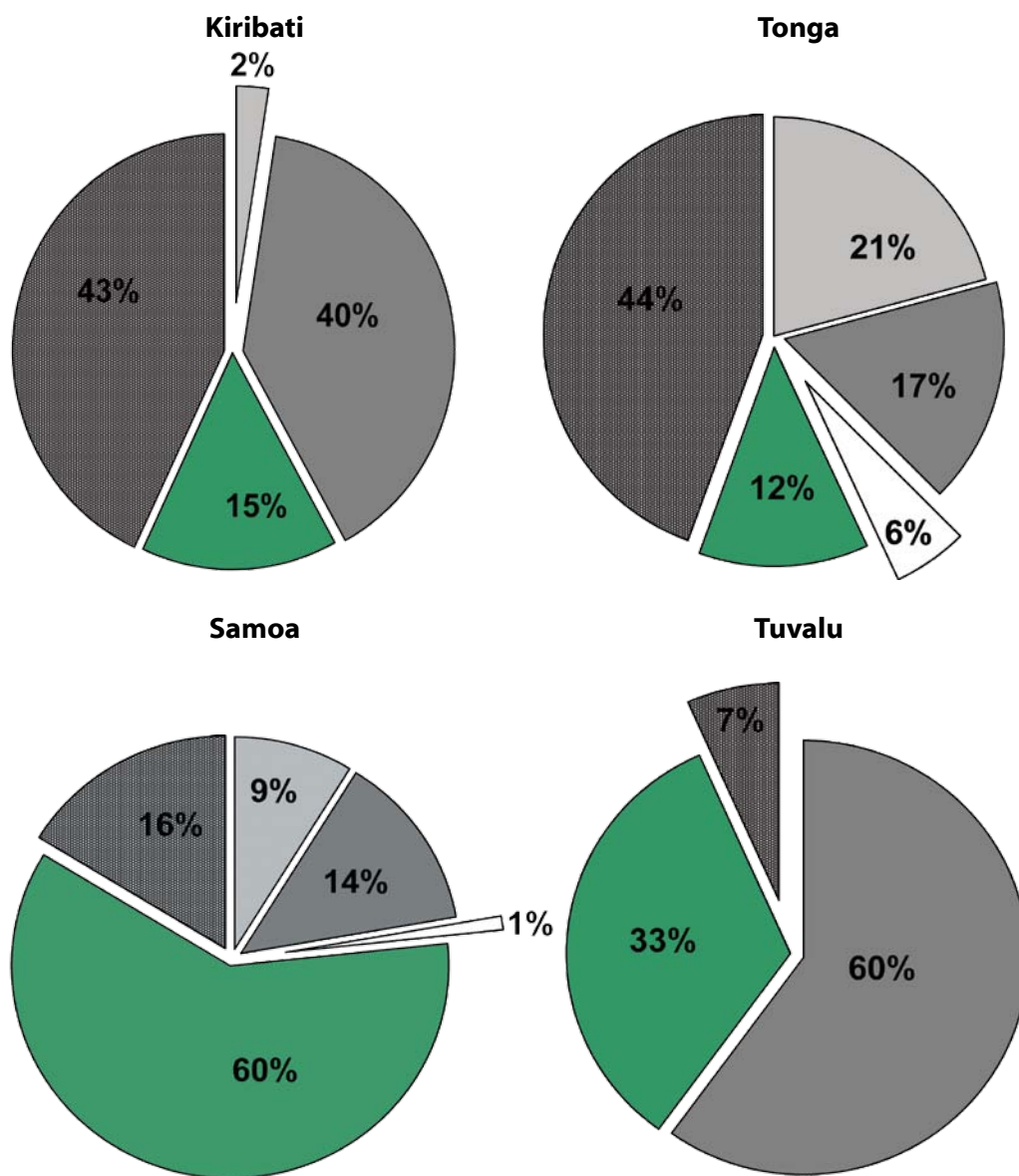


Figure 2.3: Land-use patterns in the Pacific by country

Source: FAO (2009c)

Much of this clearance occurred in Queensland, as a result of conversion to agricultural land and urban development. There is evidence that this rate of clearance has declined in recent years. Forest fires have also been a significant contributor to forest loss.

The vast majority of the Australian forest resource is classified as 'other naturally regenerated' forest (95 percent), and along with 'primary' forest comprises 98 percent of Australia's forest resources. *Eucalyptus* is the dominant genus in Australia's natural forests, with eucalypt forests comprising around 78 percent of Australia's forest cover. Most of the remainder comprises other sclerophyll forest types (comprising acacias and banksias) with the balance made up predominantly of Cyprus pine (*Callistris* spp.), paperbarks (*Melaleuca* spp.) and tropical rain forest (Table 2.2). In total, forests and other wooded lands comprise around 75 percent of Australia's land area.

Table 2.2: Australia's forest area, by forest type (2008)

Forest type	Total ('000 ha)	% of total
Native Forest		
<i>Acacia</i>	10 365	7
<i>Callitris</i>	2 597	2
<i>Casuarina</i>	2 229	1
<i>Eucalyptus</i>	116 449	78
Mangrove	980	1
<i>Melaleuca</i>	7 556	5
Rain forest	3 280	2
Other	3 942	3
Native forest total	147 397	99
Plantation	1 818	1
Australian forest total	149 215	100

Source: MPIGA (2008)

Plantation forests in Australia cover 1.9 million hectares, accounting for just 1.2 percent of Australia's total forest area. Hardwood plantations, almost all of which are *Eucalyptus* species, amounted to 807 000 hectares in 2008, while softwood plantations, predominantly of *Pinus* species, totaled 1 011 000 hectares. Australia's plantation estate has expanded significantly during the past several years, with an estimated 12 percent increase during the five years to 2008, and an expansion of 85 000 hectares between 2008 and 2010; from 1 818 000 hectares to 1 903 000 hectares.

(ii) *New Zealand*

New Zealand's natural forest area totals 6.5 million hectares – 24 percent of the national land area. Natural forests are mainly classified as cool temperate rain forests and can broadly be classified into two main types: beech forests dominated by four species of *Nothofagus* ('false beech'); and coniferous hardwood forests, comprising complex associations dominated by *Podocarpus* spp., *Dacrydium* spp. and *Agathis australis*. Natural forests extend across most of the western side of New Zealand's South Island,

and through the mountainous areas of the North Island. In the northernmost areas, warm temperate rain forests predominate.

Plantation forests in New Zealand are dominated by *Pinus radiata*, which comprises 89 percent of the 1.8 million hectares of plantation forests. Other important plantation species include Douglas fir (*Pseudotsuga menziesii*), cypress species and *Eucalyptus* species. New Zealand's planted forest estate has increased substantially during the past two decades. In 1987, the national area of plantation forest was 1 154 000 hectares, while by 2007 this had increased to 1 790 000 hectares; an increase of 55 percent. However, a notable trend during the past several years is that the area of plantations harvested has been greater than the areas planted and restocked, resulting in a net decline in the plantation estate of 37 000 hectares since 2003.

(iii) *Melanesia*

Indigenous forests cover almost 46 percent of **Fiji's** total land area. An additional 9.7 percent of land area comprises pine and hardwood plantations. Indigenous tropical rain forests are located on the eastern parts of the islands, while much lower rainfall on the leeward, western parts of the islands results in mainly open, dryland forests and grasslands. Until recent times, Fijian natural forests have been classified into three forest management classes- Production, Protection and Preservation forests- although recently the emphasis has changed to multiple-use forestry. The natural forests comprise nine ecological forest types including lowland rain forests, upland rain forests, cloud forests, broadleaved dry forests, mixed dry forests, mangroves, coastal forests and open broadleaved forests. Principal species harvested for industrial wood include *Agathis macrophylla*, *Endospermum macrophylla*, *Calophyllum vitiense* and *Myristica* spp.

Softwood forest plantations, mainly of *Pinus caribaea*, have been established on dry leeward and grasslands areas, while hardwood plantations of mainly mahogany (*Swietenia macrophylla*) have been established on logged over rain forest areas, mainly on the eastern and central parts of the larger islands. Softwood forest plantations comprise about 93 000 hectares, hardwood forest plantations comprise 60 000 hectares, with an additional 27 000 hectares of coconut plantations.

Papua New Guinea's forests cover 28.7 million hectares constituting about 63 percent of the country's total land area. The vast majority of Papua New Guinea's forests are natural forests and the most of these are classified as tropical rain forests mainly comprising tall hardwood canopy genera such as *Calophyllum*, *Elaeocarpus* and *Terminalia*. Coniferous forest comprising genera such as *Podocarpus* and *Araucaria* also occurs. In the interior of the country, the forest assumes montane characteristics and dominant species. A band of tropical moist deciduous rain forest extends across the swampy southern plains of the country characterized by species such as *Garuga floribunda* and *Protium macgregorii*.

Since the mid-1970s, forest cover in Papua New Guinea has declined by approximately 4.5 million hectares, with the most rapid decline during the mid-1980s largely as a result of heavy logging.

Papua New Guinea presently has an estimated 86 000 hectares of plantations. Most plantation species are exotics, although some indigenous species are also planted. Principal species include *Araucaria* spp., *Acacia mangium*, *Tectona grandis*, *Gmelina arborea* and *Eucalyptus deglupta*. The quality of many older state-owned plantations is likely to be low with reports that they have been badly neglected or abandoned.

Natural forests in the **Solomon Islands** total 2 186 000 hectares covering 74 percent of the total national land area. Six distinct vegetation types are distinguished in Solomon Islands: lowland rain forests, hill forests, montane forests, freshwater swamp and riverine forests, saline swamp forests (mangrove areas), and grasslands and other non-forest areas. Figure 2.4 shows the proportion of various forest types in the Solomon Islands according to 1995 inventory data.

Around 80 percent of Solomon Islands' forests are classified as hill forests, occurring at altitudes of 400-600 metres and characterized by species such as *Pometia pinnata*, *Gmelina moluccana* and *Elaeocarpus sphaericus*. Lowland rain forests occur up to the lower margins of the hill forests, while montane forests occur at altitudes above 600 metres.

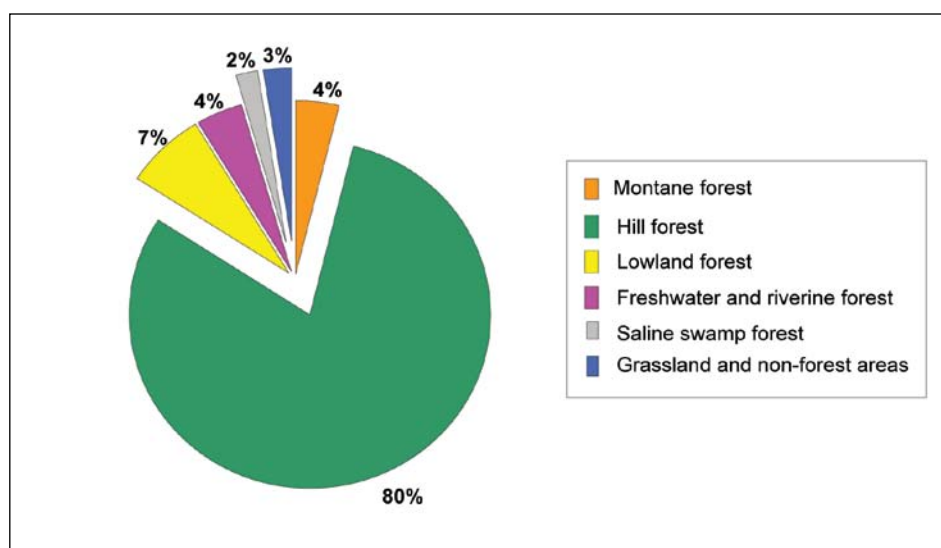


Figure 2.4: Forest and vegetation types in the Solomon Islands (1995)

Source: Pauku (2009)

The Solomon Islands reported 27 000 hectares of plantations to the Global Forest Resources Assessment 2010, a significant decline from the 50 000 hectares reported in 2005, much of which comprised derelict plantings. The area of commercial plantation forests (owned mainly by commercial forestry companies) is estimated at 22 200 hectares. Villagers have also established forest plantations of varying sizes. The first village-scale plantings were recorded in 1985, and since then planting efforts have increased with a combined total area of up to 9 000 hectares established by 2005. These communal plantations are potentially an important wood source for the future, but technical assistance is necessary to ensure proper silvicultural management. The major forest species planted by industrial plantations include *Gmelina arborea*, *Camptosperma brevipetiolatum*, *Eucalyptus deglupta*, *Terminalia* spp., *Acacia* spp., *Tectona grandis* and *Swietenia macrophylla* (Table 2.3).

Table 2.3: Distribution of plantation species in the Solomon Islands

Industrial plantations		Village plantations	
Species	Proportion (%)	Species	Proportion (%)
<i>Eucalyptus deglupta</i>	28	<i>Tectona grandis</i>	67
<i>Gmelina arborea</i>	19	<i>Swetenia macrophylla</i>	12
<i>Camptosperma breviopelatum</i>	14	<i>Eucalyptus deglupta</i>	11
<i>Swetenia macrophylla</i>	14	<i>Gmelina arborea</i>	9
<i>Terminalia</i> spp.	9	Other	1
<i>Agathis</i>	7		
<i>Tectona grandis</i>	3		
<i>Acacia</i> spp.	2		
Other	4		
Total	100%		100%

Source: Pauku (2009)

Vanuatu has 440 000 hectares of forests, which cover almost 36 percent of the country’s land area. Natural forest types in Vanuatu include lowland rain forest, montane cloud forest, seasonal rainshadow forest, mangrove forest, littoral forest and secondary forest. Lowland rain forest is the most extensive forest type, occurring at elevations up to 600 metres and mainly on the southeastern sides of the islands. Characteristic trees in the lowland rain forest include *Castanospermum australe*, *Gyrocarpus americanus*, *Intsia bijuga* and *Kleinhovia hospita*.

Vanuatu reported 3 000 hectares of forest plantations to the Global Forest Resources Assessment 2005 (no report on area of plantations was made in 2010). Most of these plantations have been established under the Local Supply Plantation (LSP) and Industrial Forestry Plantations (IFP) programmes. The LSP programme commenced in 1974 and established around 1 000 hectares of mainly *Cordia alliodora*. However, *Cordia alliodora* has had poor growth characteristics and much enthusiasm for plantation establishment has abated. The IFP programme has also established around 1 200 hectares of *Pinus caribaea* var. *Hondurensis* plantations. These are intended to produce high quality saw- and veneer logs for export. These IFP plantations have been reclassified into alternative management programmes in recent times.

Figure 2.5 gives a breakdown of Vanuatu’s plantation resources as of 2003.

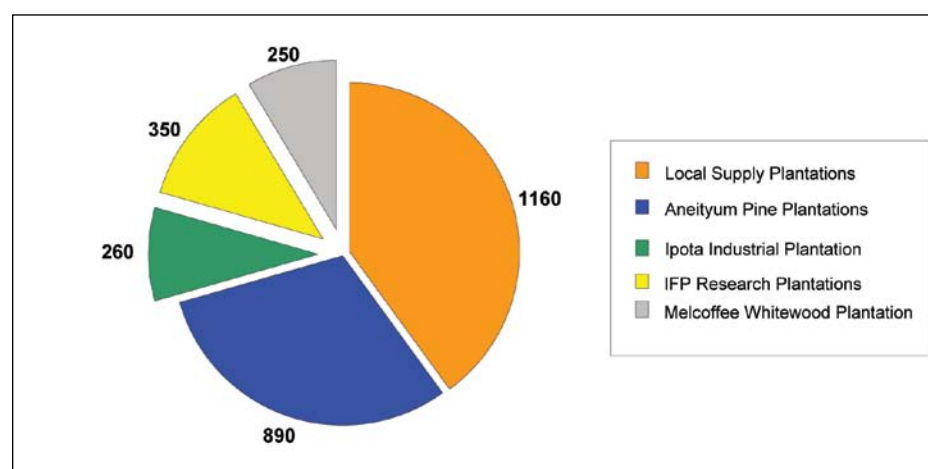


Figure 2.5: Area of plantations within Vanuatu 2003 (hectares)

Source: Bakeo et al. (2003)

(iv) Polynesia and Micronesia

Slightly more than 60 percent of **Samoa's** land area is covered with forests. Approximately half of these are classified as production forests and the remainder is protection forests (Table 2.4). Virtually no closed natural forest remains in Samoa (>65 percent crown cover), except for a small tract on the Aleipata islands. Major forest types are medium, open and secondary forests with characteristic species including *Pometia pinnata*, *Syzygium* spp. and *Planchonella samoensis*.

Table 2.4: Forest types of Samoa, 2004

Forest type	ISLAND NAME				TOTAL
	Main vegetation type	Apolima, Manono, Namua, Nuulua, Nuutele	Savaii	Upolu	
Production forest	Medium forest		18 050	248	18 298
	Open forest		18 446	16 763	35 209
	Plantation forest		3 702	1 011	4 713
	Secondary forest	78	18 147	10 825	29 049
	Mangroves			0	0
	Wetland			0	0
Production forest total		78	58 345	28 847	87 269
Protection forest	Closed forest	82			83
	Medium forest	9	54 101	155	54 265
	Open forest	27	3 826	16 286	20 139
	Plantation forest		96	294	390
	Secondary forest		1 653	6 471	8 124
	Mangroves		16	353	369
	Wetlands		17	418	434
Protection forest total		118	59 709	23 977	83 804
Grand total		196	118 054	52 824	171 073

Source: Sesega (2009)

A plantation programme began in the early 1970s, as policy-makers and forest managers envisaged the need for a sustainable flow of wood to support local industries. The state-owned Cornwall Estate in Western Savaii and government-owned land in Togitogiga, Southern Upolu were replanted with mahogany (*Swietenia macrophylla*), Spanish cedar (*Cedrella odorata*), teak (*Tectona grandis*) and other exotic species, most notably fast-growing general construction wood, *Eucalyptus deglupta* and *Anthocephalus chinensis*.

In the early 1990s, about ten years before the first plantation forests were to come on stream for milling, two devastating cyclones³ destroyed more than 75 percent of the plantations. Potential risks accruing to forest plantations in Samoa as an investment were starkly illustrated by the cyclones. Postcyclone reviews predicted more extreme risk of cyclones than was previously believed. While plantings continued at the two government blocks, annual targets were significantly reduced – from more than 1 000 hectares per year in the precyclone period – to the present target of 100 hectares a year. Today, the remaining plantation forests are concentrated at two sites, the Cornwall Estate (Masamasa and Falelima, Savaii), and in Togitogiga, South Upolu. The oldest stands were established in 1991,

³ Cyclone Ofa in 1989 and Cyclone Val in 1990.

immediately following the cyclones. Mahogany comprises the main species planted, constituting over 64 percent of the total plantation resource. Mixed plantings of mahogany and teak and other high quality native species make up the remainder of the forest plantation resource. The plantations are managed on a 30-year rotation with an estimated mean annual increment of 5 m³/hectare/year. Some plantation areas have been handed over to customary leaseholders while a small community forestry component is also slowly introducing family-owned woodlots and has replanted about 190 hectares in small lots.

The Kingdom of **Tonga** comprises about 150 islands that vary in size from Tongatapu (over a third of the total land area of Tonga at 257 square kilometres) to rocks and reef islets. On the main islands, large tracts of land are cultivated or fallow.

Tonga has around 8 000 hectares of natural forests covering 12.3 percent of the country's land area. Forested areas include mangrove and coastal swamps, littoral, lowland and upland rain forests, and secondary disturbed forests. Tropical lowland rain forests were once the most common forest type in Tonga, but they are now largely displaced by agricultural areas, with only remnant patches of lowland rain forest still found on Tongatapu. However, lowland rain forests are still common on 'Eua and the upper slopes of Vava'u. Secondary forests comprising a mixture of many native and introduced plant species are now the dominant forest type in Tonga. The dominant canopy species include *Alphitonia zizyphoides* and *Rhus taitensis*.

The nine coral atolls that comprise **Tuvalu** have a total land area of approximately 3 000 hectares, and none rise more than 5 metres above sea level. Tuvalu has poor atoll soils and forests largely comprise tracts of strand forest, covering approximately one-third of the land area. Coconut palms grow in abundance across all the islands and provide a canopy and basis for subsistence agroforestry systems producing a range of goods to support livelihoods. Coconut palms are ubiquitous in these systems, but other species such as screw pine (*Pandanus tectorius*), breadfruit (*Artocarpus altilis*), papaya (*Carica papaya*) and citrus trees are important component species.

Kiribati is an island nation comprising 33 atolls with a total land area of 73 000 hectares, scattered across an ocean area of 3.5 million square kilometres. Natural forest area in Kiribati totals approximately 12 000 hectares, with forests comprising either remnant tracts of tropical rain forests dominated by species such as *Pisonia grandis* and *Hernandia nymphaeifolia* or mangrove forests in shallow parts of lagoons.

Beach strand forests comprising species such as *Tournefortia argentea* and *Scaevola taccadal* are deliberately left intact to provide protection – from saltwater spray and storm surge – to inland agroforestry systems that occupy most arable land and typically incorporate trees such as breadfruit (*Artocarpus altilis*), coconut palms (*Cocos nucifera*), mango (*Mangifera indica*) and screw pine (*Pandanus tectorius*). The system tends to represent a natural forest rather than forest plantation because the trees occur spontaneously in a variety of different patterns and ages. Coconut is by far the dominant species.

(v) **Forest cover**

In many Pacific countries, the area of forest cover has remained relatively stable over the past two decades, though in most instances regular national inventories have not been completed and some reported variance is due to data discrepancies rather than actual change 'on the ground'. Forest areas in Australia, Papua New Guinea and the Solomon Islands have declined primarily due to clearance for agriculture and as a result

of industrial logging (especially in Papua New Guinea and the Solomon Islands). Forest areas in New Zealand and Fiji have increased, mainly as a result of forest plantation establishment. In the small island countries, forest cover has ostensibly remained largely unchanged, though there may have been degradation in some forest areas.

Figure 2.6 shows changes in total forest cover for 1990, 2000 and 2010 in Pacific countries. It also shows changes in forest characteristics for the five countries with the largest forest areas.

Country	1990 (1 000 hectares)	2000 (1 000 hectares)	2010 (1 000 hectares)
Australia	154 500	154 920	149 300
New Zealand	7 720	8 266	8 269
Fiji	953	980	1 014
Papua New Guinea	31 543	30 133	28 726
Solomon Islands	2 324	2 268	2 213
Vanuatu	440	440	440
Samoa	130	171	171
Tonga	9	9	9
Kiribati	12	12	12
Tuvalu	1	1	1
TOTAL	197 632	197 200	190 155

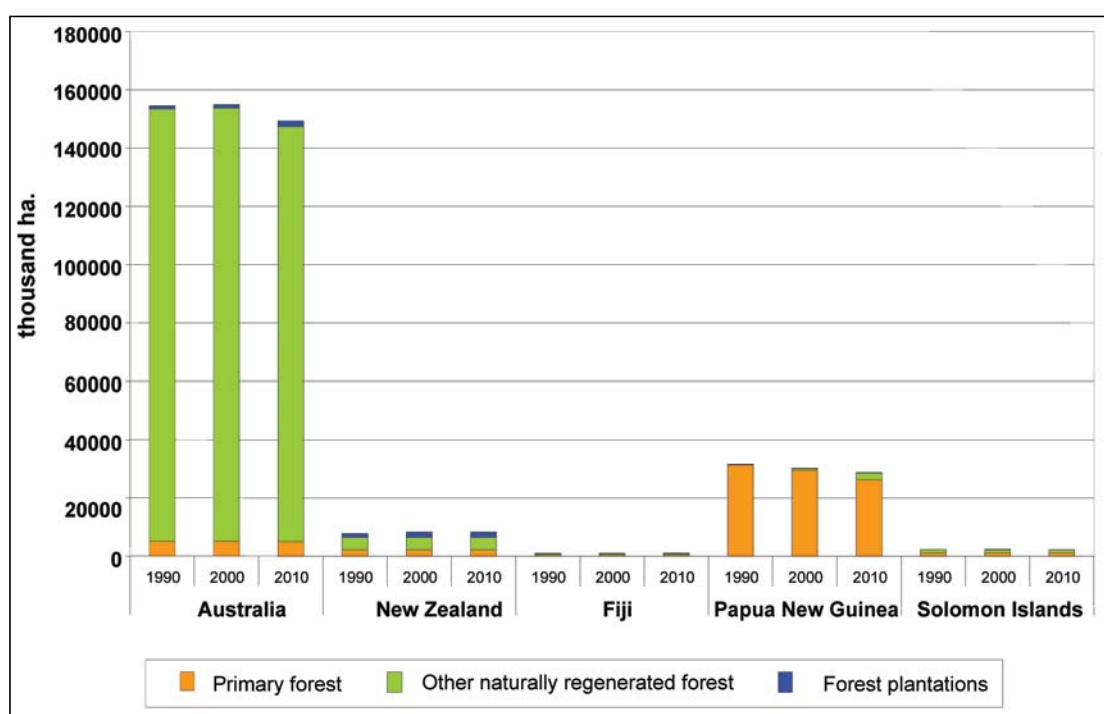


Figure 2.6: Change in forest cover in the Pacific 1990-2010

Source: FAO (2010b)

2.2. Forest ownership and management

(i) Forest ownership

Forest ownership regimes in the Pacific have developed in a variety of directions, based around the influences of traditional and colonial systems of tenure. Table 2.5 summarizes broad ownership patterns in the subregion.

Table 2.5: Forest ownership

Country	Public (%)	Private (%)	Other (%)
Australia	74	24	1
New Zealand	64	36	0
Fiji	5	95	0
Papua New Guinea	3	97	0
Solomon Islands	n/s	100	0
Vanuatu	-	-	-
Samoa	21	79	0
Tonga	56	44	0
Kiribati	70	30	0
Tuvalu	-	-	-

Source: FAO (2010b)

Forest ownership in Australia and New Zealand largely reflects ownership systems developed during their British colonial eras.

In **New Zealand**, the vast majority of natural forest (around 80 percent) is under government ownership and is located within protected areas administered by the Department of Conservation. The remaining natural forests are under private ownership, with only a very small proportion of the total natural forest area assessed as still potentially available for harvesting.

Conversely, the vast majority of plantation forests are under private ownership and almost all are production forests. Around 4 percent of plantation forests are owned by the central government with an additional 3 percent owned by local government bodies. The remaining 93 percent of forests are under private ownership, including some Maori (indigenous groups) incorporations. Since 2003, the advent of Timber Industry Management Organizations (TIMOs) as substantial plantation forest owners in New Zealand has been a notable feature. TIMOs presently own approximately 40 percent of New Zealand's plantation forests (Clarke 2010).

Native (natural) forest ownership in **Australia** is classified in six tenure classes, as shown in Figure 2.7, while plantations constitute a separate class.

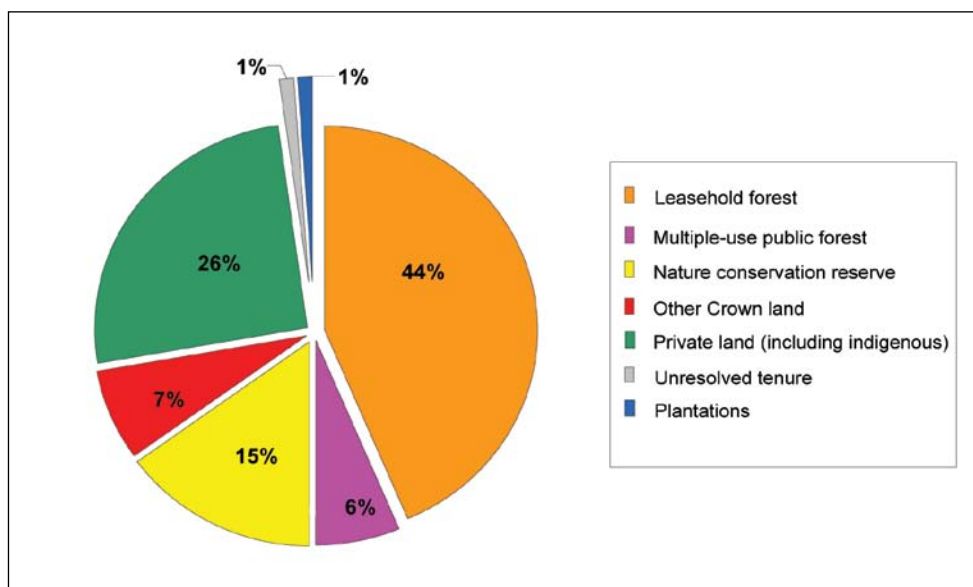


Figure 2.7: Forests in Australia by tenure and jurisdiction

Source: MPIGA (2008)

While 74 percent of Australia's forest land is government-owned, the large area of leasehold forest (around 44 percent) means approximately 62 percent of forests is under private sector management, including approximately 21 million hectares of forests (14 percent) under management by indigenous groups. *Australia's state of the forests report 2008* notes:

There are notable differences in the ownership of different forest types. The drier, sparse woodland forests make up almost 100 million hectares, half on leasehold land and another quarter on private land. The open forest types are distributed more or less evenly between public and private owners in most jurisdictions, while closed forests, comprising rainforest and mangroves, are mostly in public ownership.

Private ownership of plantations in Australia has increased markedly in the past 15 years; from about 30 percent in 1994 to 59 percent in 2006. During this period, two state governments have sold extensive tracts of plantations (one sold all its plantations and the other sold a 50 percent interest). At the same time, significant private sector investment in plantations has also occurred. Mirroring the trend in New Zealand towards greater involvement of TIMOs, 38 percent of Australian plantations are presently owned by managed investment schemes and superannuation funds.

Forest ownership in Melanesian countries is largely based around customary ownership by traditional tribal and clan entities.

In **Fiji**, 95 percent of forests is under private ownership, with 85 percent of forest under customary (*mataqali*) ownership, along with 9 percent of forests on alienated freehold land. The remaining 5 percent of forests is on government-owned land. Almost 90 percent of the unexploited production forests is under *mataqali* ownership. Fijian *mataqali* do not have any corporate authority to conduct land transactions – the land is managed by the Native Lands Trust Board and remains forever the property of the landowning unit and cannot be sold, except to the state for public purposes. All negotiations for the use of timber grown on *mataqali* lands must be conducted through the Native Lands Trust Board.

Almost 97 percent of forests in **Papua New Guinea** is under customary ownership, with very small areas under government ownership. However, under regulations not dissimilar to those applying in Fiji, any harvesting on customary land requires that the rights to the land must first be willingly transferred to the state under a 50-year Forest Management Agreement. The state then negotiates with interested parties to lease the concession. Increasingly, landowners are exerting pressure on the government to acquire these rights to timber areas and place them on tender to attract developers. Landowners regularly initiate proceedings by seeking out potential developers and then approach the government to formalize arrangements. This often causes conflicts among landowners, as well as with processes that are expected to impartially select developers of timber concessions (PNGFA 2009).

Forest ownership in the **Solomon Islands** is also mainly in the hands of customary landowners. Around 88 percent of land in the Solomon Islands is under customary ownership and this encompasses almost all forest area. These lands are variously held under a variety of different ownership systems including tribal, clan and individual ownership or rights of use. The remaining 12 percent of registered (alienated) lands is owned by the government (roughly two-thirds) and private Solomon Islanders. Some customary-owned forest lands are held under lease or in joint ventures with private companies.

All land in **Vanuatu** belongs to indigenous customary owners and rules of custom are the basis for the ownership and use of land – though a variety of traditional tenure systems are in place. These rights are enshrined in Vanuatu’s constitution. Consequently, ownership of almost all forests lies with indigenous landowners, though some logged-over areas have been leased for plantation establishment.

Land tenure arrangements in **Samoa** are complex. Lands are divided into customary land, freehold land and public land. Almost 80 percent of the land is under customary title and most indigenous forests are on customary-owned lands and under the control of local villages. Customary landownership includes a system which allows for specific family lands, communally-owned village lands and district lands (high mountain lands used primarily for hunting and gathering).

During the mid-1980s, a reforestation project established plantations on the government-owned and leased customary lands mainly in Western Savai’i and on South Upolu. Since the cyclone devastation, wrought in the early-1990s, the leased lands have been returned to the customary owners.

Table 2.6 summarizes forest ownership in Samoa in 2004.

Table 2.6: Ownership of forests in Samoa, 2004

	Customary owned (ha)	Government owned (ha)	Privately owned (ha)
Savaii indigenous forests	70 990	0	0
Upolu indigenous forests	27 390	0	0
Plantations	1 676	1 474	0
Small woodlots	0	0	190

Source: *Sesega (2008)*

The Constitution of **Tonga** vests the ownership of all land in the King of Tonga (and hence under public ownership), who has the right to grant estates and allotments. Until

the end of the 1990s, all male taxpayers were entitled to an 8-acre allotment; more than 60 percent of the country's land area was held in allotments – largely comprising coconut plantations and agroforestry systems.

His Majesty King George Tupou I, once visited Sydney, Australia, and saw homeless people sleeping in the parks and on the streets, and was determined that his people will not suffer the same fate. Tonga's land tenure was therefore founded on the principles that all Tongans should have a tax allotment to grow food for the family, and a village allotment where the family home can be built. In addition, land is not allowed to be sold, so that land ownership remains in Tongan hands. Land can be leased but only for a limited period of time, with 20 years for the tax allotment, and 50 years for the village allotment. (Nukalofa Herald, 27 May 2010.)

The largest tracts of remnant rain forest are protected in 'Eau National Park and Ha'apai island conservation reserve. The government has leased land, mainly on 'Eau Island, to establish a plantation estate that is planned to extend up to 2 000 hectares.

All land on **Tuvalu** is owned under the traditional tenure system and is regulated mainly by customary law. Land – and the agroforestry systems that occupy it – is mainly owned by extended family groups (Kaitase) but may also be divided among family members for individual ownership (Vaevae). The government does not own any land, but can lease land for any 'public purpose' including for conservation projects.

Most of the land and forests in the populous islands of **Kiribati** (mainly the Gilbert Islands group) is owned by groups of extended families (*ramages*) living in small, scattered villages. Landholdings include village lands with agroforestry sites growing pandanus and breadfruit, taro beds, and forest lands mainly occupied by coconut palms (Crocombe 1987).

The main exceptions to private ownership are the Line and Phoenix Islands, which are owned by the state. Only one of the Phoenix Islands and three of the Line Islands are inhabited, including Kiritimati, which comprises about 70 percent of Kiribati's land area. Kiritimati's vegetation comprises mainly grasslands and low shrublands, with virtually no closed forest. The whole island is a wildlife sanctuary.

(ii) *Forest management*

Box 2.1: Seven thematic elements of sustainable forest management

Seven thematic elements of sustainable forest management have been derived from regional and international processes on criteria and indicators. These 'key components' of sustainable forest management are:

1. Extent of forest resources – maintaining adequate forest cover and stocking;
2. Biological diversity – conservation and management;
3. Forest health and vitality – minimizing the risks and impacts of unwanted disturbances;
4. Productive functions – maintaining supplies of primary forest products;
5. Protective functions – maintaining soil, hydrological and aquatic systems;
6. Socio-economic functions – contributions to the overall economy and to society;
7. Legal, policy and institutional framework – in support of the above six themes.

Source: <http://www.fao.org/forestry/24447/en/>

Australia

Australia's state of the forests report 2008 provides a comprehensive overview that describes and evaluates the country's progress towards forest sustainability against seven criteria (similar to the thematic elements of Box 2.1) established by the Montreal Process Working Group.⁴

In terms of the national forest conservation estate, the report notes that between 2003 and 2008 the area of Australia's natural forests in formal nature conservation reserves increased by about 1.5 million hectares to 23 million hectares. Approximately 16 percent of Australia's forests – and more than 70 percent of known old-growth forests – are within nature conservation reserves. During the same period, representation of most forest types in formal nature conservation reserves increased, including significant changes for some types. For example, the proportion of rain forests in conservation areas increased from 33 percent to 55 percent.

Approximately 30 million hectares of forests, mainly those in the conservation estate, are managed for protection values, i.e., soil and water conservation. Most publicly-owned multiple-use and nature conservation reserve forests are also actively managed for recreation and tourism uses. A variety of forest recreational facilities is provided, including tracks, information centres and tree canopy walkways.

Management of forests for wood production is increasingly being focused on forest plantations. At present, Australia's forest plantations produce two-thirds of the country's log supplies, with that proportion projected to continue to increase. During the period 2001-2006, the volume of logs harvested in natural forests declined by 14 percent, while the plantation harvest increased by 28 percent. Also during that period, approximately

⁴ Montreal Process Working Group on Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests.

2 million hectares of multiple-use public forests were withdrawn from assignment for potential wood production.

The most significant cause of forest loss in Australia is severe bushfires. Fire constitutes a natural part of the ecological cycle of much of Australia's natural forests, but is also a significant challenge and threat to human utilization of forests. Between 2001 and 2006, fires burned an estimated 24.7 million hectares of forests. Twenty million hectares were burned by wildfires, while 4.7 million hectares were prescribed for burning as a means of protection against more catastrophic losses through wildfires.

Other significant areas of forest loss from 1990 to 2005 were due to conversion of dry woodlands on private lands in Southwest Queensland. Previously these areas had been left uncleared as they were unsuitable and uneconomic to farm. However, new technologies, new varieties of grasses and cattle, and new export markets made it feasible and commercially attractive to convert them from forests to cattle pasture (Byron personal communication).

In general, forests in Australia are relatively well managed compared to most countries in Asia and the Pacific. The national area of forests is still incurring a modest proportionate decline, but at the same time the network of forest conservation reserves is expanding, and production forests outside the conservation estate are managed within a sound policy and regulatory environment, as well as being under the scrutiny of powerful civil society groups. Natural forests are increasingly being withdrawn from wood production, with an expanding planted forest estate increasingly dominating wood supplies.

New Zealand

Forest management in New Zealand is largely dichotomous, with most plantation forests being managed for wood production and most natural forests being managed for conservation. For most conservation forests, the primary management tools applied relate to recreational enhancement and pest control. Similar to Australia, recreational management includes development and maintenance of forest walking tracks and huts for trekkers, signage, information provision and educational facilities. Significant pests to New Zealand's natural forests include the Australian brush-tailed opossum, red deer, wild pigs, German wasps and various species of the weasel family and rats that prey on indigenous forest birds.

The primary silvicultural treatments applied to production forests are pruning and thinning (particularly to the predominant radiata pine plantation forests). In recent years, there has been a marked decline in the area of new planting of plantation forests, down from peaks of almost 100 000 hectares *per annum* in the mid-1990s, to just over 2 000 hectares *per annum* in 2007. New Zealand's *National Exotic Forest Description (2007)* (NZMAF 2008) also notes significant reductions in silvicultural treatments in recent years.

The area of production thinned forest has declined over the last decade. Approximately 16 percent of the radiata pine planted forest currently is, or is expected to be, production thinned. In 1995, 28 percent of the radiata pine forests was, or was intended to be, production thinned. Production thinning of the radiata resource has decreased in the Central North Island region from 50 percent in 1995 to 22 percent in 2007.

Similarly, in 2007, approximately 61 percent (976 000 hectares) of the radiata pine planted forest estate is, or is expected to be, pruned to a height of at least four metres. This compares with around 68 percent in 1995.

In general, the reductions in new planting and tending reflect generally low returns accruing to plantation forestry during the past decade, relative to some earlier periods (and current returns), allied with the increasing importance of reconstituted board products (especially medium density fibreboard [MDF]) relative to sawntimber. A notable trend is that, during the past five years, some areas of planted production forest have been converted to pasture. Historically, this type of land-use change from planted production forestry has been rare and largely reflects very high returns in dairy farming compared to relatively depressed forestry earnings.

Overall, forest management in New Zealand accords well with most principles, criteria and themes of sustainable forest management. The overall forest area is increasing, a very large proportion of the extensive natural forests are in protected areas under conservation management, the country is a significant net exporter of forest products and its legal, policy and institutional framework is sound and relatively advanced compared with most other countries in Asia and the Pacific. The major areas of concern relate to the adequacy of pest management activities in reducing degradation in natural forests, and monocultural aspects of exotic plantation forests which, critics argue, may suppress indigenous biodiversity.

Melanesia

Papua New Guinea's National Forest Policy identifies an overarching objective of *management and protection of the nation's forest resource as a renewable natural asset*, noting that *...the forest resources of Papua New Guinea shall be managed in accordance with government programs embodying the principles of sustained yield management ...*

Measured on a per capita basis, Papua New Guinea has a relative abundance (5 hectares/capita) of forests compared with most other countries in Asia and the Pacific. The forest growing stock in Papua New Guinea is estimated at 1.035 billion cubic metres (184 m³/capita).

Forest lands in Papua New Guinea may be classified into six types:

- i. Production forests – areas under concessions or proposed for concessions in the near future (30 percent of the forest area).
- ii. Reserve forests – forests where a decision has yet to be made on land-use (34 percent).
- iii. Protection forests – forests assigned legal status as protection or conservation areas (1 percent).
- iv. Afforestation areas – areas currently in grasslands, but with afforestation potential.
- v. Salvage areas – savannah forest areas that could be cleared for afforestation (afforestation and salvage areas collectively 15 percent).
- vi. Other forest areas – forest areas not formally included in any of the above classifications (20 percent).

Harvesting in the production forests is based on a selection system that specifies a single minimum cutting diameter, generally 50 centimetres, and all commercial trees above this diameter are removed regardless of forest type, tree species or condition. In most cases the forest is significantly disturbed with large gap sizes and consequent heavy vine invasion. A 35-year cutting cycle applies to any new harvesting plans, regardless of forest type, but in older concessions a 10-20 year cutting cycle may apply.

Timber concessions are signed for a 50-year period, allowing two harvests using the 35-year cutting cycle. During the 1990s, concession rights to 5.8 million hectares of forests were issued. However, there has been a significant reduction in the area of concessions issued since 2000. Only 750 000 hectares of forests were acquired under timber concessions between 2000 and 2007.

Various instruments are designed to promote the sustainability of timber harvesting including the various laws, regulations and contracts that govern forest concessions, as well as the national Logging Code of Practice. However, PNGFA (2009) notes:

PNG is doing its best to ensure that logging companies conform to the SFM tools that have been developed for the country. One of the continuing problems for the PNG Forest Authority (the main government agency mandated to manage the forests in the country) is that often it does not have adequate resources (in terms of finances and logistical support) to properly monitor and regulate compliance by the timber companies.

Forests not allocated as timber concessions are mainly under customary ownership and are outside any formal management plans. The primary uses of these forests are for foraging and hunting, although some communities are allying with NGOs and using small portable sawmills in sustainable community forestry wood production programmes.

Overall, Papua New Guinea faces significant challenges in moving towards sustainable forest management. At the core of the challenge is that harvesting the forests confers enormous wealth to concession holders, while the regulatory authorities are poorly resourced and struggle to carry out their mandated roles. The money at stake and power imbalances create powerful incentives to violate concession rules and boundaries and exploit vagaries in forest ownership, and provide an environment in which corruption may prosper.

The generally steep topography of the large islands of the **Solomon Islands** – and the small size of the hundreds of atolls – renders much of the country's forest areas unviable or inaccessible for commercial harvesting. Consequently, the country maintains extensive forest cover, although estimates suggest that forest cover on the six main islands has declined from approximately 80 percent to approximately 60 percent today.

The bulk of forest management focuses on the merchantable forests, with the inaccessible interior forests coming under relatively *laissez-faire* management regimes. The principal logging technique in the Solomon Islands is selective logging. Legislation currently restricts harvesting to trees greater than 60 centimetres in diameter, and on slopes of greater than 30 degrees or above 400 metre contours. Nonetheless, logging practices have been criticized for being wantonly destructive, with selective 'high grading' being carried out with little regard for the residual forest or the wider environmental implications of forest degradation.

Harvesting in the country's merchantable forests has largely outstripped their sustainable capacity and, seemingly, the government's capacity to effectively regulate logging. Pauku (2010) notes:

For example in 2004, it was reported that around 1 million cubic meters of logs were harvested, in contrast to the sustainable harvest estimated at around only 200,000m³. In 2007, round log exports increased by 28% to 1,446,003m³, from 1,130,365m³ in 2006 (CBSI report, 2007). Such a rate of log exports is a reflection of the heavy reliance on the forest sector through logging by successive governments.

Despite this significant overcutting and gloomy forecasts that timber supplies in the merchantable forests will be exhausted by 2015, harvesting has continued apace. Currently, there are 141 felling licences and 150 milling licences operative throughout the country (Pauku 2010).

The overarching forestry issue in the Solomon Islands is unsustainable logging and its economic, environmental and social implications. In recent times, the forestry industry has generated around 20 percent of government revenues, and often more than 50 percent of export revenues. Thus, there are enormous economic pressures to continue logging, regardless of the long-term implications.

Considerable interest has been shown in small community-based forest management projects producing ecotimber. In due course, it seems likely that they will constitute a significant component of a much-reduced Solomon Islands timber industry, along with privately-owned plantation forests.

There is a significant dichotomy in forest management in **Fiji** between the natural and plantation forests. Natural forests are largely under the control of customary owners and management responsibilities, apart from periods of logging, lie with the owners. Management of large tracts of forests is generally passive, with little or no management input.

Logging in natural forests is generally carried out under a selection system, with a cutting cycle of at least 20 years. Natural forest harvests peaked in 1987, at 220 000 m³, and have since been in decline, falling to 100 000 m³ in 2004 and 61 000 m³ in 2007. Conversely, plantation forest harvests have been expanding since commencement in 1987, reaching 300 000 m³ in 2004.

Fiji's mahogany (*Swietenia macrophylla*) plantations are grown on rotations of 30-35 years and without pruning or thinning. The *Pinus caribaea* plantations are grown on rotations of approximately 17 years. On high quality sites, the trees are pruned to 6 metres for sawlog production.

Overall, Fiji's significant plantation resources mean the country is well placed to move towards sustainable forest management, without severely compromising its wood production potential. Fiji has shown significant commitment to the achievement of sustainable forest management and the 2007 national forest policy provides new guidance towards concrete measures to improve forest management.

Much of the interior of **Vanuatu** is too steep and rugged to make agriculture or logging economically viable, so large tracts of interior forests have been preserved from clearance. These forests generally perform soil and watershed conservation roles, but generally receive little formal management intervention by the customary owners. However, the lowland forests have been extensively logged or cleared. Almost all silviculture in the natural forests relates to harvesting, where selective logging is carried out using a minimum felling diameter of 60 centimetres. Various silvicultural treatments including weeding and thinning have been applied to Vanuatu's modest plantation estate, at different times.

The principal forestry concerns in Vanuatu relate to deforestation and forest degradation. Large areas of lowland forest have been cleared, and this has raised concerns over loss of biodiversity, as well as the promotion of severe soil erosion. A range of initiatives including development of a national forest policy, a national Code of Logging Practice and efforts to introduce reduced impact logging exemplify efforts to promote sustainable forest management, though the actual implementation of measures is less promising.

Polynesia and Micronesia

Samoa's natural forests have been heavily depleted during the past 40 years, with large-scale harvesting commencing in the mid-1970s resulting in clearance or degradation of much of the lowland tropical forest and foothill forest on Savai'i and Upolu; the two main islands. At the same time, Samoa implemented a significant plantation forest establishment programme, but this was severely disrupted by major cyclones in the early 1990s. The net result is that Samoa has only very small areas of merchantable forest remaining and they are expected to be exhausted within five years. Meanwhile, plantation forestry is not yet in a position where it can offer an alternative source of timber.

Sesega (2009) notes:

Sustainable forest management is, in theory, implemented through the judicious application of a forest licensing system governing the allocation of indigenous forests, a forest permit system for plantation forests, and the Code of Logging Practices to ensure environmentally sound and sustainable resource extraction.

However, the forest licensing system has largely failed to work effectively to regulate forest harvesting, to the extent that virtually all remaining merchantable forest is licensed for harvesting. On a more positive note, Samoa has successfully incorporated significant areas of forests into its national system of parks and reserves and management of these areas incorporates plantings for watershed protection.

Forest management in **Tonga** focuses on three priority areas for development: agroforestry development; plantation establishment; and conservation and research. The principal features of forest management in these areas include:

- More than 60 percent of Tonga's land area is held in small family allotments and this fragmentary system limits forestry development in many areas to agroforestry and the establishment of small scattered woodlots.
- The predominant species in Tonga's plantation estate are *Pinus caribaea* and *Toona australis*. Various silvicultural treatments are applied to (or planned for) plantations including weeding, pruning and thinning.
- Forest areas on E'au and Ha'apai islands are managed as conservation areas.

There is little formal forest management in either **Kiribati** or **Tuvalu**. In both countries, forest management is largely confined to agroforestry systems, though in some areas various species have been tested as windbreaks and protection from seaspray. Harvesting of wood is done to meet subsistence requirements and within traditional systems that allocate rights in this respect to wood and trees.

2.3. Wood and wood products

There is significant disparity between the forestry industries in Australia and New Zealand – which have developed large, integrated wood-processing industries – and most other countries in the Pacific, where primary processing largely comprises sawmilling, and in two instances, plywood manufacture.

Industrial forestry in the Pacific is an extremely important industry, contributing significantly to the value of national GDP and value of exports for a number of countries, including Australia, Fiji, New Zealand, Papua New Guinea and the Solomon Islands.

Overall, industrial forestry is mainly characterized by countries with relatively large areas of forests and volumes of wood available for harvesting, and relatively low populations. However, even in the developed countries, significant volumes of wood are exported with little value added. The flip side of the coin is that many of the small island countries have only subsistence supplies of wood and timber, and are dependent on imports for most processed wood products.

(i) Logging and log trade

Industrial logging in Pacific countries is carried out by a range of private sector firms and government corporations, with small-scale logging by individual portable sawmillers becoming increasingly common in the island countries. In New Zealand, Fiji, Samoa and Vanuatu logging is done almost exclusively by local private sector firms and contractors. In Australia, state forest agencies conduct some logging operations, along with private sector operators, while in Tonga logging is done by a government corporation. In the Solomon Islands and Papua New Guinea the dominant operators are the often controversial transnational concession holders.

Table 2.7 lists volumes of industrial roundwood removals, log imports and exports, and apparent consumption of industrial roundwood for countries in the Pacific in 1997 and 2007.

In terms of wood production, countries that produced more than 1 million cubic metres of wood *per annum* in 2007 were Australia, New Zealand, Papua New Guinea and the Solomon Islands. Australia (37 percent), New Zealand (18 percent) and the Solomon Islands (54 percent) all markedly increased their annual wood harvests between 1997 and 2007, while Papua New Guinea (47 percent) and Tonga (56 percent) significantly reduced their recorded annual harvests.⁵

Volumes of log imports were very small in all countries, mainly reflecting that the larger countries are all wood surplus producers and that log imports are mainly special purpose species. However, volumes of log imports to smaller countries such as Vanuatu, Samoa and Tonga increased markedly (on relatively small volumes), reflecting increasingly tight wood supply situations in these countries.

⁵ Note that Papua New Guinea's and Tonga's volume of log exports in 2007 significantly exceeded the recorded production of industrial roundwood, suggesting some discrepancies in the data, beyond issues of timing of harvests and log shipments. PNGFA (2009) notes that PNG exports approximately 90 percent of its roundwood harvest.

Table 2.7: Production, consumption and trade in industrial roundwood ('000 m³)

Country	1997				2007			
	Production	Imports	Exports	Consumption	Production	Imports	Exports	Consumption
Australia	19 791	2	695	19 098	27 083	2	1 065	26 020
New Zealand	17 109	3	5 952	11 160	20 258	3	5 979	14 283
Fiji	459	0	0.6	459	472	0.5	15 ⁶	458
Papua New Guinea	3 239	0	3 011	228	1 708	0	2 016	-308
Solomon Islands	734	0	700	34	1 130	0.06	1 011	119
Vanuatu	39	0.06	0.2	39	28	0.1	0.09	28
Samoa	61	0.06	0.1	61	61	0.1	0.6	60
Tonga	5	0.03	0	5	2	1	4	-1
Kiribati	0.01	0	0	0.01	0	0.01	0	0.01
Tuvalu	0	0.06	0	0.06	0	0.06	0	0.06

Source: FAO (2009c)

Several countries in the region are major log exporters on a global scale. The Solomon Islands (89 percent), New Zealand (30 percent) and Papua New Guinea all exported significant proportions of their annual harvests as logs in 2007, foregoing potential opportunities for additional earnings and employment by processing in-country, though considerations relating to profitability and effects of economies-of-scale need also be taken into account. In many instances, where processing is inefficient and uncompetitive, efforts to add value through additional wood processing merely end up adding costs and result in a net loss of value.

In 2007, New Zealand was the world's fourth largest log exporter, behind the Russian Federation, the United States and Germany; in 2010 New Zealand is expected to be the world's second largest log exporter behind the Russian Federation. New Zealand exports mainly softwood radiata pine logs, predominantly to Asian markets, with the largest volumes exported to Republic of Korea, China and Japan, where they are generally used for low value purposes such as production of pallets and packaging, though increasingly also for higher value construction purposes. Exports to less traditional markets such as India, Indonesia, Philippines, Saudi Arabia and the United Arab Emirates are also increasing rapidly.

Papua New Guinea was the world's second-largest exporter of tropical logs in 2007, behind Malaysia, while the Solomon Islands ranked fifth, behind Gabon and Myanmar. Papua New Guinea and the Solomon Islands export hardwood logs mainly to Asian markets such as China, Japan and Malaysia, where they are used in plywood manufacture and for finished hardwood products including flooring and outdoor furniture.

Conversely, Fiji and Vanuatu both have log export bans in place, with a primary aim of stimulating domestic processing industries (though potentially to the detriment of forest growers).

⁶ This volume of exports seems anomalous given that Fiji has a log export ban in place (Brown/Bulai, personal communication).

(ii) Woodchips

In 2007, Australia was the world's largest exporter of woodchips, exporting 9.6 million cubic metres of woodchips. Australia's exports of woodchips have increased during the past decade, reaching a peak of 11.7 million m³ in 2003. Growth in Australia's woodchip trade has largely been driven by increasing availability of plantation-grown hardwood chips, allied with strong demand for raw material feedstock for pulp and paper manufacturing, mainly in Japan but also in Republic of Korea, Taiwan Province of China and Indonesia.

Table 2.8: Production, consumption and trade in woodchips ('000 m³)

Country	1997				2007			
	Production	Imports	Exports	Consumption	Production	Imports	Exports	Consumption
Australia	12 868	4	7 477	5 395	17 181	1	9 683	7 499
New Zealand	-	0	437	-	1 239	0	366	873
Fiji	-	0	241	-	210	3	242	-28 ⁷
Papua New Guinea	-	0	70	-	-	0	33	-
Vanuatu	-	0	0	-	-	0	0.2	-

Source: FAO (2009c)

New Zealand exports pine and eucalypt woodchips, though this trade has dwindled significantly in the last several years. Virtually no woodchips were exported in 2008.

Fiji exports a very significant volume of its industrial roundwood production in the form of woodchips. These are pine woodchips derived from Fiji's pine plantations and they comprise more than half the value of Fiji's forestry exports. Japan is the main market for Fijian woodchips.

Papua New Guinea has one woodchip mill and exports hardwood chips to Asia.

Table 2.8 lists production consumption and trade data for woodchips in Pacific countries.

(iii) Sawntimber

Sawmilling is the predominant and most widespread wood-processing industry in the Pacific. Excluding woodchipping, roughly two-thirds of primary wood processing in the Pacific is production of sawntimber. Table 2.9 provides production, consumption and trade data for sawntimber in Pacific countries.

Australia and New Zealand produce moderate volumes of sawntimber on a global scale; both are among the world's top 20 producers of sawntimber. Several countries have expanded their sawntimber production during the past decade including Australia (42 percent), New Zealand (36 percent), Vanuatu (300 percent) and Tonga (35 percent). Conversely, sawntimber production in Fiji and Papua New Guinea has declined.

7 NB. The evident discrepancy between production and export of woodchips in Fiji (resulting in 'negative consumption') might be explained by the timing of export shipments, i.e., chips produced in the preceding year but exported in 2007.

In Australia, the production of hardwood sawntimber has declined modestly over the past 25 years, to slightly over 1.1 million cubic metres in 2007. Conversely, production of softwood sawntimber has increased strongly during the same period, to almost 4 million cubic metres in 2007. This reflects a strong shift in Australia towards sourcing wood from planted forests. Australia operates around 80 sawmills with output greater than 10 000 cubic metres *per annum*, including four with output greater than 250 000 cubic metres *per annum*. Australia consumes 92 percent of its sawntimber production domestically, including in remanufacturing for export, and is also a modest net importer of sawntimber.

Similarly, most of New Zealand's sawntimber production derives from planted forests, largely *Pinus radiata*, and is used in a wide variety of applications including for structural, packaging and remanufacturing purposes. New Zealand exports more than 40 percent of its sawntimber production to a wide variety of markets, including to Australia and many of the Pacific island countries.

Fiji's sawmilling sector comprises around 25 fixed mills, including one of international scale and a number of small portable mills. These mills process a variety of timber species, predominantly pine and native hardwoods, but also increasing volumes of plantation-grown mahogany. Approximately 60 percent of Fiji's sawntimber exports are mahogany, with the United States being the major market. Specialty hardwoods and small volumes of pine sawntimber are also exported, the latter particularly to neighbouring island countries. Most of the pine sawntimber is used domestically, predominantly as a structural timber.

Table 2.9: Production, consumption and trade in sawntimber ('000 m³)

Country	1997				2007			
	Production	Imports	Exports	Consumption	Production	Imports	Exports	Consumption
Australia	3 544	757	60	4 241	5 064	575	377	5 262
New Zealand	3 136	34	1 155	2 015	4 280	52	1 781	2 551
Fiji	133	0	17	116	125	2	14	113
Papua New Guinea	218	0	30	188	60	0	71 ⁸	-11
Solomon Islands	12	0	10	2	12	0.02	18 ⁸	-6
Vanuatu	7	0.02	3	4	28	5	0.7	33
Samoa	21	1	0.2	22	21	14	0.09	35
Tonga	2	2	0.01	4	2	12	0.04	12
Kiribati	0	2	0	2	0	2	0	2
Tuvalu	0	0.7	0	0.7	0	0.7	0	0.7

Source: FAO (2009c)

⁸ There is an evident discrepancy between production and export data resulting in negative apparent consumption in Papua New Guinea and the Solomon Islands. PNGFA (2009) cites Papua New Guinea sawntimber exports in 2004 at 47 000 cubic metres while Pauku (2009) notes major difficulties in accessing reliable data in the Solomon Islands

Papua New Guinea has five major sawmills, as well as a significant number of portable mills. However, the latter operate largely outside the official purview. Most of Papua New Guinea's sawntimber is consumed domestically, though recorded per capita consumption is relatively low considering the country's wealth of forest resources. However, there is doubtless a significant volume of sawntimber utilized in the informal sector.

In the past, the Solomon Islands' timber industry was dominated by large-scale operators, using fixed-base band and circular saws for timber milling. However, a significant trend, as timber supplies have been depleted, has been towards increased use of portable chainsaw mills and Lucas sawmilling. Pauku (2009) notes 150 small- to medium-sized timber milling companies operating in the Solomon Islands. Timber milling is for both local and export markets. There are two kiln drying facilities in the Solomon Islands. Other than this, for general construction purposes, timber is mainly sold and used without further processing. Significant volumes of sawntimber are consumed in housing construction.

Samoa's sawmilling sector is declining, in line with the diminishing supply of wood from production forests; two of its four sawmills closed between 2000 and 2004, and the remaining two are operating at reduced volumes. There has been a significant shift towards portable sawmilling. Sesega (2009)⁹ notes that in the mid-1970s, one sawmill in Samoa, alone processed more than 45 000 cubic metres of timber, while in 2006, total sawntimber production was 967 cubic metres. While data may be somewhat unreliable, a clear trend for Samoa, Tonga and the other small Pacific island countries is a marked increase in dependence on imports to meet domestic demands for sawntimber. For example, New Zealand's export statistics show that the country's exports of sawntimber to Samoa increased from 1 402 cubic metres in 1999 to 15 986 cubic metres in 2008, while New Zealand sawntimber exports to Tonga increased from 2 351 cubic metres to 4 473 cubic metres over the same period.

Box 2.2: Utilizing coconut for wood production

Senile coconut palms provide an important source of wood in the Pacific islands. Arancon (2009) cites significant coconut resources in Vanuatu (96 000 hectares), Samoa (93 000 hectares), Fiji (60 000 hectares), the Solomon Islands (59 000 hectares) and Kiribati (25 000 hectares). Traditionally, coconut wood was used for a wide variety of purposes and during the past several decades milled cocowood has been an important building material for domestic use. Significant volumes of cocowood timber are sawn, often using portable sawmills. However, in recent times, cocowood has also been produced for higher value applications. Arancon notes:

[Some] Pacific countries like Fiji...have managed to commercially process senile coconut palms into high quality coco wood housing components... The Pacific Green Furniture Company in Fiji, for instance, has made a great stride in processing and producing high-quality coco wood furniture for export. The company has an annual turnover of around F\$ 15 million and predicts a future increase of F\$ 60 million (Yabaki, 2004).

Source: Arancon (2009)

9 NB. The data cited in Sesega (2009) are considered significantly more reliable than the FAOSTAT data cited in Table 2.9.

(iv) Pulp and paper

Australia and New Zealand are the only countries in the Pacific that operate pulp and/or paper mills. Table 2.10 provides production, consumption and trade data for wood pulp in Pacific island countries, while Table 2.10 provides similar data for paper and paperboard.

There are six major companies producing pulp and/or paper in Australia, at 17 sites around the country. These include several large integrated pulp and paper facilities (including Maryvale, Albury, Wesley Vale and Tumut), and more than 15 other facilities manufacturing various type of paper and paperboard. As of 2004, the country had 34 paper machines in operation (NAFI 2006).

The New Zealand pulp and paper industry comprises seven mills, with most capacity residing in two international scale integrated pulp and paper mills at Kinleith and Kawarau. New Zealand has two smaller integrated pulp and paper facilities, two dedicated pulp mills and a small papermaking facility at Penrose, which also has a paper recycling facility (Brown and Ortiz 2001).

Table 2.10: Production, consumption and trade in wood pulp ('000 tonnes)

Country	1997				2007			
	Production	Imports	Exports	Consumption	Production	Imports	Exports	Consumption
Australia	945	203	0	1 148	1 182	347	10	1 519
New Zealand	1 412	11	586	837	1 529	24	867	686
Fiji	0	0	0	0	0	77	1	76
Vanuatu	0	0	0	0	0	500	0	500
Samoa	0	0	0	0	0	285	0	285
Tonga	0	0	0	0	0	7	0	7

Source: FAO (2009c)

New Zealand produces a significant volume of softwood wood pulp in excess of its domestic papermaking capacity; this is exported, with Japan, China and Australia being the largest export markets. Australia supplements its pulp production with imports. Both countries utilize significant volumes of recovered paper in paper manufacturing. During the past decade Australia has significantly increased its pulp and especially paper production with the opening of the Tumut pulp and paper mill in 2001.

The absence of papermaking facilities in Pacific island countries and demands for diverse types of paper in Australia and New Zealand, mean that all countries in the Pacific import significant proportions of their paper and paperboard requirements.¹⁰ In most countries, consumption of paper has increased significantly during the past decade.

¹⁰ The reported imports of wood pulp into Pacific island countries in Table 2.10 appear anomalous. There is no readily apparent explanation for how such pulp might be used.

Table 2.11: Production, consumption and trade in paper and paperboard ('000 tonnes)

Country	1997				2007			
	Production	Imports	Exports	Consumption	Production	Imports	Exports	Consumption
Australia	2 418	1 136	419	3 135	3 192	1 490	684	3 998
New Zealand	890	237	409	718	872	478	592	758
Fiji	0	6	0	6	0	39	0.7	38
Papua New Guinea	0	14	0.01	14	0	16	0	16
Solomon Islands	0	0.1	0	0.1	0	0.4	0	0.4
Vanuatu	0	0.08	0	0.08	0	0.3	0.2	0.1
Samoa	0	0.2	0	0.2	0	0.8	0	0.8
Tonga	0	0.04	0	0.04	0	0.4	0	0.4
Kiribati	0	0.05	0	0.05	0	0.05	0	0.05
Tuvalu	0	0.01	0	0.01	0	0.01	0	0.01

Source: FAO (2009c)

(v) *Panel products*

Plywood and veneer

Australia, New Zealand, Fiji and Papua New Guinea are all producers of plywood and veneer.

New Zealand's plywood production statistics incorporate production of laminated veneer lumber (LVL), and almost all of the substantial production growth in New Zealand plywood statistics, indicated in Table 2.12, results from development of LVL production capacity. Since 1990, New Zealand has constructed at least six new LVL mills or new production lines. Much of this LVL is consumed domestically, particularly in load-bearing applications where its superior strength relative to sawntimber is valuable. Hence, despite growth in plywood/LVL production in New Zealand, the volume of exports has declined. Around 80 percent of New Zealand's veneer production is consumed in the manufacture of plywood and LVL, with the remainder exported.

Table 2.12: Production, consumption and trade in plywood ('000 m3)

Country	1997				2007			
	Production	Imports	Exports	Consumption	Production	Imports	Exports	Consumption
Australia	151	72	3	220	130	269	5	394
New Zealand	195	6	102	99	422	30	76	376
Fiji	6	0	2	4	8	0.6	1	7
Papua New Guinea	10	0.5	0.2	10	5	0	3	2
Solomon Islands	0	0.5	0	0.5	0	0.3	0	0.3
Vanuatu	0	0.3	0	0.3	0	0.1	0	0.1
Samoa	0	0.06	0	0.06	0	0.2	0	0.2
Tonga	0	0.2	0	0.2	0	0.1	0	0.1
Kiribati	0	0.05	0	0.05	0	0.05	0	0.05
Tuvalu	0	0.07	0	0.07	0	0.07	0	0.07

Source: FAO (2009c)

Australia produces plywood (including LVL) at nine mills. Most mills utilize softwood species (radiata pine, slash pine or hoop pine [*Auracaria cunninghami*]), though one mill produces hardwood plywood from eucalypts. Most plywood is consumed domestically, and Australia also imports significant volumes of plywood (including LVL). Around two-thirds of Australia's apparent consumption of plywood in 2007 was imported. Australia produces sliced veneer at three mills in Tasmania and Queensland, and also imports a moderate volume of veneer.¹¹

Fiji produces plywood and veneer at two mills located on Vanua Levu. Production of veneer sheets in Fiji has declined during the past decade, in line with reduced supplies of peeler logs from the natural forests. At the same time, more of the veneer production is being used in plywood manufacture, hence there is an increase in plywood production, but a significant decline in exports of veneer sheets.

Papua New Guinea has two plywood mills and two veneer mills. While plywood production in Papua New Guinea has remained relatively small and has been somewhat in decline over the past decade; veneer production and exporting have grown strongly since 2000.

Most countries in the region import modest volumes of plywood and veneer relative to their sizes and populations (Table 2.13).

¹¹ It is evident that Australia does not report production of sheet veneer that is used in plywood manufacture.

Table 2.13: Production, consumption and trade in veneer sheets ('000 m³)

Country	1997				2007			
	Production	Imports	Exports	Consumption	Production	Imports	Exports	Consumption
Australia	5	18	1	21	2	41	3	40
New Zealand	311	1	7	305	688	11	141	558
Fiji	10	0	10	0.4	8	0.6	0.4	8
Papua New Guinea	5	0	0.3	5	83	0	51	32
Solomon Islands	0	0	0	0	0	0	0	0
Vanuatu	0	0	0.1	-0.1	0	0.05	0	0.05
Samoa	0	0.1	0	0.1	0	0.1	0	0.1
Tonga	0	0.02	0	0.02	0	0.06	0	0.06
Kiribati	0	0	0	0	0	0	0	0

Source: FAO (2009c)

Fibreboard and particle board

Australia and New Zealand are both significant producers and exporters of medium density fibreboard (MDF), ranking among the world's top 20 producers and exporters in 2007 (Table 2.14).

Australia manufactures fibreboard (both MDF and hardboard) mainly from radiata pine woodchips (though *Eucalyptus* may be used in some higher density boards) at ten facilities, with the largest found at Oberon and Bell Bay. Australia exported 57 percent of its fibreboard production in 2007.

New Zealand manufactures fibreboard at six facilities, with the largest plants located on the South Island at Richmond, Sefton and Mosgiel. The feedstock to all plants is plantation-grown radiata pine. In 2007, approximately two-thirds of New Zealand's MDF production was exported, with almost half the volume of exports destined for Japan.

Table 2.14: Production, consumption and trade in fibreboard ('000 m³)

Country	1997				2007			
	Production	Imports	Exports	Consumption	Production	Imports	Exports	Consumption
Australia	434	107	125	416	723	145	415	452
New Zealand	611	8	403	216	837	20	564	293
Fiji	0	2	0	2	0	2	0.04	2
Papua New Guinea	0	0.02	0	0.02	0	0.3	0	0.3
Solomon Islands	0	0	0	0	0	0.06	0	0.06
Vanuatu	0	0.08	0	0.08	0	0.3	0.2	0.1
Samoa	0	0.08	0	0.08	0	1	0	1
Tonga	0	0.02	0	0.02	0	0.1	0	0.1
Kiribati	0	0	0	0	0	0	0	0
Tuvalu	0	0.02	0	0.02	0	0.02	0	0.02

Source: FAO (2009c)

Australia produces significant volumes of particle board and ranks inside the top 20 of the world's producers. Particle board is produced at approximately ten mills, including at Mt. Gambier, Gympie and Tumut. Most of Australia's particle board is consumed domestically; mainly for construction purposes and joinery, particularly flooring.

New Zealand also produces a moderate volume of particle board at three mills. In 2007, slightly less than 50 percent of New Zealand's particle board production was exported.

Table 2.15: Production, consumption and trade in particle board ('000 m³)

Country	1997				2007			
	Production	Imports	Exports	Consumption	Production	Imports	Exports	Consumption
Australia	790	13	100	703	933	90	18	1 005
New Zealand	215	3	98	120	256	2	125	133
Fiji	0	0.3	0	0.3	0	2	0.05	2
Papua New Guinea	0	1	0	1	0	1	0	1
Solomon Islands	0	0	0	0	0	0	0	0
Vanuatu	0	0	0	0	0	0	0	0
Samoa	0	0.1	0	0.1	0	0.04	0	0.04
Tonga	0	0.02	0	0.02	0	0.04	0	0.04
Kiribati	0	0	0	0	0	0	0	0
Tuvalu	0	0.01	0	0.01	0	0.01	0	0.01

Source: FAO (2009c)

Most Pacific island countries import modest volumes of fibreboard and particle board (Table 2.15) to meet demands for building construction and joinery. Some particle board was apparently re-exported from Fiji in 2007.

(vi) Other forestry products

Australia and New Zealand produce a range of manufactured and remanufactured items including furniture and furniture components, manufactures of paper and paperboard, flooring, moldings, joinery, prefabricated housing components and other wooden manufactures. Many of these are substantial industries in their own right. For example, in 2000, the turnover of the wooden furniture industry in Australia was estimated at A\$1.4 billion (NAFI 2006).

The value of imports of manufactured wood products into Australia and New Zealand are also substantial. For example, NAFI (2006) notes the value of Australian joinery imports in 2003 to have been A\$90 million. For 2008, New Zealand's Ministry of Agriculture and Forestry (NZMAF) *Forestry production and trade statistics* cite the value of imports in 2009 of manufactures of paper and paperboard at NZ\$332 million, continuously shaped wood, i.e., moldings, etc. at NZ\$18 million and wooden furniture and furniture parts at NZ\$182 million.

The Melanesian countries, as well as Samoa and Tonga, all produce furniture and household effects, generally for domestic markets, though small volumes are also exported. For example, Leslie and Tuinivania (2009) note Fiji's production of processed wood products including moldings, furniture and furniture components, and block board.

All Pacific countries import finished wood products, such as household and office furniture and specialist paper products. New Zealand statistics for 'other forestry products'¹² in 2008 show the value of these exports from New Zealand to neighbouring Pacific island countries: Fiji (NZ\$12.3 million), Samoa (NZ\$4.4 million) and Tonga (NZ\$2.6 million).

A range of other forestry products, particularly carved wooden souvenirs and furniture, are produced for sale throughout the Pacific. In some of the island countries, production of wooden handicrafts as a contribution to the tourist industry provides a valuable source of employment and revenue. For example, Pauku (2009) notes:

Tourists' admiration of wood carving in Solomon Islands is noted with interest, and it provides a niche market for these products. No data is available on the quantity of carvings sold locally, nor those exported, but production seems, generally, to be gathering momentum, especially as the tourism industry is picking up.

2.4. Wood as a source of energy

Wood remains an important source of energy in the Pacific region and is used extensively in all countries. However, statistics on woodfuel production and consumption are scarce, and largely rely on modeling and estimation, rather than direct surveys.

¹² Classified as including woodchips, moldings, manufactures of paper and paperboard, furniture and miscellaneous forestry products.

Table 2.16: Fuelwood production (m³)

Country	1997	2007	2010
Australia	6 957 000	5 181 000	3 632 000
New Zealand	-	-	642 000
Fiji	37 000	37 000	1 233 000
Papua New Guinea	5 533 000	5 533 000	8 253 000
Solomon Islands	138 000	124 400	740 000
Vanuatu	24 000	91 000	303 000
Samoa	-	-	223 600
Tonga	-	-	140 700
Kiribati	-	-	132 000
Tuvalu	-	-	26 200

Sources: FAO (2009c); Brown (1997)

Table 2.16 shows estimated production of fuelwood for Pacific countries, with data for 1997 and 2007 drawn from FAOSTAT database estimates, while the 2010 data are drawn from Brown (1997) which forecast woodfuel consumption in 2010 based on population, and derived estimates of per capita wood consumption.

Consumption of wood for home heating remains a significant wood use in **Australia** and **New Zealand**, particularly in rural areas, where supplies of fuelwood are abundant and readily accessible. Fuelwood is produced commercially, from woodlots, scrub areas and via sawmill offcuts, as well as collected by (usually rural) households for domestic use. Most farming households in Australia and New Zealand own chainsaws and motor-driven log splitters are also common.

Box 2.3: Fuelwood production and collection in Australia

“Approximately half of the fuelwood burned in households is collected by the residents, and 84 percent of the timber is obtained from private property. Three-quarters of the people who collect their own fuelwood gather fallen timber, but they also take live and standing dead timber. Established wood merchants who advertise in the Yellow Pages® or who have a business premises account for only about one-quarter of fuelwood that is purchased. Merchants obtain the preferred timber species, such as red gum and box, from distant sources and often transport the wood 400 kilometres or more. Most fuelwood is purchased from small suppliers (60 percent) and smaller amounts are bought from friends (10 percent). These small suppliers represent a completely unregulated part of the market that is worth about A\$260 million/year.”

Source: Driscoll et al. (2000)

Particulate emissions in wood smoke are of significant concern in both Australia and New Zealand, especially in urban areas. In New Zealand urban areas, an estimated 84 percent of fine atmospheric particulates in winter may derive from woodsmoke. The Ministry for the Environment has issued a National Environmental Standard that applies to all new woodburners installed in urban areas in New Zealand after 1 September 2005. Key provisions are that a wood burner must have a discharge of less than 1.5 grams of particles for each kilogram of dry wood burned and the ratio of useable heat energy output to energy input (thermal efficiency) must be not less than 65 percent (NZHMO 2009).

Box 2.4: Electricity co-generation in New Zealand

A number of forest industrial plants burn wood for electricity co-generation. This process involves wood waste being burned to heat a boiler and steam from the boiler being used to drive a turbine which generates electricity. The Kinleith paper mill has one of the largest co-generation facilities in New Zealand. This plant burns approximately 320 000 tonnes of biomass each year, producing 47 percent of Kinleith's energy needs.

Source: Bioenergy Knowledge Centre and Hancock Timber Resource Group

Wood is also an important fuel source in **Fiji**, especially for the 54 percent of its population in rural areas. In more urbanized areas, there has been significant substitution towards use of electricity and fossil fuels. Some records of fuelwood consumption have been maintained and they show a long-term increase in fuelwood consumption. In line with FAOSTAT data presented in Table 2.16, Leslie and Tuinivana (2009) note that, *it is suspected that fuelwood consumption in rural areas has been underestimated.*

One wood-based industrial plant in Fiji operates an electricity co-generation plant, which burns 36 000 tonnes of hog-fuel (wood waste) each year, to produce 3 megawatts of energy.

More than 80 percent of the population in **Papua New Guinea** lives in rural areas and most people depend on wood energy for cooking and heating. Even in urban areas, wood is used extensively, particularly when electricity and liquefied petroleum gas (LPG) prices are relatively high. This has resulted in significant cutting of forest areas on city fringes to provide fuelwood for sale. Wood is also used in the agriculture sector, in hot air drying processes for copra, tea and other commodities.

In some areas, significant fuelwood shortages are being encountered, particularly in the Highlands region. PNGFA (2009) observes:

Extension programmes by the government to encourage people to plant trees and woodlots in the early 1970s and 1980s have largely been abandoned, thereby resulting in less wood being available for domestic purposes as firewood.

Similarly, in the other Pacific island countries, wood has traditionally been the main source of fuel for cooking. In urban areas, electricity, coconut shell charcoal and LPG have substituted to a certain extent for wood, but in rural villages, wood remains the predominant fuel for cooking. Statistics on woodfuel production and consumption are not collected, although fuelwood is sold in and around urban areas.

In many small atolls, fuelwood supplies are increasingly being depleted, especially given escalating costs of fossil fuels. For example, in **Tuvalu**, wood energy is still widely used for cooking in the outer islands and to a lesser extent on Funafuti. Fuelwood is limited to shrubs, coconut husks and coconut leaves – with increasing scarcity being a significant problem.

2.5. Non-wood forest products

Compared with numerous countries where many people subsist in or around forests – and relative to industrial wood production – the range of non-wood forest products (NWFPs) extracted from forests in Australia and New Zealand is relatively small. Honey is one of the most significant NWFPs produced in both countries. In Australia, honey

production is an A\$100 million industry and it is estimated that natural forest nectars comprise 85 percent of the resource base for honey production.

A number of important oils are collected in Australian forests including *Eucalyptus* leaf oil, tannins, tea tree (*Melaleuca alternifolia*) oil (most or all of which is farmed) and species used in the medicinal plant industry. Wildflower harvesting in natural forests is another significant NWFP industry in some regions. Wildflowers collected from natural forests in Western Australia are estimated to have a wholesale value of as much as A\$25 million. There is also a small-scale industry based on the harvesting of bush foods, comprising more than 300 plant species and some animals. Forests also contribute raw materials used to produce contemporary indigenous arts and crafts, including carvings, bark paintings, weavings and dyes.

Most NWFPs are collected on a commercial basis in New Zealand, because most natural forests are protected from all forms of unlicensed exploitation, while the planted forests are often not open to the public. In the natural forests, sphagnum moss, for use in plant nurseries and absorptive applications, is gathered. Ferns, shrubs and small plants are extracted legally or illegally for garden and house decoration. The major NWFP extracted from the planted forests is turpentine which is processed at a plant in Mt. Maunganui. Both the planted and natural forests are host to feral pigs, deer, goats and opossums, all of which are hunted for recreational and commercial purposes.

In the Pacific islands, most NWFPs are used for subsistence purposes by the indigenous people. The experience of the Solomon Islands is typical, where 1 300 plants have been classified as providing some form of NWFPs. They have been grouped into five classes:

1. Food plants, mainly collected and cultivated;
2. Cultivated plants of agricultural significance, e.g., those known to influence soil fertility;
3. Plants that fulfill a basic need, e.g., fuelwood;
4. Custom and craft purposes; and
5. Medicines.

However, in most countries in the Pacific no systematic inventory of NWFPs has been undertaken.

The preponderance of agroforestry systems in Pacific countries means that tree crops are the dominant NWFP, with coconut, banana, pandanus and breadfruit among the important tree crops and dietary staples. Other NWFPs that have been commercialized in Pacific countries, notably the Solomon Islands, include *Canarium indicum* (ngali nut), *Morinda citrifolia* (Indian mulberry) and *Calamus hollrungii* (rattan).

In Fiji, a variety of bamboos and ferns are collected for commercial and communal needs. Sandalwood is commercially extracted for oil and other potential uses. Commercially bottled waters for international markets are now sourced from forest areas. Box 2.5 describes various other NWFPs produced in Fiji.

Box 2.5: Non-wood forest products in Fiji

“Non-timber forest products are of great importance to rural communities. Many plants are used as foods, medicines, construction and roofing materials, dyes, artisanal products, and in ceremonials and rituals. Bush meat, especially pigs, is a valuable food item. Mud crabs, lobster and shellfish are harvested from the mangrove. Stems of tree ferns are collected from forest areas and made into ornamental posts (balabala) which are widely used. Some plants, such as yaqona (Piper methysticum), from which kava is made, are now largely cultivated and others, collected from the wild, are being over-harvested. Few products are marketed except noni (Morinda citrifolia) and sandalwood (Santalum yasi), which has a certain economic potential, especially for village-based production. The challenge is to develop this potential while managing the existing resource sustainably.”

Source: Govt. of Fiji (2007)

In Papua New Guinea, agarwood (*Gyrinops ledermannii*) is a valuable commodity, collected for the production of incense and perfumes. Papua New Guinea also produces tea tree oils.

Sandalwood (*Santalum* spp.) oil is an important NWFP for Vanuatu and several other countries, with sandalwood trees increasingly being ‘domesticated’ and grown in plantations. Distilled oil, pre-grind sapwood and heartwood and carving logs are all sold for export.

Other than food, NWFPs collected in Samoa are mainly leaves, barks and roots used in traditional medicines. Two of commercial significance are *Omalanthus nutans*, which shows potential in the treatment of HIV/AIDS and nonu (*Morinda citrifolia*), which is used extensively as a herbal remedy.

2.6. Service functions of forests

Forests provide a vast array of non-extractive, beneficial services that can be grouped into two broad types:

- Those for which a formal market exists or might be developed (e.g. carbon sequestration, ecotourism, recreation, provision of clean water, hunting, grazing, etc.); and
- Those that are largely intangible and probably not saleable through markets (e.g., cultural and spiritual values, landscape values, biodiversity conservation, watershed conservation and erosion control). These services are probably best classed as permanent externalities – i.e., providing a welfare benefit, but cannot be accounted for in price and market systems.

(i) Significance of forest-based recreation and ecotourism

In **Australia**, most publicly-owned multiple-use and conservation forests are available for public recreation and tourism purposes. Public access to privately-owned forests is generally more limited. Statistics in five states (Queensland, New South Wales, Victoria, Western Australia and South Australia) show more than 19 million hectares of forests are available for recreational usage. Areas of high recreational and tourism use are actively managed for these values and facilities such as visitor centres and forest canopy walks

have been established in some locations. Multiple recreational activities are engaged in, including walking, running, cycling, climbing, fishing, camping, horse riding, snow and water sports. Facilities to support these activities are provided consistent with demand, available resources and where consistent with the forest setting. For example, in New South Wales alone, there are more than 33 000 kilometres of forest roads and trails, while Victoria maintains approximately 3 700 kilometres of walking tracks. Significant revenues are earned in some locations from forest visitors, and concession fees and charges are levied on certain activities. Limited data are collected on visitor numbers at some sites. For example, single site survey data indicate more than 200 000 day visits are made each year to the forest reserves in the Mount Lofty Ranges near Adelaide (MPIGA 2008).

Forests in **New Zealand** are used for a wide variety of recreational purposes and provide an important backdrop to tourism, the country's largest foreign exchange earning sector. The vast majority of the natural forest estate is publicly-owned and freely accessible for recreation. Many planted forests are also publicly accessible at the owners' discretion. Activities such as trekking, climbing, camping, hunting, photography and sight-seeing are all dependent on or extensively enhanced by New Zealand's forests. Forests are also important in a wide range of other recreational activities such as diving, fishing, horse-riding, bird-watching, orienteering, mountain-biking and motorcycling.

Although not strictly ecotourism, New Zealand's entire tourist industry is based around natural and wilderness attractions. Entry to national parks is free and all national parks have well-developed networks of trails providing easy access to natural forests. All commercial activities carried out in national parks require an official concession to operate, issued by the Department of Conservation. In 2009, more than 3 600 concessions were current, with a significant number relating to ecotourism activities such as accommodation (488 concessions), guiding (473 concessions), attractions (11 concessions) and filming and photography (9 concessions). All tourism businesses operating or applying to operate in New Zealand's national parks, reserves and conservation areas are required to prepare an environmental impact assessment. Tourism concessions are only granted if they are consistent with the protection of natural resources.

Ecotourism is also a growing industry in **Fiji**, based on the country's strategic location – as the airline hub for Pacific island countries – and beautiful recreational areas on certain parts of the islands. Forests provide a backdrop to Fiji's beach and water-based tourism, but also host their own attractions in areas such as Koroyanitu National Heritage Park and in the rain forests of the Eastern Highlands. Recreational activities include walking, cycling, horse-riding, bird-watching and rock climbing.

Conversely, in **Papua New Guinea** and the **Solomon Islands** there is only limited use of forests for recreation. In Papua New Guinea, PNGFA (2009) notes that a number of national parks were established in the early 1960s and 1970s, but their maintenance and upkeep has not been sufficient to attract local or overseas visitors. The only area of significance is the Kokoda Trail which is famous for its Second World War heritage. Many tourists, especially from Australia, walk the trail. In the Solomon Islands, forest recreation activities include bush-walking or hiking, trekking, outdoor camping and bird watching. Similar to Papua New Guinea, a lack of facilities and recreation management in most national parks limits their attractiveness to visitors. The most popular forest area is the Honiara Botanical Gardens though, overall, public use of forests as valuable recreational areas is perceived to be low (Pauku 2009).

The ecotourism sector has begun to emerge in **Vanuatu** as an important source of income for resource owners and tour operators. Among potential attractions are the Kauri Reserve on Erromango, which hosts a magnificent stand of Kauri pine (*Agathis macrophylla*). Other forest areas and features have been preserved for their biological and aesthetic significance. The most recent is the proposed Lake Letas conservation area on the island of Gaua, which combines tropical forests and some endemic species with a lake environment (Tate, in prep.).

Statistics on forest-based recreation in **Samoa** are limited, but the overall perception is that forests are highly valued for recreation and this is evidenced by significant additions to the country's protected area network since 2000. In the past decade, the government has designated two new national parks and ten additional parks and reserves, with the latter particularly anticipating recreational opportunities. New reserves include Fulusou Botanical Gardens, Taumesina Reserve and the Vaitele Recreation Area. Statistics on forest-based recreation at a limited number of sites show that more than 90 percent of visits to Le Pupu Pue National Park, the Vailima Botanical Garden and Mt. Vaea Reserve are by locals. Approximately 8 000 visits are recorded annually, mainly for walking, bush-hiking, trekking, outdoor camping and bird watching; as well as visits by schools for educational purposes.

Tonga offers several direct opportunities for forest-based recreation, most notably in 'Eua National Park, which comprises 449 hectares of natural forest on the island of 'Eua. The management plan for the park includes provision for the development of camping facilities, trails, associated signposting and walking guides. Other forest areas such as Mt. Talau National Park on the island of Vava'u provide ecotourism opportunities, while more generally forests contribute to marine tourism.

The small areas of beach strand forest on many atolls of **Kiribati** and **Tuvalu** provide a backdrop to walking and other beach and marine activities. Otherwise, forest-based recreation is very limited.

(ii) Forests and water

Forests constitute an important component of many hydrological cycles and hence the relationship between forests and water is of critical importance in most countries. In the Pacific, important forest-water relationships relate to: (i) provision of freshwater; (ii) control of soil erosion; (iii) regulation of water flows; (iv) coastal protection; and (v) reducing dryland salinization.

In Australia, forests play all five roles. Australia's relatively dry climate means that provision of freshwater and regulation of water flows are of particular importance, while dryland salinization is a significant problem in many areas (Box 2.6).

Box 2.6: Dryland salinization

“Salinity from dry lands can occur when the water table is between two to three metres from the surface of the soil. The salts from the groundwater are raised by capillary action to the surface of the soil. This occurs when groundwater is saline (which is true in many areas), and is favoured by land-use practices allowing more rainwater to enter the aquifer than it could accommodate. For example, the clearing of trees for agriculture is a major reason for dryland salinity in some areas, since deep rooting of trees has been replaced by shallow rooting of annual crops.”

Source: Wikipedia: <http://en.wikipedia.org/wiki/Salinization>

Water use by tree plantations (and diverted from other potential uses) is a subject of controversy in some areas, and is a focus of increased community and scientific attention. Similarly, MPIGA (2008) notes that:

Major wildfires during the period affected soil erosion and water quality across forest tenures, creating an increased challenge for forest managers. The resulting natural regrowth is expected to reduce water yields in affected catchments for decades.

The relative abundance of water in New Zealand, allied with often steep terrain, means forests have an important role in control of soil erosion, watershed protection and regulating water flows. In some drought-prone areas, water use by plantations is of increasing community concern.

In the Melanesian countries, the need for watershed management to mitigate soil erosion and downstream flooding is well recognized and generally embedded in forest policies and legislation. Water quality issues are also significant in some areas. PNGFA (2009) notes that:

The role of forests in protecting watersheds has generally been recognized in traditional PNG culture and forests in river catchments have not been disturbed in many traditional communities in the country for many years. Respect for forests, especially those present in watersheds, is partially embedded in the spiritual and cultural norms of the tribal people.

For countries in the cyclone belts, watershed rehabilitation after cyclone damage is a significant challenge. In Samoa, for example, the damage caused by cyclones Ofa and Val in 1990 and 1991 has driven a substantial part of subsequent forestry policy, including tree planting to rehabilitate watersheds. Sesega (2009) notes, for example, that the effects of these cyclones on the Vaisigano watershed resulted in 40 percent of trees being uprooted and 50 percent of the remaining standing trees being badly damaged. Sizeable areas of the watershed have since been replanted under rehabilitation activities.

In the smaller Pacific islands and atolls, forests' roles in coastal protection and provision of freshwater take on great importance. Coastal protection, including protection from inundation during extreme tidal events, has garnered significant attention with growing fears of inundation resulting from climate-induced sea-level rises and in the wake of the 2004 Asian tsunami and, particularly, the 2009 Pacific tsunami that caused substantial damage and loss of life on Samoa, American Samoa and Tonga. Trees and forests (including mangroves) also play important roles in stabilizing coastal zones and protecting vulnerable crops from salt spray and cyclones.

(iii) *Urban forestry*

On a global scale, urban areas in the Pacific are relatively small, with only six cities (Sydney, Melbourne, Brisbane, Perth, Adelaide and Auckland) with populations of greater than 1 million people. Generally, the relative abundance of land relative to population has generated sprawling urban areas, with relatively few high-rise development and many houses encompassing their own home gardens. Cities are generally 'green' even without specific attention to urban forestry, though significant attention to provision of parks, green belts, botanical gardens and similar amenities is a feature of most Australasian cities. Indeed, using a definition of forest as "an area having minimum tree crown cover of 10 percent" many Pacific urban areas approach being forests in their own right.

(iv) *Conservation of biodiversity*

Forests are among the most important repositories of terrestrial biological diversity, offering diverse habitats for plants, animals and micro-organisms. The Pacific is recognized as an extremely significant repository of biological diversity, with five of the world's 34 Hotspots of Biological Diversity (identified by Conservation International) located in the Pacific; namely, the East Melanesian Islands, New Caledonia, New Zealand, Polynesia-Micronesia and Southwest Australia. The biodiversity hotspots are identified as areas holding especially high numbers of endemic species and being the most immediately important for conserving biodiversity.

Box 2.7: Biodiversity hotspot: East Melanesian Islands

"Once largely intact, the 1 600 East Melanesian Islands are now a hotspot, due, sadly, to accelerating levels of habitat loss, which has been caused chiefly by excessive logging, mining, and unsustainable farming practices. The region is one of the most geographically complex areas on Earth. Isolation and adaptive radiation have led to very high levels of endemism, both within the whole hotspot and on single islands. Notable endemic species include the majestic Solomons sea-eagle and more than a dozen threatened species of flying fox. The islands also harbor a diverse group of vascular plants species, including 3 000 endemics."

Source: Conservation International (2009)

All of the Pacific countries are signatories to the Convention on Biological Diversity, with the primary objectives of *conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources*. Biological diversity can be defined in terms of ecosystem variability, genetic variability and species variability.

A strong indicator of ecosystem conservation is the proportion of land area in nationally protected areas. At The World Conservation Union's Fourth World Congress on Protected Areas – held in 1992 – a goal was set to extend the network of the world's protected areas to cover at least 10 percent of each major biome by 2000. Table 2.17 shows the extent of protected areas and conservation forests in the Pacific.

It is notable that three countries- Kiribati, Tonga and New Zealand- significantly exceed the World Conservation Union threshold of having 10 percent of their land area in protected areas, while Australia exceeds the target and Papua New Guinea is on the

border of achieving the target. Furthermore, New Zealand, Samoa and Australia all report more than 10 percent of their forest areas to be primarily designated for conservation.

Table 2.17: Extent of terrestrial protected areas¹³ and forests designated for conservation¹⁴

Country	Area (‘000 ha)	Proportion of land area (%)	Conservation forest area (%)
Australia	79 013.5	11.0	15
New Zealand	7 975.5	29.5	76
Fiji	39.4	2.2	9
Papua New Guinea	4 488.2	9.7	5
Solomon Islands	22.0	0.8	22
Vanuatu	54.3	4.5	-
Samoa	10.3	3.6	17
Tonga	19.1	25.5	82
Country	Area (‘000 ha)	Proportion of land area (%)	Conservation forest area (%)
Tuvalu	0	0	0
Kiribati	39.9	55.0	2

Sources: UNEP-WCMC (2008); FAO (2010b)

Approximately 23 million hectares of **Australia’s** natural forests are in formal nature conservation reserves. This area increased by approximately 1.5 million hectares in the period 2003-2009. MPIGA (2008) notes that: *the representation of forests in Australia’s forest reserve system is substantial, with most of the broad forest types protected above the targets recommended by the World Conservation Union*. Approximately 4.6 million hectares of Australia’s natural forests are in World Heritage-listed areas.

New Zealand has a very high proportion (77 percent) of its natural forests in protected areas. In common with Australia, management of New Zealand’s national parks and reserves is of a relatively high standard on a global scale and confers a high degree of protection to the plants and animals that inhabit them. Invasive species constitute probably the greatest threat confronted by New Zealand’s national parks, with much of New Zealand’s endemic birdlife highly vulnerable to predators; for example, predation by stoats, weasels, rats and opossums of the iconic flightless kiwi and other birds. Major trapping programmes are carried out in many areas to help protect against these predators.

While **Papua New Guinea** has, to date, designated 3 million hectares of forests as protection areas, the area actually gazetted for protection amounts to only one-sixth of this amount. Scarcity of resources further hinders effective management of these areas, with NGOs supplanting the Department of Environment and Conservation as the principal management agents in many cases.

13 Nationally designated protected areas (World Conservation Union categories I to IV). Source: UNEP-WCMC (2008).

14 Percentage of total forest whose primary function is designated as conservation of biodiversity. Source: FAO (2010b).

Resource constraints are also a factor in the management of protected areas in the **Solomon Islands**, where ambitious plans developed by the Ministry of Environment, Conservation and Meteorology to achieve environmental sustainability have been scaled back. Nonetheless, the country maintains more than 40 protected areas, with management support from some NGOs.

In **Vanuatu**, the government is working collaboratively with landowners to establish conservation areas for forests and other areas of biological significance. At present, the forest conservation estate is estimated at almost 7 000 hectares, with some areas of forests protected under the Environmental Management and Conservation Act and the National Parks Act. However, most conservation areas in Vanuatu are based on informal agreements with landowners, and without legally-binding agreement between the parties. The absence of such a legal framework could be a threat to the future of these conservation areas.

Almost all of the Pacific countries have developed some form of national biodiversity strategy. For example, in the Solomon Islands, a number of laws and regulations have recently come into force to ensure that the long-term sustainability of the national protected area system is secured.

Since 1999, **Samoa** has made significant additions to its national protected area network, with two new national parks and 13 additional reserves having been established. Sesega (2009) notes that:

The total area under protection has increased from 4 734 hectares in the early 1980's to 10 796 hectares in 2007, or 6.3 percent of the remaining forested area and 3.8 percent of Samoa's total land area.

Kiribati's protected area network encompasses 55 percent of its national land area. Most of this comprises the Kiritimati (Christmas Island) Atoll wildlife sanctuary, a renowned haven for seabirds and other marine life, while in 2006, Kiribati created the Phoenix Islands Protected Area, the world's third largest marine protected area.

(v) Forests and climate change

Currently, climate change dominates a large part of the international forestry agenda and the Pacific is no exception to this ascendancy. There seems little doubt as to the truth of the statement that, "where climate change goes, forestry will follow" at least for the next several years. However, the rapid evolution of the climate change debate, and related development of associated mechanisms, rules and schemes, means most countries in the Pacific have taken a cautious approach in developing their own strategies and policies relating to forestry.

This caution is borne out in that, while all the Pacific countries have acceded to, or ratified, the Kyoto Protocol, Australia's ratification was deferred until December 2007, while Tonga acceded to the protocol in January 2008.

All Pacific countries are also parties to the United Nations Framework Convention on Climate Change (UNFCCC). Australia and New Zealand, as developed countries, are listed as Annex I Parties, while Fiji, Kiribati, Papua New Guinea, Samoa, the Solomon Islands, Tonga, Tuvalu and Vanuatu are all listed as non-Annex I parties. This differentiation also reflects the countries' current positions, policies and responses to climate change in the forestry arena.

Among the more strident advocates for measures to mitigate climate change are Tuvalu and Kiribati, both of which fear inundation of their low-lying atolls if sea levels rise. Both countries are endeavouring to provide leadership examples by developing renewable energy programmes, as are a number of other Pacific island countries, through their own initiatives as well as participation in regional initiatives such as the Pacific Renewable Energy Program (PREP) and Integrated Clean Energy for Peace and Climate (ICE-PAC).

In Australia and New Zealand, the major governmental responses to climate change currently lie in the development of national emission trading schemes. A New Zealand Emission Trading Scheme (ETS) was enacted in 2008, with forestry being the first sector to which the scheme was applied. However, after a change of government at the end of 2008, the scheme has been reviewed, with some alterations. Box 2.8 summarizes the current rules of the New Zealand ETS.

Box 2.8: The New Zealand ETS and forestry

The New Zealand ETS follows many of the Kyoto Protocol rules although it does contain additional restrictions for pre-1990 forest owners. It treats forests differently depending on when they were first established and also, if they have been on-sold. Under New Zealand's implementation of the Kyoto Protocol, forests first established before 1990 (called pre-1990 forests) are treated differently from post-1989 established 'Kyoto' forests.

Owners of pre-1990 forests will receive a carbon credit allocation of 60 New Zealand Units (NZUs) for each hectare of forest owned, if they established their forest or purchased the forest prior to 2002. If the forest was purchased since 2001, the owner will receive only 39 NZUs. If pre-1990 established forest land is deforested (i.e., harvested and converted to another land use) the owner will be liable for the total amount of carbon contained in the forest at maturity. Participation in the ETS is mandatory for pre-1990 forest owners who deforest their land.

Owners of post-1989 forest land can choose to enter the ETS. Owners who enter the scheme receive all of the credits and associated liabilities linked with this forest land: they receive New Zealand Units (NZUs) if their forests' carbon stocks increase as a result of tree growth and they must surrender NZUs if those stocks decrease (for example, due to harvesting or fire). Where owners opt not to enter the ETS, the Crown takes responsibility for changes in carbon stocks and for the associated credits and liabilities.

Source: NZMAF (2009a); NZFOA, personal communication

In other measures relating forestry to climate change, New Zealand has also implemented an Afforestation Grant Scheme, which offers grants to plant forests on land that was not forested on 31 December 1989 (the Kyoto compliance date); and a Permanent Forest Sink Initiative, which enables private forest owners to receive carbon credits in the form of Assigned Amount Units (AAUs) when they establish new permanent forests (i.e., forests that will never be harvested).

In May 2009, the advent of Australia's Carbon Pollution Reductions Scheme (CPRS) was deferred until July 2011. The proposed Australian scheme would sell licences to emit carbon. The Australian forestry industry has strongly advocated for forestry to be included in the CPRS, similar to the New Zealand scheme and the Australian

Government is still considering whether and how credits from carbon offsets offered by sectors such as forestry would be included in the scheme. The new Gillard-led Australian Government plans to seek guidance on future climate change policy development from a parliamentary committee advised by experts on climate change.

Other Australian initiatives that encourage establishment of forests as carbon sinks include the Greenhouse Challenge Plus initiative, which allows companies to offset carbon emissions through the establishment of forest sinks. Various state governments have also implemented schemes incorporating carbon sinks, such as the New South Wales Government's Greenhouse Gas Abatement Scheme.

The larger Pacific island countries – Fiji, Papua New Guinea, the Solomon Islands, Vanuatu, Tonga and Samoa – are generally moving steadily, but cautiously, ahead in their approaches to forestry and climate change. Certainly, the countries are alive to the potential benefits to their countries from the global carbon trade and specific initiatives such as Reducing Emissions from Deforestation and Forest Degradation (REDD). However, while such schemes are still in embryonic form, the countries are generally approaching these with caution. A regional *Pacific Island Framework for Action on Climate Change 2006-2015* (PIFACC) was approved by Pacific island leaders in 2005 to promote coherence and coordinated regional approaches in supporting Pacific island countries and territories; to provide an 'entry point' to areas where support is needed; to mobilize resources; and to provide an advocacy framework.

Perhaps the most proactive country has been Papua New Guinea, which has championed the perspective of developing forestry countries through the Coalition of Rainforest Nations. The Coalition aims to have emissions' offsets related to deforestation (in addition to afforestation and reforestation) incorporated into global carbon emissions' markets. The Papua New Guinea Government has also progressed work to develop a carbon trading policy incorporating forestry, designation of potential Clean Development Mechanism (CDM) project areas in provincial and national Forest Plans, and has established a Climate Change and Environmental Sustainability Office (though as of July 2009 its activities have been suspended pending investigation of irregularities in the premature issue of unverified carbon credits). Papua New Guinea, with its large reserves of tropical forests is taking a very close and active interest in the development of REDD mechanisms – and is one of nine initial pilot countries being assisted by the United Nations REDD programme to prepare and implement national REDD strategies and mechanisms.

Fiji, Vanuatu and Tonga are the focus of a GTZ-SPC project on *Adaptation on Climate Change in the Pacific Island Region*. The project is aligned with the PIFACC 2006-2015.

Vanuatu has established a Vanuatu Carbon Credits Project (VCCP), the activities of which include: commencing development of a national forest carbon monitoring system under a project funded by the United Kingdom; establishment of a Vanuatu Designated National Authority (DNA) – the office that will approve carbon credit projects; and starting fundraising and prioritization and development of detailed plans including a Vanuatu REDD Readiness Plan Idea Note (R-PIN) for World Bank REDD support.

Meanwhile, Tuvalu has set a goal of shifting to 100 percent renewable energy by 2020 as a means of promoting its concerns about global warming and associated sea-level rise (Box 2.9).

Box 2.9: Tuvalu targets renewable energy

"The Pacific island state of Tuvalu set a goal in August 2009 of a 100 percent shift to renewable energy by 2020, hoping to set an example to industrialized nations to cut greenhouse gases it blames for rising sea levels.

Tuvalu estimates it would cost just over US\$20 million to generate all electricity for its 12,000 people from solar and wind power and end dependence on diesel.

"We look forward to the day when our nation offers an example to all -- powered entirely by natural resources such as the sun and the wind," Kausea Natano, minister for public utilities and industries, said in setting the 2020 target. Natano said that Tuvalu's own efforts to curb the islanders' tiny greenhouse gas emissions "will strengthen our voice" in the negotiations.

Tuvalu says that "king tides" whipped up by more powerful cyclones are already bringing salt water onto crops."

Source: Reuters, August 2009

2.7. Policy and institutional framework

Recently, the development of forest policies and forest legislation in the Pacific has generally centred on the needs and requirements for sustainable forest management and for forests to contribute to national development. Institutions have also evolved in directions that support this emphasis. There is generally a high degree of commonality in the broad objectives of forest policies and legislation in the region, particularly in the policies of similar countries, although specific national concerns dictate the specific policy emphasis in individual countries. Often extra-sectoral legislation and policies – and even institutions – may have a greater impact on forests and forestry than those that are sector-specific.

Table 2.18 summarizes the principal legislation, policies, institutions – and lists some of the important other instruments used to regulate forestry – in Pacific countries.

(i) Forest policies

Forest policy development in the Pacific subregion is largely directed at an overarching objective of sustainable forest management, but also specifically focuses on topical concerns including: conservation; improved rural livelihoods; deforestation and forest degradation; plantation development; industrial development; allocation of forests for harvesting; harvesting practices, including illegal logging; tourism; watershed management; land-use planning; climate change and people's participation; and self-determination for resource owners, especially indigenous groups. National forest policies also include aspects that relate less directly to 'physical' forestry, such as public awareness-raising, education and training, institutional strengthening, research and development and meeting international obligations.

Most countries have an overarching national forestry policy – exceptions are New Zealand, Kiribati and Tuvalu, while Tonga is presently finalizing its first-ever national forest policy; these are normally supported by various formal and informal policies

relating to specific thematic or regional dimensions of forestry. For example, PNGFA (2009) notes that in Papua New Guinea, subsidiary forestry policy development includes carbon policy, downstream processing policy, reforestation policy and ecoforestry policy.

Overall, the broad trend in development of Pacific forest policies – over a very considerable period – has been towards a broadening of the dimensions of forests and forestry, far beyond timber harvesting. Box 2.10 describes the key dimensions of the vision associated with the development of a new forest policy for Fiji (released in 1997). In general, this vision is representative of ‘state-of-the art’ forest policy development for most Pacific island countries.

Box 2.10: New Fiji Forest Policy 2007

The Fijian government approved a new national forest policy in 2007. The policy outlined a vision for the future of forest sector comprising:

- *a permanent forest cover, including a protected forest area network, that provides the full range of ecological, economic and social functions at the local, national and global level;*
- *forest management practices that provide high value goods and services by effective planning and utilization techniques, while soil erosion and siltation in vulnerable watersheds are substantially reduced, ensuring balanced water supply, pollution avoided and valuable biodiversity preserved;*
- *a thriving forest industry that provides stable employment and contributes significantly to national economic development by value-added processing and export of quality products;*
- *greatly improved rural livelihoods by substantial involvement of resource owners and communities in sustainable management of their forest land and in forest-based industries; and*
- *an institutional framework that monitors and ensures the implementation of sustainable forest resources management and encourages investment in sustainable forest management and forest industries, with a forest administration that combines with this role as leading agency and delivers high quality services that correspond to the needs of the clients.”*

Source: Fiji Forest Policy Statement 2007

Table 2.18: Principal legislation, policies, institutions and other instruments in Pacific countries

Country	Principal legislation	National forest policy	Other instruments	Key govt. institutions
Australia	<ul style="list-style-type: none"> Environment Protection and Biodiversity Conservation Act (1999) State forestry legislation 	<ul style="list-style-type: none"> National Forest Policy Statement (1992) 	<ul style="list-style-type: none"> Regional Forest Agreements Plantations for Australia: the 2020 Vision National Indigenous Forestry Strategy Australian Forestry Standard 	<ul style="list-style-type: none"> Department of Agriculture, Fisheries and Forestry (DAFF) State forestry agencies
New Zealand	<ul style="list-style-type: none"> Forests Act (1949) Resource Management Act (1991) 	No comprehensive national forest policy.	<ul style="list-style-type: none"> Biosecurity strategy Biodiversity Strategy Forest Industry Development Agenda Sustainable Land Management Programme 	<ul style="list-style-type: none"> Ministry of Agriculture and Forestry (MAF) Department of Conservation (DoC)
Fiji	<ul style="list-style-type: none"> Forest Decree (1992) Environment Management Act (2005) 	<ul style="list-style-type: none"> Fiji Forest Policy (2007) 	<ul style="list-style-type: none"> Forest Management Standard Fiji National Logging Code of Practice (1990) 	<ul style="list-style-type: none"> Forestry Department, Ministry of Primary Industries (MPI) Department of Environment (DoE)
Papua New Guinea	<ul style="list-style-type: none"> Forestry Act (1991) Forestry Regulations (1998) Environmental Planning Act (1978) 	<ul style="list-style-type: none"> National Forest Policy (1990) National Forest Plan (1996) 	<ul style="list-style-type: none"> National Forests and Conservation Action Plan (1989) National Biodiversity Strategy and Action Plan PNG Logging Code of Practice 	<ul style="list-style-type: none"> Papua New Guinea Forestry Authority (PNGFA)

Country	Principal legislation	National forest policy	Other instruments	Key gov. institutions
Solomon Islands	<ul style="list-style-type: none"> • Forest Resources and Timber Utilization Act (1969) • Environmental Act (1998) • (Forestry Bill (2004)) 	<ul style="list-style-type: none"> • National Forest Policy (1994) 	<ul style="list-style-type: none"> • National Environment Strategy (1991) • National Code of Practice for Timber Harvesting 	<ul style="list-style-type: none"> • Ministry of Forests, Environment and Conservation (MoFEC)
Vanuatu	<ul style="list-style-type: none"> • Forestry Act (1982) 	<ul style="list-style-type: none"> • National Forest Policy (1998) 	<ul style="list-style-type: none"> • Code of Logging Practice 	<ul style="list-style-type: none"> • Department of Forests, Ministry of Agriculture, Forestry and Fisheries (MAFF)
Samoa	<ul style="list-style-type: none"> • Forests Act (1967) • Forest Regulations (1969) • Watershed Protection and Management Regulations (1992) • Forest Resource Management Bill (in prep.) 	<ul style="list-style-type: none"> • National Forest Policy (1995) 	<ul style="list-style-type: none"> • Village Fono Act (1990) • Village Conservation Agreements 	<ul style="list-style-type: none"> • Ministry of Natural Resources and Environment (MoNRE)
Tonga	<ul style="list-style-type: none"> • Forest Act (1961) 	<ul style="list-style-type: none"> • National Forestry Policy for Tonga (in preparation). 	<ul style="list-style-type: none"> • National Environmental Management Strategy (1992) • Ministry of Agriculture, Food, Forests and Fisheries (MAFFF) Forestry Plan 	<ul style="list-style-type: none"> • Forestry Department, MAFFF
Tuvalu	<ul style="list-style-type: none"> • No forestry-specific legislation 	<ul style="list-style-type: none"> • No comprehensive national forest policy. 	<ul style="list-style-type: none"> • Kakeega o Tuvalu, (National Development Plans) • National Environment Management Strategy 	<ul style="list-style-type: none"> • Forestry Division, Ministry of Natural Resources and Environment (MoNRE)
Kiribati	<ul style="list-style-type: none"> • Local Government Act 1984 	<ul style="list-style-type: none"> • No comprehensive national forest policy. 	<ul style="list-style-type: none"> • National Development Plans National Biodiversity Strategy and Action Plan 	<ul style="list-style-type: none"> • Ministry of Environment, Lands and Agricultural Development (MELAD)

Given the proportionately large volumes of logs and chips exported from Pacific countries, the development of downstream wood-processing facilities has been a significant policy focus in most countries, though with mixed results. Various countries have experimented with log export restrictions: Fiji and Vanuatu have had long-running bans in place; but in other countries pressures to earn revenue have usually meant these restrictions have been short-lived. Creation of enabling environments for investment has been the focus in Australia and New Zealand and, to a lesser extent, other countries.

Plantation substitution for natural forests has been a strong policy theme, one that helps to characterize the subregion, with the 'New Zealand model' (and technical support) probably a significant influence in most countries.

More recently, engagement of indigenous communities, stakeholders and landowners is also a characterizing policy theme in most countries. In the Melanesian countries, where the indigenous people own most of the forests, there have been efforts to more actively engage these people in decision-making, rather than merely signing up their forests for logging concessions. In Australia and New Zealand, ownership and management rights to significant tracts of forests have been acquired by indigenous groups; often in settlement of historical land confiscations.

(ii) Legislation

Forestry legislation in most Pacific countries is generally governed by one core 'Forests Act', backed by a range of other forestry-specific legislation (including Forestry Regulations) often legislating for a single specific purpose. Most countries also have a range of more general legislation that strongly encompasses forestry, including environmental laws, laws governing national parks and reserves, and legislation relating to land and resource management.

In most countries, the basic forestry legislation is long established and subject to occasional amendment. In several countries, for example the Solomon Islands, efforts to enact new legislation to replace the core existing legislation have proven controversial and difficult, even though much of the original act might be obsolete.

Usually, the legislation establishes the institutional and administrative system for forests and outlines a range of provisions on the management of forests.

(iii) Other regulatory and policy instruments

A wide variety of other regulatory and policy instruments is utilized in the Pacific to achieve specific forestry outcomes.

Table 2.18 shows that, in the Melanesian countries, the adoption of voluntary codes of practice to regulate timber harvesting is widespread, though the extent to which loggers implement and comply with the codes is less certain. For example, Pauku (2009) notes that in the Solomon Islands:

There remains significant doubt over the effectiveness of the Code, and the Government's capacity to enforce logging regulations.

Significant efforts are being made to strengthen many aspects of these codes of practice, including strengthening monitoring and evaluation systems.

In most countries, various specific strategies have been devised to address particular forestry challenges. Many of these are umbrella environmental strategies; others listed

in Table 2.18 include strategies dealing with biodiversity, conservation, biosecurity, plantation development, indigenous forestry, and industrial development. Most of the developing countries in the subregion also have (or have had) a variety of donor-funded projects and technical assistance programmes addressing a wide variety of issues, but many relating to improving harvesting practices in particular. In the smaller countries, agroforestry development is a major emphasis of special programmes.

In Australia, the development of Regional Forest Agreements (RFAs) between the federal government and state governments has been an integral feature of Australian forest policy during the past 15 years. Box 2.11 outlines the RFA approach.

Box 2.11: Regional Forest Agreements in Australia

“A key element of the approach adopted in the 1992 National Forest Policy Statement involved the negotiation of regional forest agreements (RFAs) between the Australian and certain state governments. RFAs are 20-year plans for the conservation and sustainable management of certain areas of Australia’s native forests; they are designed to provide certainty for forest-based industries, forest dependent communities and conservation. They use a science-based methodology to determine forest allocation for different uses and forest management strategies and are the result of substantial scientific study, consultation and negotiation covering a diverse range of interests. Ten RFAs have been negotiated bilaterally between the Australian Government and four of the six state governments.”

Source: MPIGA (2008)

(iv) Institutions

Public sector forestry institutions

Compared to many other regions of the world, government ownership of forests is relatively modest. In most of the island countries, the vast majority of forests are owned by local communities. In New Zealand, the government owns most of the natural forest conservation estate, while the production planted forests are largely in the hands of the private sector. In Australia, ownership is mixed between the various states and the private sector. Thus, in general, government forestry institutions tend to have less ‘hands-on’ roles in, especially, production forestry, than in other Asia-Pacific subregions. In New Zealand, Australia and Fiji, a trend has been for governments to move away from direct involvement in production forestry, with some forest assets being privatized or corporatized. In the Solomon Islands, most government-owned plantations have been sold to the private sector, while in Samoa, some areas of plantation have been handed back to the customary leaseholders. At present, the Fijian Government is in the process of handing over ownership of the mahogany plantations managed by Fiji Hardwoods Corporation to the owners of the land on which the plantations are growing. In most of the Melanesian countries, however, the government retains responsibility for brokering the issuance of logging concessions in community-owned forests to private sector companies (e.g., the Native Lands Trust Board in Fiji).

Generally, government forestry agencies also hold most of the responsibility for management of conservation areas, with other major roles focusing on regulatory functions including policy development, forest health and biosecurity.

Private sector

The private sector in Australia and New Zealand owns and/or manages a large proportion of the production forest estate. This role has been significantly enhanced by the privatization processes of the past 25 years. In the Melanesian countries, some plantation forests are in the hands of private sector corporations.

In all countries, the private sector has the dominant role in logging and wood processing, with very few government-owned wood-processing facilities (and in some countries none). In the island countries, however, the timber industries are generally small, fragmented and lacking in international competitiveness; consequently, log and chip exporting dominate the export industries.

In Papua New Guinea and the Solomon Islands, particularly, overseas companies play a significant and sometimes controversial role in the logging industry. For example, PNGFA (2009) notes:

There are about 25 or so foreign-owned logging companies operating in PNG, with the majority of these largely from Malaysia. Most of these companies are connected in the sense that they are owned by one large conglomerate, but operating under different company names. One particular company controls close to 45 percent of all logging and log export operations in the country, and is one of the five companies who together control over 80 percent of the log export market.

Indigenous people and local communities

In the Pacific island countries, indigenous people dominate the ownership of forests. For many of these communities, logging the forests offers the most viable means of upgrading living standards and community development. Hence, there is considerable willingness in many (mainly in Melanesia) communities to have forests designated for logging concessions. The 1996 comments of Dolman on Papua New Guinea (in Brown 1997), still hold resonance:

While donors, development agencies, the concerned public, and environmental groups continue to rejoice at all the checks and balances, most Papua New Guineans are livid. They see forests as their window for leaving the stone age and moving into education, health clinics and the shop window. They know that timber is now worth real money and do not appreciate being told to keep their hands in their pockets.

In New Zealand and Australia, some indigenous groups have assumed control of significant tracts of forests. Box 2.12 describes briefly the economic forestry aspects of the New Zealand Government's settlement with the Central North Island Iwi (tribes), based on the findings of the Waitangi Tribunal, which hears land grievances in New Zealand.

Box 2.12: Central North Island iwi settlement

In July 2009, a group of indigenous Maori tribes in New Zealand gained ownership of the world's largest plantation forest land assets as part of a Treaty of Waitangi settlement with the government.

Under the terms of the Central North Island Forests Land Collective Settlement Act 2008, assets totaling approximately NZ\$450 million – including 176 000 hectares of forest lands and NZ\$280 million in cash – were transferred to eight iwi based in the Central North Island. This is, to date, the largest single settlement of historical treaty grievances by the Crown.

The iwi that make up the Central North Island Iwi Collective are: Ngai Tuhoe, Ngati Rangitahi, Ngati Whare, Ngati Tuwharetoa, Ngati Manawa, Ngati Whakaue, and Raukawa and Te Pumautanga o Te Arawa. Together these iwi have more than 110 000 members.

The Collective will own the lands on which the plantation forests have been established (the lands were previously owned by the Crown), but the trees growing on the land remain under ownership of the holders of Crown Forest Licenses (mainly private sector entities), which make land lease payments to the new owners. The licences provide for use of the land for forestry purposes and are valid for up to 35 years following the transfer of the underlying land to iwi in settlements.

Source: Southem™

Civil society organizations

Civil society groups, including national and international NGOs, continue to play a key role in influencing Pacific forest agendas. The focus of NGO activities in forestry in the region tends to be on issues relating to increased and improved forest conservation and indigenous people's rights and development, although other issues such as genetic engineering also garner attention.

A general trend in NGO activity in forests in the Pacific has been the shift away from confrontational protests and towards working with landowners to develop community-based natural resource management and landowner forestry enterprises. For example, a variety of NGOs are running forestry projects in the Solomon Islands including the Solomon Islands Development Trust, Greenpeace, Isabel Sustainable Forest Management Trust, Solomon Western Islands Fair Trade (SWIFT) and SOLTRUST.

