

Commonwealth Forests

An overview of the
Commonwealth's forest
resources



COMMONWEALTH FORESTRY ASSOCIATION
2007

CONTENTS

FOREWORD	i
INTRODUCTION	ii
ACKNOWLEDGEMENTS	iii
GLOSSARY	iv
ACRONYMS AND ABBREVIATIONS	vi
CHAPTERS	
1. The forest resource - <i>Jim Ball</i>	1
2. Sustainable forest management and protection - <i>Jim Ball</i>	13
3. Benefits from the forest - <i>Gary Bull and Steven Northway</i>	28
4. Forest policy, law and administration - <i>Jim Ball</i>	37
5. Training at professional and technical levels - <i>John Innes and David Ward</i>	42
6. Forest research and the Commonwealth - <i>Peter Wood</i>	54
7. The Commonwealth in the international forestry dialogue - <i>Jim Ball</i>	66
8. Challenges and opportunities in Commonwealth forestry - <i>Jim Ball</i>	75
ANNEXES	
1. Commonwealth countries, land area and population	78
2. The forest resource	
2.1 Area of forest and other wooded land	80
2.2 Characteristics of forest and other wooded land	83
2.3 Change in extent of forest, 1990-2000, 2000-2005	86
2.4 Change in extent of primary forest 1990-2005	88
2.5 Designated functions of forest - primary function 2005	89
2.6 Forest plantations 2005	90
2.7 Percentage of forest by ecological zone	92
2.8 National importance of forest ecological zones	94
2.9 Forest ownership 2005	95
3. Management and conservation tables	
3.1 Management of the Production Tropical Permanent Forest Estate	97
3.2 Management of the Protection Tropical Permanent Forest Estate	97

3.3	Commonwealth member countries of international processes on Criteria and Indicators for Sustainable Forest Management	98
3.4	Commonwealth countries with forests under certification schemes	98
3.5	IUCN protected area categories	99
4.	Wood production and services	
4.1	Industrial roundwood	100
4.2	Wood fuel	102
4.3	Employment	104
5.	Commonwealth forestry associations and forestry journals	
5.1	Professional forestry associations in the Commonwealth	105
5.2	Commonwealth forestry Journals	107
6.	International forestry agreements, conventions and regulations	
6.1	International forestry-related agreements and conventions	113
6.2	Tree species subject to CITES regulations	117
7.	Country information	118

FOREWORD

Commonwealth people are today all much more conscious of the impacts that can result from an uncaring approach to the global environment. Climate change, which 20 years ago Commonwealth governments agreed to address and prevent, is now adversely affecting people everywhere. Sea-level rise, droughts, floods, and shifting seasonal patterns threaten traditional ways of life across the Commonwealth. We know that forests are vital in overcoming these challenges, not only through their ability to store carbon, but also in managing water flows and providing a sustainable source of fuel, food, building materials and fibre. And yet we are continuing to destroy our forests.

Commonwealth Forests is a wonderful new resource, but with a hard-hitting message. It reminds us in an objective and concise way that we are not learning the lessons of the past fast enough. Deforestation across the Commonwealth between 2000 and 2005 continued at a rate of more than 25,000 square kilometres per year, more than one third of the world total of 73,000 square kilometres. This represents a loss of 0.31% of the forest estate every year, compared to the world average of 0.18%.

The biggest losers are in Africa (1.08% overall forest loss per year) where Nigeria (3.3% per year), Uganda (2.2%) and Ghana (2.0%), all countries with a proud history in Commonwealth forestry, seem intent on converting their natural heritage and adding to the global burden of greenhouse gas emissions at a time when forests are ever more vital to their people and to the world climate. In Asia, Pakistan (2.1%) and Sri Lanka (1.5%) are apparently not far behind. These trends need to be reversed, and they can be. In India, New Zealand and UK the forest estate appears to be steadily increasing in size.

Another disturbing trend revealed by this book is the decline in opportunities to train the foresters of the future. Just when we need them most, forestry schools across the Commonwealth are being closed down and amalgamated with other disciplines. This trend has to be reversed if the professionals we need to conserve and rebuild our forests are to be available in years to come.

Our failure to value forests properly, and to build those values into national accounts and budgets, is largely to blame for the continuing undervaluation and overexploitation of the forest resource. Countries like Papua New Guinea are setting the pace in calling for the value of standing forests to be taken into account, both nationally and as part of a global resource. Meanwhile Guyana is breaking new ground in sustainable, community-led forest management in the Iwokrama rain forest.

Commonwealth nations must stand together and work together to reverse the decline in world forests. *Commonwealth Forests* provides the baseline material for a plan of action that has eluded us for far too long.



Dr Mark Collins
Director, Commonwealth Foundation, London.

INTRODUCTION

This study of forests and forestry in the Commonwealth arose from an idea developed by the Commonwealth Foundation and the Commonwealth Forestry Association. *Commonwealth Forests* aims to quantify and describe the present state of forestry in Commonwealth countries, and by identifying common challenges and opportunities to promote contacts and collaboration among foresters throughout the Commonwealth.

The Commonwealth is a voluntary association of 53 independent countries, whose 1.8 billion people make up around 30 per cent of the world's population. The countries of the Commonwealth, spread across six continents, include some of the world's largest – both in terms of area and in terms of population - and some of the smallest. Three of its countries are among the most heavily forested in the world, and Commonwealth countries have historically been among the global pioneers of scientific and sustainable forestry. Developments in the policies and practices that govern the forestry sector of the countries of the Commonwealth not only reflect what is happening in the rest of the world but also often forecast future trends.

The Commonwealth Forestry Association (CFA) is the world's longest established international forestry organization, tracing its history back to 1921. Today it unites foresters, scientists, students, NGOs and policy makers throughout the Commonwealth and beyond in a unique international network that provides professional support to its members and forms a key element of civil society.

Commonwealth Forests has developed the concept of the former *Commonwealth Forestry Handbook* in providing not only facts and figures and useful contacts and references, but also an analysis of the sector and identification of the main challenges facing the forestry services of the countries of the Commonwealth. It is organized in three parts: the text, in eight chapters, the data, in annexes, and the country information.

Commonwealth Forests is a collaborative effort of foresters of many nations, who are recognised in the Acknowledgements. Unfortunately it cannot cover all aspects of forestry and not all readers will agree with those that have been included. Inevitably some of the information will be out of date by the time it is printed. We hope that readers will provide feedback to improve the balance and to update the information; we plan that the country information at least will shortly be put on the CFA website, and later perhaps the whole text.

Commonwealth Forestry Association

The Crib
Dinchope
Craven Arms
Shropshire SY7 9JJ
England

Email: cfa@cfa-international.org
Phone: +44 (0)1588 672868
Fax: +44 (0) 870 0116645

ACKNOWLEDGEMENTS

The publication of this book was generously funded by the Commonwealth Foundation.

The Forestry Department of the Food and Agriculture Organization (FAO), whose data are extensively quoted, kindly made facilities available for the principal author who also greatly benefited from discussions with several FAO staff, notably Gillian Allard, Jim Carle, Doug Kneeland, Mette Løyche-Wilkie and Adrian Whiteman.

A special debt is owed to those who contributed time and experience to writing *Commonwealth Forests*:

- Chapter 3 (Benefits from the Forest) was prepared by Professor Gary Bull and Steven Northway, University of British Columbia;
- Chapter 5 (Education) was prepared by Professor John Innes, University of British Columbia, and David Ward; and
- Chapter 6 (Research) was prepared by Peter Wood O.B.E.

The remainder of the text was written by Jim Ball.

The web searches for the Country Information were carried out by Bev Moore (the Americas), Charles Recha and Sheila Mbiru (Eastern Africa), Diek van der Zel (Southern Africa), Victor Kawanga (Central Africa), Julius Adewopo (West Africa), Luke McWhirter (Australasia and Pacific Islands).

Several experienced foresters kindly reviewed and commented on the first draft of the chapters. They included Dr Ben Chikamai, Prof. Ian Ferguson, Dr Jag Maini, Alan Pottinger, Jim Richardson, Prof. Jeff Sayer, R.V. Singh, Prof. Gombya Ssembajjwe, and Dr Lee Su See. Deficiencies in the text remain, however, the responsibility of the principal author.

GLOSSARY

Forest

The definition is that used in FAO's Global Forest Resources Assessment 2005.

Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use.

The definition adds the following explanatory notes:

1. *Forest is determined both by the presence of trees and the absence of other predominant land uses. The trees should be able to reach a minimum height of 5 meters in situ. Areas under reforestation that have not yet reached but are expected to reach a canopy cover of 10 percent and a tree height of 5 m are included, as are temporarily unstocked areas, resulting from human intervention or natural causes, which are expected to regenerate.*
2. *Includes areas with bamboo and palms provided that height and canopy cover criteria are met.*
3. *Includes forest roads, firebreaks and other small open areas; forest in national parks, nature reserves and other protected areas such as those of specific scientific, historical, cultural or spiritual interest.*
4. *Includes windbreaks, shelterbelts and corridors of trees with an area of more than 0.5 ha and width of more than 20 m.*
5. *Includes plantations primarily used for forestry or protection purposes, such as rubber-wood plantations and cork oak stands.*
6. *Excludes tree stands in agricultural production systems, for example in fruit plantations and agroforestry systems. The term also excludes trees in urban parks and gardens.*

Other wooded land

Land not classified as forest, spanning more than 0.5 ha; with trees higher than 5 m and a canopy cover of 5-10 per cent, or trees able to reach these thresholds in situ; or with a combined cover of shrubs, bushes and trees above ten per cent. It does not include land that is predominantly under agricultural or urban land use. (FAO, FRA2005)

Plantations

Forest or other wooded land of introduced species and in some cases native species, established through planting or seeding.. May included areas of native species characterized by few species, straight tree lines and/or even-aged stands. (FAO, FRA2005)

Semi-natural forest

Forest or other wooded land of native species, established through planting, seeding or assisted natural

regeneration (FAO, FRA2005). Areas established by planting are described as Planted Semi-natural Forest.

Planted forests

The concept of planted forests combines the areas of Plantations and of Planted Semi-natural Forest, the justification being that planted semi-natural forest has more in common with plantations than with semi-natural forest regenerated by seeding or natural regeneration, in terms not only of regeneration method but also planting stock, tending and management techniques.

ACRONYMS AND ABBREVIATIONS

(the acronyms and abbreviations below have only been included where they occur at more than one place in the text or country information)

C&I	Criteria and Indicators
CBD	Convention on Biological Diversity
CFA	Commonwealth Forestry Association
CHOGM	Commonwealth Heads of Government Meeting
CIFOR	Center for International Forestry Research
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMW	Commonwealth
COFO	(FAO) Committee on Forestry
EU	European Union
FAO	Food and Agriculture Organization (of the United Nations)
FLR	Forest Landscape Restoration
FMU	Forest management unit
FSC	Forest Stewardship Council
FRA	(FAO) Global Forest Resources Assessment
ICRAF	World Agroforestry Center
IFF	Intergovernmental Forum on Forests
IMFN	International Model Forest Network
IPF	Intergovernmental Panel on Forests
IPCC	Intergovernmental Panel on climate Change
ITTO	International Tropical Timber Organization
IUCN	World Conservation Union (International Union for the Conservation of Nature and Natural Resources)
IUFRO	International Union of Forestry Research Organisations
JFM	Joint Forest Management
LFCC	Low forest cover countries
MCPFE	Ministerial Conference on the Protection of Forests in Europe
NGO	Non Governmental Organization
NWFP	Non-wood forest product
OWL	Other wooded land (see definition above)
PFE	Permanent forest estate
PFM	Participatory Forest Management
RIL	Reduced Impact Logging
SIDS	Small island developing states
SFM	Sustainable forest management
UNCCD	United Nations Convention to Combat Desertification
UNCED	United Nations Conference on Environment and Development
UNEP	United Nations Environmental Programme
UNFCC	United Nations Framework Convention on Climate Change
UNFF	United Nations Forum on Forests
WUI	Wildland urban interface
WWF	Worldwide Fund for Nature

Chapter 1

The Forest Resource

Jim Ball Chair, Commonwealth Forestry Association

EXTENT OF THE FOREST RESOURCE

Forests in Commonwealth countries cover over 800 M ha, or just over one fifth of the world's forest area (see Annex 2.1 for details). This figure, which refers to forests with a canopy cover of more than 10 per cent and an area of more than 0.5 ha¹, includes all types of forest from primary, undisturbed forest, through natural and semi-natural forests which have been modified by human activity, to plantations.

Three Commonwealth countries, Canada (310 M ha), Australia (163.7 M ha) and India (67.7 M ha) are among the world's ten countries with the largest extent of national forest estate. Other Commonwealth countries with more than 20 M ha of forest include Cameroon (21.2 M ha), Tanzania (35.3 M ha), Zambia (42.5 M ha) in Africa, and Malaysia (20.9 M ha), and Papua New Guinea (29.4 M ha) in South-east Asia.

The importance of forests to a country may not, however, be measured only in terms of area. A different picture emerges when considering the proportion of the land area covered by forest: Guyana has 77% of the land area under forest, followed by Belize (73%), Malaysia (64%), Dominica (61%) and Zambia (57%). A third way of looking at the potential contribution of forests to the country's environment, economy and culture is to consider the area of forest per head: Guyana has 19.6 ha of forest/head of population, Canada has 9.7 ha/head, Australia 8.1 ha/head, Botswana 6.9 ha/head, Belize 5.8 ha/head and Papua New Guinea 5.2 ha/head. But measuring the adequacy of the forest estate has less to do with those

TABLE 1.1 Area of forests in the Commonwealth 2005

Region	Forest			OWL*
	1,000 ha	% land area	ha forest/head	1,000 ha
Africa	178,036	23.4	0.5	170,676
Americas				
- Caribbean	1,175	39.8	0.2	332
- Other	326,891	34.6	9.9	95,646
Total Americas	328,066	34.6	8.6	95,978
S Asia	72,408	19.0	0.1	6,168
SE Asia & Pacific	226,388	25.7	3.7	7,690
Europe	3,019	12.0	0.0	234
Total Commonwealth	807,917	26.8	0.4	280,746
Total World	3,952,025	30.3	0.6	1,375,829

* Other Wooded Land
Source: FAO 2006(a)

¹ The full definition is in the Glossary.

countries that have a large forest area, a large proportion of the land's surface under forest, or a high figure for forest area per head. Rather, it is the many Commonwealth countries with less than 10% of the land area under forest, and/or less than 0.1 ha of forest per head, which need to consider how they can meet demand for forest goods and services; the special situations of forests in Low Forest Cover Countries, Small Island Developing States and on Mountains are reviewed in the box (below).

Trees are also found outside forests. Information on Other Wooded Land (OWL), defined as land not classified as forest, covering more than 0.5 ha, with trees more than 5 m high and a canopy cover of

BOX 1.1 *Forests in Low Forest Cover Countries (LFCC), Small Island Developing States (SIDS) and on mountains*

Forests in these three special situations have several features in common: firstly the local people are highly reliant on them for products and environmental benefits; secondly other people who live beyond the immediate environs of the forests benefit from them; thirdly the forests themselves are subject to the hazards of extreme climatic conditions; and fourthly they often represent genetic resources or natural ecosystems that are not found elsewhere. Countries in all situations realise the need for afforestation to ameliorate their conditions.

Low Forest Cover Countries (LFCC) have been defined by FAO as those countries with less than 10 per cent of their land under forest. According to this definition there are 55 LFCC countries reported in FRA2005 (FAO 2006a), of which twelve are Commonwealth countries: four in Africa, one in the Caribbean, three in South Asia, three in South-east Asia and the Pacific, and one in Europe. Details are in Annex 2.1. A meeting of LFCC in 1999 in Iran accepted FAO's definition, established the Tehran Process, identified the potential roles of NGOs, the private sector, research and training institutions and the rural poor, and called for increased investment.

Rural people in these countries, especially the poorest, are highly dependent on the forest for products such as fuelwood and non-wood forest products such as fodder. Low rainfall is common to LFCC countries, often combined with high population, and the environment therefore tends to be highly degraded. Periodic droughts may affect not only the local people but the forest on which they depend, while urban populations, often far from the forest, may also source fuelwood or charcoal from the forest.

There is no internationally accepted definition of a small island developing state. They were, however, given an international political identity with the establishment in 1991 of the Alliance of Small Island States (AOSIS). Although commonly called Small Island Developing States (SIDS), some are not small, others are not islands and a few are not developing economies. Twenty-seven of the 39 AOSIS countries are members of the Commonwealth, mostly in the Pacific or the Caribbean – see Annex 2.1.

Trees are important in SIDS for the provision of products, coastal protection and in support of tourism. Most Commonwealth SIDS are quite well forested; only two are LFCC (Maldives and Nauru). But forests on island SIDS are especially vulnerable to damage and destruction by hurricanes and typhoons, or tidal surges. Climate change threatens unique island tree species and ecosystems, which may have developed in isolation; some endemic species are being conserved *ex situ*. All Commonwealth SIDS import oil as a fuel, which accounts for a high proportion of earnings; alternative and affordable renewable energy sources, such as wood, are required to reduce vulnerability to price rises. Isolation from markets also limits their commercial opportunities.

Mountain forests, found in many Commonwealth countries in Africa (Kenya, Tanzania, Uganda, Cameroon), the Americas (Canada), South Asia (India, Pakistan, Sri Lanka), SE Asia (Malaysia, New Zealand) and Europe (UK), maintain water supplies and quality, reduce erosion and protect against landslides. They may have greater biological diversity and endemism than lowland forests but are likely also to be more sensitive to changes in climate. They provide essential water to both mountain people and to those living downstream while the local people rely on the forests for fuel, grazing and NWFP and outsiders appreciate the scenic beauty and recreational facilities. Mountain forests are often culturally important since they enshrine sacred groves or trees.

Sources:

- LFCC: FAO, 2000. FAO, 2003.
- Special issue of the *International Forestry Review* Vol. 4(4), December 2002, devoted to Forestry and Small Island Developing States
- Website of the Mountain Partnership <http://www.mountainpartnership.org/>

5-10 per cent, is not as complete or reliable as on forests, but it is likely that OWL covers around 2.8 M ha in Commonwealth countries. Such trees may be unmanaged relicts of cleared forest, or they may be systematically managed stands in agroforestry systems. The latter may serve a number of environmental and economic functions, which may be similar to forests in principle if not in extent. Trees in OWL are highly difficult to classify and inventory because they are so heterogeneous, and hence it is difficult to develop policies for their promotion. But the regional totals, especially that of Africa, show the potential contribution of this resource to forest goods and services - often especially important to rural people - and to the poor in particular, who may rely on a wide range of non-timber forest products obtained from OWL for their domestic energy and livelihoods.

NATURAL, MODIFIED AND SEMI-NATURAL FOREST

Most forests in Commonwealth countries have been more or less modified by human activities. Thus Annex 2.2, summarised in Table 1.2, shows that Modified Natural Forest constitutes approximately two thirds of the total.

At first glance it might seem encouraging that 28 per cent of the total forest area is primary forest, but most of that lies in Canada (165,400 ha). In Africa most of the primary forest was reported from Malawi and Kenya, while in SE Asia and the Pacific significant areas were reported by Papua New Guinea (25,200 ha), Australia (5,200 ha), Malaysia (3,800 ha), and New Zealand (3,500 ha).

Commonwealth forests cover a wide range of natural forest types, from montane to mangrove and from boreal to tropical moist forest. The table below illustrates the importance of the forest ecological zones recognised by FRA2000 to the countries of the Commonwealth by ranking the three most represented in each country². This has led to some omissions - the small proportions of tropical rain forest (2%), temperate oceanic and montane forest (both 4%) in Australia, do not feature, nor the 7% of tropical

TABLE 1.2 *Characteristics of Commonwealth forests*

Region	Primary and Modified Natural Forest (1000 ha)				Plantations	
	Σ Area*	Primary	Modified	Semi-natural	Production	Protection
Africa	144,843	2,518	139,510	31	2,780	4
Americas						
- Caribbean	1,143	28	1,071	0	23	6
- Other	326,891	173,350	151,540	-	-	-
Total Americas	328,066	175,378	152,611	0	23	6
S Asia	72,407	167	36,690	31,532	1,737	2,281
SE Asia & Pacific	223,769	38,944	163,883	15,526	5,385	31
Europe	3,019	22	757	311	1,902	27
Total	772,104	217,029	493,451	47,400	11,827	2,349
%		28.1	64.0	6.1	1.5	0.3

Source: FAO 2006(a)

* Totals do not agree with Table 1.1, since a few countries did not report on the characteristics of their forests to FRA2005. The difference, of 35,800 ha, is only 4% of the total, so the figures are believed to be sufficiently representative of the actual breakdown of forest characteristics.

² Two countries are missing from the Table - Bermuda and Tuvalu. Neither was included in the information of ecological zones in FRA2000.

TABLE 1.3 *National importance of forest ecological zones*

Major forest types	National proportion		
	Highest	Second	Third
Tropical rain forest	Cameroon (81%); Ghana (47%); Dominica (79%); Grenada (71%); Jamaica (84%); St Kitts&Nevis (54%); St Lucia (61%); St Vincent & the Grenadines (56%); Trinidad&Tobago (100%); Guyana (74%); Bangladesh (63%); Maldives (100%); BrueniDarussalem (100%); Fiji (100%); Kiribati (100%); Malaysia (94%); Nauru (100%); PNG (80%); Samoa (100%); Singapore (100%); Solomons (100%); Tonga (100%); Vanuatu (100%)	Sierra Leone (40%); Bahamas (29%); Belize (42%); India (13%);	Mozambique (1%); Nigeria (22%); Antigua&Barbuda (22%);
Tropical moist deciduous	Malawi (48%); Mauritius (100%); Seychelles (100%); Sierra Leone (60%); Uganda (78%); Antigua&Barbuda (43%); Bahamas (54%); Belize (58%);	Cameroon (16%); Gambia (24%); Ghana (32%); Kenya (18%); Mozambique (18%); Nigeria (36%); Tanzania (18%); Zambia (49%); Grenada (25%); Jamaica (16%); St Kitts&Nevis (45%); St Lucia (37%); St Vincent & the Grenadines (43%); Guyana (23%); Bangladesh (37%); Sri Lanka (20%);	South Africa (1%); Uganda (5%); India (11%); Sri Lanka (18%);
Tropical dry	Botswana (73%); Gambia (76%); Mozambique (81%); Namibia (53%); Nigeria (38%); South Africa (61%); Swaziland (86%); Tanzania (65%); Zambia (51%); Barbados (100%); India (56%); Sri Lanka (62%); Australia (39%);	Malawi (37%); Uganda (16%); Antigua&Barbuda (34%); Dominica (21%);	Cameroon (2%); Ghana (21%); Kenya (1%); Grenada (4%); St Kitts&Nevis (2%); St Lucia (2%); St Vincent & the Grenadines (1%); Guyana (4%); PNG (5%);
Tropical montane	Kenya (53%);	Namibia (3%); South Africa (2%); Malaysia (6%); PNG (11%);	Malawi (15%); Tanzania (3%); Bahamas (17%);

Sub-tropical humid	New Zealand (51%);	Australia (5%);
Sub-tropical dry		Australia (6%); Cyprus (100%); Malta (100%)
Sub-tropical montane	Lesotho (100%); Pakistan (31%);	Swaziland (14%);
Temperate oceanic	UK (85%);	New Zealand (34%);
Temperate continental		Canada (13%);
Temperate montane		New Zealand (16%);
Boreal coniferous	Canada (40%);	UK (10%);
Boreal tundra		Canada (24%);
Boreal montane		UK (4%);

Source: FAO FRA2000

montane forest in India, or the temperate montane forest of Canada (12%) or the UK (2%), and boreal montane forest (9%) of Canada. Nevertheless, as discussed below, it shows the forest types most important to Commonwealth countries

It is no surprise that the forest types of importance to most Commonwealth countries are tropical, and it accords with popular perception that the tropical rain forest and tropical moist deciduous forests are well represented. The box describes mangrove formations, one of the most widespread and important in the rain forest zone. But the importance of dry tropical forest types is less well appreciated. They represent the highest proportion of the forest of thirteen Commonwealth countries, including some where moist forest types might be expected to dominate - Mozambique, Nigeria, Tanzania, India and Sri Lanka, for example. Savanna woodland, and other dry formations, are of crucial importance for the livelihoods of many people, yet conservation, research and the development of management practices lag behind.

Despite the 2002 International Year of Mountains, the importance of montane forests is poorly appreciated. In common with other fragile ecosystems, montane forests are vulnerable to the very natural disasters against which they provide protection.

Temperate forests are less well represented in the Commonwealth, but Canada's boreal forests are of global importance (see Box 1.2).

DEFORESTATION - AND FOREST DEGRADATION

Deforestation refers to the loss of forest area from one period to another. It mostly occurs due to the conversion of forests to agricultural land, especially in the tropics. If the total national forest area is (erroneously) thought to be indicative of the contribution of a country's forests to its and the world's environmental, social, cultural and economic wellbeing, then the loss of forest is thought to indicate the opposite.

Globally the area of forest lost each year appears to be reducing slightly, from 0.22% yearly in the decade 1990 to 2000 to 0.18% yearly in the five years from 2000 to 2005. Some Commonwealth countries showed an increase in net forest area, notably India (362,000 ha from 1990-2000 and 29,000 ha from 2000-2005), as well as New Zealand (51,000 and 17,000 ha in the two periods), UK (18,000 and 10,000 ha), Swaziland (5,000 in each of the two periods) and Gambia (2,000 ha in each of the two periods).

But overall there has been a loss of forest in Commonwealth countries in recent years. The annual area of forest lost has grown, from 0.27% yearly in 1990-2000 to 0.31% yearly in 2000-2005, a rate of loss nearly twice as fast as the rest of the world. Commonwealth African countries appear to be losing the

BOX 1.2 *Two climatic extremes - mangroves and boreal forest*

Mangrove forests are essential for coastal protection from storms and tidal surges and provide a wide range of products. The most reliable recent estimate provided by countries in a recent FAO study showed that there are 15.7 million ha of mangroves world-wide, of which Commonwealth countries account for 6.1 million ha, or 39% of the world's total.

Region

Most reliable recent estimate ha x1000

Main countries in regions

Africa

Nigeria (50%), Mozambique, Cameroon, Tanzania, Sierra Leone 2,005

Americas

Bahamas (36%), Guyana, Honduras, Belize 399

South Asia

Bangladesh (Sunderbans) and India 1,092

South-east Asia & Pacific

Australia (56%), Malaysia, PNG 2,572

Total

6,068

The many wood products obtained from mangroves range from timber, poles and posts to firewood, charcoal and tannin, while non-wood products include thatch, honey, wildlife, fish, fodder and medicine. Unfortunately, many mangrove forests have been converted to salt pans, aquaculture ponds or agriculture.

Commonwealth countries possess a significant part of the world's mangrove forests, and they form an important resource for the livelihoods of coastal people.

Canada's **boreal forest** covers 310 million ha, or 77% of Canada's total forest area and nearly one third of this forest type in the world. The boreal coniferous forest occurs in a mainly continental climate. There are large areas of closed stands of conifers composed of white and black spruces *Picea glauca* and *P. mariana*, balsam fir *Abies balsamea*, and tamarack *Larix laricina*, but there are also deciduous species such as white birch *Betula papyrifera*, trembling aspen *Populus tremuloides* and balsam poplar *P. balsamifera*.

The boreal tundra woodland is influenced by cold arctic air and are more open. The better-drained sites support black spruce and tamarack and some white spruce, with balsam poplar, white birch and alder (*Alnus incana*) along rivers.

While there have been small losses of Canada's boreal forest in the recent past due to man's activities (agricultural clearing, hydro-electric development, oil and gas exploration etc) the greatest threat now comes from climate change. Global warming may shift the geographic range of many of the boreal forest species northwards by 300 to 500 km, replacing them with species of temperate forest. At the same time the occurrence of natural disturbances such as fire, insect and disease infestations and extreme weather events may increase.

The consequence of global warming on the boreal forest will be reduction in area, or even loss, of some of the boreal forest and the release of greenhouse gases. Carbon, presently locked in permafrost forest soils, may not be released but accumulate as organic matter in melted bogs. Methane, on the other hand, a greenhouse gas with a global warming potential more than 20 times greater than carbon dioxide, may be emitted from the bogs, compounding the accumulation of greenhouse gases.

Sources:

- Mangroves: FAO, 2003 and 2006(a)
- Boreal: FAO, 2002
- The State of Canada's Forests 2004-2005. Canadian Forest Service, Natural Resources, Canada. www.cfs.nrcan.gc.ca

TABLE 1.4 *Change in extent of Commonwealth forests, 1990-2000 and 2000-2005*

Region	Forest Area (1,000 ha)			Annual rate of change			
	1990	2000	2005	1990-2000		2000-2005	
				1000ha/ yr	%	1000ha/ yr	%
Africa	208,062	187,981	178,036	-2008	-1.01	-1989	-1.08
Americas:							
Caribbean	1,192	1,179	1,175		-0.09		-0.05
N & C	326,891	326,891	326,891				
Σ Americas	328,083	328,070	328,066	n.s.	n.s.	n.s.	n.s.
S. Asia	69,699	72,637	72,408	+294	0.41	-46	-0.05
SE Asia/Pacific	234,166	228,877	226,388	-529	-0.23	-498	-0.22
Europe	2,772	2,966	3,019	+19	0.7	11	0.35
Total Commonwealth	842,782	820,531	807,917	-2,225	-0.27	-2,522	-0.31
Total World	4,077,291	3,988,610	3,952,025	-8,868	-0.22	-7,317	-0.18
%	20.7	20.6	20.4	25.1		34.5	

Source: FAO 2006(a)

most forest every year, although the rate has slightly decreased in recent years.

Commonwealth countries with particularly high rates of forest loss yearly between 2000 and 2005 include Nigeria (-3.3%), Uganda (-2.2%) and Ghana (-2.0%). In Asia, Pakistan has lost in that period 2.1% yearly, and Sri Lanka 1.5% yearly. Details are in Annex 2.3. Forest losses have, however, been noted recently in the press of many Commonwealth countries; there have been recent adverse press reports of forest excisions, encroachments, settlements or “land grabs” in Bangladesh and Kenya, while forest degradation from illegal logging has been reported in Ghana.

Annex 2.4 shows the rate of loss of primary forest, i.e. forest of native species, in which there are no clearly visible indications of human activity and ecological processes are not significantly disturbed. Countries with no primary forest, or with no records, were omitted. The greatest absolute loss of primary forest has occurred in Papua New Guinea, where over 274 thousand ha were deforested yearly between 1990 and 2000, and a further 250 thousand ha yearly between 2000 and 2005. Nigeria lost 82 thousand ha yearly, and Malawi over 39 thousand ha yearly, in both periods. Other countries with significant losses of primary forest included Sri Lanka (6,000 ha yearly in both periods) and Kenya (over 2,000 ha yearly). Losses of primary forest appear to be continuing, but the available evidence suggests that the rate of loss has slowed.

Deforestation has important implications for climate change. Forests play an important role in the climate system since they are a major reservoir of carbon, containing some 80% of all the carbon stored in land vegetation, and about 40% of the carbon in soils. It is often assumed that global warming is being mainly caused by the burning of oil and gas. But in fact the cause of between 25 and 30 percent of the greenhouse gases released into the atmosphere each year – 1.6 billion tonnes – is deforestation (workshop of the UNFCCC with FAO in August 2006, Rome, report on <http://unfccc.int>)

But the figures on deforestation do not reflect degradation of existing forest, through successive harvesting for example, which may reduce species diversity, the range of stem sizes, and forest functions affecting protective capacity, biological diversity or carbon storage. Nor does deforestation reflect the conversion of natural forest to planted forest, since the definition refers to “the loss of forest area from one period to another”.

FOREST PLANTATIONS

A recent FAO report proposes the concept of “planted forests”(FAO, 2006c), that is combining the areas of plantations and of planted semi-natural forest formerly considered separately, since both establish similar species (often using improved seed or clonal material) and use intensive management methods. This section is, however, is based on the FRA2005 report, which did not make this distinction so it refers to plantations.

Forest plantations were originally established to provide industrial timber, mainly in those countries, such as South Africa or the United Kingdom, which had a small natural forest estate. But since the mid-1980s forest plantations have assumed greater importance as a source of wood in nearly every country, whatever their forest cover – thus often taking pressure off the natural forest – and for the provision of protective functions.

The total reported area of forest plantations in the Commonwealth was estimated as 14.2 million ha in

TABLE 1.5 *Area of forest plantations in the Commonwealth 2005*

Country	Area of forest plantations (1000 ha)			% 2005 total forest	Annual change rate (ha/year)	
	1990	2000	2005		1990-2000	2000-2005
Africa	2,318	2,568	2,784	1.6	50	43
Caribbean	30	29	29	2.5	-1	0
S Asia	2,670	3,599	4,020	5.6	93	84
SE Asia & Pacific	4,383	5,128	5,416	2.4	75	58
Europe	1880	1937	1929	63.9	6	-2
Σ Commonwealth	11,281	13,261	14,178	1.8	198	183
Σ World	102,638	126,943	139,768	3.5	2,431	2,565

Source: FAO FRA2005 and forthcoming FAO 2006(c)

2005 (see Table 1.5 and details in Annex 2.6)

Plantation data should be treated with even more caution than figures for total forest area, since not all countries report on their plantation area – Canada being one of the most important. The FRA2005 figures quoted above refer to plantations generally of exotic species only. But the figures for the Commonwealth nevertheless illustrate the relative importance of plantations to regions and to countries, and show trends.

The use of rubber wood for saw timber has been pioneered in Malaysia, and rubber (*Hevea brasiliensis*) is now included in plantation areas.

Plantations make up 1.8% of the 2005 Commonwealth forest estate, compared with a global average of 3.5%, but the rate of increase in the Commonwealth plantation area appears to be growing slightly in recent years. Most Commonwealth plantations lie in SE Asia and Pacific (38% of the total), followed by South Asia (28%), Africa (20%) and Europe (14%). The Caribbean area of plantations is very small, and no plantations were reported from the rest of the Americas.

Countries which are among the largest plantation nations in the world include India (3.2 million ha), New Zealand and the United Kingdom (1.9 million ha each), Australia (1.8 million ha), Malaysia (1.6 million ha) and South Africa (1.4 million ha). The main areas of Commonwealth plantations lie in the following regions:

- Africa – South Africa, followed by Nigeria, Malawi, Kenya, Ghana and Tanzania
- Caribbean – only Trinidad and Tobago, and Jamaica have plantations
- South Asia – India followed by Pakistan, Bangladesh and Sri Lanka.

- SE Asia and Pacific – New Zealand, Australia and Malaysia
- Europe - UK

There are several countries where forest plantations are highly important in the provision of goods and services. In Africa they include Lesotho (92.5% of the forest estate), Mauritius (40.5%), Swaziland (21.1%) and South Africa (15.5%). Ninety nine per cent of New Zealand's industrial wood came from plantations in 1997 (FRA2000), and industrial wood products are the third largest export, after dairy products and manufacturing. In Swaziland the plantations are of great importance for the provision of timber, but in neighbouring South Africa the plantations have a protective role on watersheds, as well as a productive function.

In Bangladesh plantations make up 32% of the forest estate and are important for protection as well as the production of firewood, but in India, despite the large area, they only make up 4.8% of the forest estate. New Zealand is a country which created a strong plantation programme, whose rate of expansion has now strongly slowed as land is converted back into uses such as grazing which have become more profitable again. The UK, with a similar area of plantations, is also converting some of its plantations back to their original native species composition, but for environmental and conservation reasons.

A very wide range of species are used for plantations. *Eucalyptus* species are the most common in the tropics and sub-tropics, where they meet a wide range of needs, from firewood to sawtimber, but another increasingly common species, also of Australian origin, is *Acacia mangium*, which is a major component of the saw timber and pulpwood programmes in Malaysia. Teak (*Tectona grandis*) is important in India where it is grown for premium saw timber and peeler logs, and is increasingly being promoted as an investment by the private sector. Teak is grown to a lesser extent in Malaysia and Sri Lanka. Pines are grown in several countries, especially *Pinus patula* (in countries of eastern, central and southern Africa), *Pinus radiata* (in eastern, central and southern Africa and in Australia and New Zealand). Poplar species, hybrids and cultivars are grown in many developing countries such as India where they provide veneer logs for the match industry as well as fodder and services such as shade; *Populus tremuloides* is planted in Canada. Rubber (*Hevea brasiliensis*) is grown in Malaysia not only for latex but also for saw logs.

There are three issues regarding the selection of species. The first concerns the use of exotic species, or species planted outside their native range. They include the eucalypts in many African countries, where they have grown so long they are almost naturalised. Others include *Acacia mangium* and, in the UK, major components of the industrial wood supply such as Sitka and Norway spruce (*Picea sitchensis* and *P. excelsa*). The second issue is genetic modification, which is mainly being done on poplar species, and which has attracted adverse attention in the UK. The third issue is invasiveness, which refers not only to introduced tree species but also insects and diseases - for a general description see <http://www.fao.org/forestry/site/aliens/en/> In South Africa, for example, an estimated 100 739 km² (8.07 percent of national area) have been affected by invasive alien tree species, and thirteen species of Australian *Acacia* have been declared invasives and subject to control programmes.

Planted trees have long been established through agroforestry, a form of sustainable land use that combines natural or planted trees and shrubs with crops and/or livestock on the same unit of land, in ways that increase and diversify farm and forest production while also conserving natural resources. Now this practice is being further developed into partnerships between small landowners and industrial companies – long used on tea estates - and known as outgrower schemes. The forest companies benefit from access to land, diversification of supply and increased co-operation with local communities, while the farmers have an alternate and additional source of income, a guaranteed market, reduced risk and, in some cases, financial support for development. Commonwealth examples include (FAO 2006(b) :

- India, Bhadrachalam Paperboards, eucalyptus pulp, 3,210 ha and 1,375 growers
- Solomon Islands, Kolombangara Forest Products, sawlogs, 200 ha and 100 growers
- Vanuatu, Melcoffee Sawmill, sawlogs, 100 ha, 50 growers
- South Africa, Mondi Ltd., pulpwood, 5,900 ha and 2,854 growers

- South Africa, wattle bark, 436 ha, 430 growers
- Ghana, Swiss Lumber Co. 150 ha, 25 growers
- New Zealand, Tasman Forest Industries, pulpwood, 11,000 ha, 27 Maori Land Scheme groups.

The growth in outgrower schemes reflects also the recent increase in ownership of planted forests by small holders, a trend noted in a forthcoming FAO publication.

Trees are also being increasingly used to rehabilitate or to protect sites. Typically trees have been used to rehabilitate land affected by erosion or by mining – either surface mining, or the dumping of mine spoil, but now trees are used to rehabilitate many other types of degraded site and on sites irrigated with waste water. *Unasylva* #207 gives an overview of the use of trees to rehabilitate sites.

URBAN FORESTRY

Trees have been planted in towns and cities along roads and in parks to add to the landscape, for ornamentation and to give shade in every Commonwealth city for many years. More recently their role in reducing pollution, both from the noise of vehicles and from air-borne particles has attracted attention, while the need for peri-urban forests has been recognised. Half of the world's people now live in cities - even in forest-rich Canada 78% of the people live in urban centres - and it is projected that within the next 50 years, two thirds of the world's population will do so (World Urban Forum, 2006). More parks and other open public spaces will be required for recreation – which implies more urban trees.

More than half the developing world's urban population lives in slums and sadly, since this proportion is unlikely to decrease greatly as the cities expand, this will offer urban trees the opportunity to fulfil more than their traditional functions. They could, for example, provide wood for construction and domestic energy, stabilise hillsides, drain swamps and rehabilitate sites, even generate income.

Introduced species were formerly used in urban tree planting - the Jacaranda on Uhuru Highway in Nairobi or the plane trees in London streets - but now there is a move towards the planting of indigenous species in some cities. Urban tree planting in colonial days was often initiated by the forest service, but this role was soon taken over by city authorities who have given increasing responsibility to the units responsible for urban parks and gardens.

The challenges will be, and are, to make adequate provision for the maintenance of ambitious urban forestry projects, not just their implementation. Tree species must be matched not only to the site characteristics but to their likely influence on roads and buildings as they develop. Greater numbers of

BOX 1.3 *Urban tree planting in Malaysia*

Urban tree planting has gone through three phases in Malaysia, a process similar to many other countries:

- Pre-independence. *Pterocarpus indicus* is reported to have been planted in Malacca (1778) and Penang (1802); Kuala Lumpur Lake Gardens (1888) and Penang Botanical Gardens established; widespread urban tree planting in the 1920s and 1930s.
- Greening programmes, starting with Kuala Lumpur (1973); Landscape Unit established in Dept. of Town & Country Planning (1981); rules and regulations for the planting, cutting and conservation of trees; greater emphasis on urban tree planting in the Structural Plan for Kuala Lumpur
- Landscaping the Nation programme (1995), and a Prime-ministerial nation-wide “Garden Nation” campaign (1997), both supported by growing public interest in the environment and demand for attractive surroundings; local government nurseries established to meet the demand for plants; Landscape Master Plans for every town or city council.

trained professionals will be required, with skills in multi-disciplinary urban planning and management, as well as training in the social sciences.

Connecting urban societies with the natural world, the theme of the 2006 National Conference of the UK's Institute of Chartered Foresters, sums up the opportunities to link urban people to nature through urban forestry. The practice of urban forestry and of arboriculture, formerly the poor relations of the forestry profession, are now assuming greater importance.

FOREST OWNERSHIP

Ownership of forests in the Commonwealth is predominantly public, with the exception of forests in Caribbean countries. In Fiji, Papua New Guinea and Vanuatu most of the forest is owned by customary landowner groups. The ownership of Other Wooded Land follows a similar pattern. Annex 2.9 shows that the countries with significant proportions of private forest are:

- Africa – Uganda (70%), Mauritius (47%) and South Africa (34%);
- Caribbean – Barbados (96%), Jamaica (65%), Saint Lucia (53%), Grenada (31%), Trinidad & Tobago (25%) and Bahamas (20%);
- South Asia – Pakistan (34%);
- South-east Asia and the Pacific – Papua New Guinea (97% “other”), Fiji (93%) New Zealand (37%);
- Europe – United Kingdom (64%) and Cyprus (39%).

Many Commonwealth countries have been privatising plantations which were formerly owned by the State. New Zealand and the UK have been among the first to do this, since the mid-1980s. New Zealand's experience has been that internationalization followed privatization – evidently all major plantation areas are owned by non-New Zealand owners. In South Africa, on the other hand, the privatisation programme stalled in the late 1990s following democratisation since it was felt, among other reasons, that it would not contribute to addressing social problems. In the end, learning from the New Zealand model, some sales of publicly-owned plantations did go ahead, but with provisions for sales of 10% of shares to black groups, 9% to employees, and the land would be leased in the long-term but the state would retain ownership (Bethlehem and Dlomo, 2003).

SUMMARY

The forests of Commonwealth countries account for more than one fifth of the world's forest area or nearly 810 M ha; the Commonwealth has the resource base to play a major role in the international dialogue on forests and forest-related issues.

For example, three Commonwealth countries (Canada, Australia and India) are among the ten most forested countries while five more have forests covering more than 20 million ha each. Twenty eight per cent of the Commonwealth's forests were classified as primary forest, mainly in Canada but with significant areas in Africa and SE Asia and the Pacific. All Commonwealth forests cover a wide range of natural forest types and represent a very high level of biological diversity. Two forest types of particular importance not only in ecological terms but also in terms of environmental, social and economic benefits are the boreal forests of Canada and the mangrove forests of the coastline of many small island developing states and other low-lying countries; both are under threat from the effects of global warming.

The importance of forests and woodland to rural people in Low Forest Cover Countries and in montane zones is often not understood by policy-makers. Other wooded land (OWL) is also an unappreciated resource; it covers 280 million ha in Commonwealth countries and while it is a significant resource for many rural people, more studies are required to quantify it and the benefits it provides, especially to the poorest.

But deforestation is continuing in Commonwealth forests, not only at a slightly faster rate than the recent (2000–05) loss of forests in the world, but apparently at a faster rate than in the period 1990–2000 – whereas the world’s deforestation has slightly slowed since then. Most of this loss has occurred in certain African and South Asian countries. The loss of primary forest continues too, above all in Papua New Guinea but to a lesser extent in certain African and South Asian countries.

The outlook is, however, not entirely pessimistic. A recent article (Mather, 2007) draws attention to the recent net gain of forest in three Asian countries, including India, or a “forest transition” from net deforestation to net reforestation. In the cases of India the article draws attention to changes made in national forest policy to promote Joint Forest Management since 1990 (see Chapter 2) as being one of the significant means of facilitating that transition. Forest transition may have occurred in many developed economies in the 19th century, possibly related to increasing national wealth, and countries such as the UK and New Zealand still show net forest gains. Increasing income per head, however, does not now satisfactorily explain the reasons for forest transition; India had a GDP/head of \$2,670 in 2002, and Malaysia \$9,120, but Malaysia’s rate of forest loss has increased, not decreased. On the other hand, Chapter 2 shows that Malaysia scored better than India in many of the attributes of sustainable forest management.

Countries world-wide are establishing plantations to offset the loss of natural forests, and Commonwealth countries have a long history of growing trees in plantations. Currently plantations in Commonwealth countries cover over 14 million ha, or 1.8% of the Commonwealth forest estate compared with the global proportion of 3.5%. Several Commonwealth countries rely heavily on planted forests for the provision of forest goods and services and there is a move towards “outgrower” schemes by smallholders in many countries, reflecting a global trend. Such schemes can contribute to the livelihoods of rural people, but there are implications for policy-makers, who should bear in mind the impact on wood supplies of sudden changes in facilitating policies. Tree planting in towns and cities is attracting increasing recognition and support.

Most forests in Commonwealth countries are publicly owned, but some countries have communal ownership and several others predominantly private ownership. Some Commonwealth countries have been pioneers in the privatisation of forests.

REFERENCES

- BETHLEHEM, L and M. DLOMO. 2003. Forests, economics and the development agenda. General Paper, 12th World Forestry Congress, Québec City
- FAO, 2000. Report of the open-ended international meeting of experts on special needs and requirements of developing countries with low forest cover and unique types of forest. Information Note, 14th Session of the Near East Forestry Commission, Tehran. FO:NEFC/2000/INF.5
- FAO. 2002. Global Forest Resources Assessment 2000. Forestry Paper 140. FAO, Rome.
- FAO. 2003. State of the World’s Forests 2003. FAO, Rome
- FAO. 2006a. Global Forest Resources Assessment 2005. Forestry Paper 147. FAO, Rome.
- FAO. 2006b. Forestry Out-grower Schemes: a global view. FAO Corporate Document Repository <http://www.fao.org/DOCREP/004/AC131E>. Accessed June 2006
- FAO 2006c. Global planted forests thematic study: Results and Analysis. Planted Forests and Trees Working Papers, Working Paper FP38. Forest Resources Development Service, Forest Resources Division. FAO, Rome
- MATHER, A.S. 2007. Recent Asian forest transitions in relation to forest-transition theory. *International Forestry Review* 9 (1), 491-502.
- NYOKA, B.I. 2003. Biosecurity in forestry: a case study on the status of invasive tree species in Southern Africa. Working Paper FBS/1E FAO, Rome
- SREETHERAN, M., PHILIP E., ADNAN M. and SITI ZAKIAH M. 2006. A historical perspective of urban tree planting in Malaysia. *Unasylva* 223 Vol 57 pp 28-33

Chapter 2

Sustainable forest management

Jim Ball *Chair Commonwealth Forestry Association*

This chapter covers all aspects of sustainable forest management¹, including not only management techniques but also the conservation of forest resources and their protection.

FOREST MANAGEMENT

The start of management of the forest

Forests have been managed sustainably for thousands of years. Early people realised the importance of forests as the source of their livelihoods and must have acted both to protect them and to promote the growth of useful trees. For example, Dawkins and Philip (1998) speculate that wildings of the fruit tree Durian (*Durio zibethinus*) may have been distributed and tended throughout its present range in Malaysia and Indonesia by people, and the same may be true of other fruit tree species.

The importance of trees to humans has been recognised by many religions. Many sacred groves, dedicated to ancient deities, are protected to this day. Swamy *et al* (2003) state that an assessment in 1995 found over 13,000 sacred groves in all India. These, and others elsewhere such as in Africa, are strictly protected and as a result are important for the conservation of species including medicinal plants. Shyam Sunder (1995) quotes from the two thousand year-old Ishopanishad: *All in this manifested world, consisting of moving and non-moving are protected by the Lord. Use its resources with restraint.* There are many references to trees in both the Bible and the Koran, with the recognition that they are the gift of God and that mankind is responsible for their wise stewardship. *The earth is the Lord's, and everything in it, the world and all who live in it* (Psalm 24.1) while in the Koran fuelwood is recorded as a divine provision: *Is it ye who grow the tree which feeds the fire or do We grow it?* (Sura 56:72). More specifically in the Bible, in Nehemiah 2:8, Asaph is described as the *keeper of the king's forest*; he is requested to supply timber for the rebuilding of the temple, clearly implying management and sustainability of the supply.

In considering more recent times Dawkins and Philip (*op. cit.*) draw attention to the sad fact that the development of silvicultural practice was more likely to have followed excessive logging or forest clearance, and draw attention to the heavy deforestation that occurred along sea trade routes from the 17th century on. Forest reserves were developed in the 1760s for the Caribbean islands of St Vincent, Barbados and Tobago, to protect watersheds from clearance for sugar or cotton plantations. Forest reserves were established in Mauritius (then under French control) for similar reasons under the *Règlement Economique* in 1769 and the Botanic Gardens was established there to evaluate suitable species for reforestation.

¹ ITTO has defined sustainable forest management as: The process of managing permanent forest land to achieve one or more clearly specified objectives of management with regard to the continuous flow of desired forest products and services without undue reduction in its inherent values and future productivity and without undue undesirable effects on the physical and social environment.

The development of forest management systems

By the end of the 19th century the importance of forests for the sustainable supply of goods (not only timber, but also firewood) and services, especially watershed protection, had been recognised. Reservation, which included both physical demarcation of boundaries as well as the control of logging, had started in India since the First India Forest Act of 1862 and continued in Burma (now Myanmar) and subsequently in Straits Settlements (now Malaysia). It was the main forestry activity in colonial Africa and the Caribbean in the 1920s, 1930s and into the 1950s.

The first management systems for tropical forests were those developed for teak forests in India and Burma (Myanmar) from the mid-19th century (described in Dawkins and Philip, *op. cit*), while plantation techniques were developed for many other countries. But the development of silvicultural systems for the management of other tropical moist forest types were not developed until the 1950s and 1960s, such as the Malayan Uniform System, the Timber Stand Improvement of Uganda (also a uniform system) and the Tropical Shelterwood System of Ghana. They combined yield control by minimum girth/diameter limits and the poisoning of “weed” trees to liberate the “desirable” species for which there was a market. Twenty years later these systems were no longer used for a number of reasons, including high costs and lack of staff, while a recent study of the effects of harvest regulations in Ghanaian forests did not find increased regeneration or a balanced size-class distribution arising from nine decades of their application (Asamaoah Adam *et al.* 2006).

By the 1980s the sustainable management of tropical moist forest appeared to be almost non-existent and the permanency of the forest estate, the basis of sustainable management, was often threatened. The ITTO report *No Timber Without Trees* (Poore *et al.* 1989) showed that a very small area was even in theory under sustainable management. But recently the ITTO has issued a new report, *Status of International Forest Management* (ITTO, 2005) that gives a more encouraging picture. There has evidently been progress since

TABLE 2.1 *Management of the Production Tropical Permanent Forest Estate in some ITTO member countries (% of area)*

Country	Natural forest		Plantation	
	Licensed concessions	With Management plan	With Management plan	
Africa				
Cameroon	56	20	6	n.d.
Ghana	90	100	23	100
Nigeria	39	24	n.d.	47
Asia & Pacific				
Fiji	n.a.	n.a.	n.a.	80
India	100	72	36	25
Malaysia	61	100	43	100
PNG	64	57	17	n.d.
Vanuatu	n.d.	0	0	100
Americas				
Guyana	70	68	10	0
Honduras	67	42	12	58
Trinidad & Tobago	59	59	12	100

* Derived from ITTO 2005

TABLE 2.2 *Forest management in other Commonwealth countries % of forest area*

Country	Management Plan
Africa	
Kenya	9.4
Lesotho	2.1
Uganda	35.0
Americas	
Belize	74.2
Canada	70.9
Guyana	24.9
Honduras	15.3
Jamaica	13.5
S. Asia	
Bangladesh	100
Sri Lanka	100
SE Asia & Pacific	
Australia	100
New Zealand	87.0
Papua New Guinea	17.5
Singapore	100
Solomons	
Europe	
Cyprus	100
Malta	100
UK	83

Source: FRA2000

1989, when the authors had trouble finding even one M hectares of sustainably managed natural forests. Instead at least 25 M hectares were identified, and India and Malaysia alone accounted for 40% of that. There is also greater agreement about which criteria and indicators should be used to assess if a forest is managed sustainably, and more management-related information is available about forests in general. The report states that many more forests have management plans, but only 7% of the 352 M hectares of the natural forests in tropical countries managed to produce timber are being managed sustainably. Many companies with management plans do not actually follow them and much of the tropical timber on the market comes from illegal sources. Tables 2.1 and 2.2 and Annex 3.1 and 3.2 show the situation of the management of the Permanent Forest Estate in the 11 Commonwealth countries that are ITTO members.

Management of the permanent natural forest estate with production function in the eleven Commonwealth ITTO countries shows that there are high proportions of licensed concession and of forests with management plans, both natural forest and plantation, although the area of natural forest believed to be sustainably managed is low. But, as Table 2.3 (below) shows, apart from Malaysia, there is no Commonwealth ITTO producer country marketing timber from forests certified under one or other of the schemes.

Information on the state of forest management in other Commonwealth countries has been drawn from FRA 2002, summarised in Table 2.2 below.

The additional, but usually earlier, information in Table 2.2 shows that some other countries - not only the developed economies - have a high proportion of their forests under working plans. But information is still lacking.

Management techniques

Recent developments in the techniques for tropical moist forest management have promoted reduced impact logging (RIL), which incorporate methods that were developed as part of the earlier systems and were included in concessionaires' licenses. They include directional felling, pre-exploitation climber cutting and the use of logging arches. RIL will provide the conditions for regeneration and will protect the site, although not offering the flexibility to liberate existing stems or to influence the composition of the future crop through manipulation of the overstorey.

The ecosystem approach

The idea of sustainable forest management, long familiar to foresters in terms of wood production, was expanded to include all goods and services and the need for the involvement of stakeholders following UNCED in 1992. A more recent concept has been the ecosystem approach, which developed from the Convention on Biological Diversity (CBD) which addresses the management of biological diversity in a range of ecosystems. An examination of the two concepts (Løyche Wilkie *et al.* 2003) concluded that although they evolved separately (the former from UNCED, the latter from the meetings of parties to the CBD) both aim at "promoting conservation and management practices which are environmentally, socially and economically sustainable and which generate and maintain benefits for both present and future generations." Furthermore "The few conceptual differences between the two sets of principles [which guide the two approaches] stem from different starting points (production forests and forest management versus conservation ecology) but are minimal for practical purposes."

Criteria and Indicators

Criteria and indicators processes arose from UNCED in 1992. They aim to contribute to sustainable forest management through the definition of its attributes (criteria) and the measurement of progress (indicators).

There are nine International Processes on Criteria and Indicators for sustainable forest management, involving 150 countries, some of which are members of more than one Process. Forty-one Commonwealth countries are members of eight of the Processes (see Annex 3.3).

Certification

Certification is a procedure by which written assurance is given that a product, process or service is in conformity with certain standards (ISO, 1996). Most of the certification schemes in forestry are third-party verification schemes, under which an independent assessment of forest management is carried out by an accredited third party, either against defined processes or systems, or against the outcome or the quality of goods and services measured against defined standards.

The main certification scheme used in the Commonwealth is that of the Forest Stewardship Council (FSC), but there are four national schemes, the Australian Forestry Standard (AFS www.forestrystandard.org.au), the Canadian Standards Association (CSA), the Malaysian Timber Certification Council (MTCC www.mtcc.com.my)

and the UK Woodland Assurance Standard (UKWAS www.ukwas.org.uk) which includes the FSC and the Pan-European Forest Process (PEFC). There is also a North American scheme, the Sustainable Forestry Initiative (SFI www.aboutsfi.org). New Zealand is establishing its own National Standard, which will be

TABLE 2.3 *Areas of forest certified in Commonwealth countries*

Country	Scheme	Source	Area, 000 ha (natural forest unless stated)
Australia	FSC AFS	Country information	550.4 5,729.8
Belize	FSC	FRA2000	96
Canada	CSA, FSC, SFI	Country information	119,800 under one or more of the three schemes
Guyana	FSC	CFAN#33**	570
Honduras	FSC	FRA2000	20
Malaysia	MTCC	ITTO 2005	7,910* - natural forest 1,750* - plantation
Namibia	FSC	FRA2000	54
New Zealand	FSC	CFAN#30	620 - plantations
Papua New Guinea	FSC	ITTO 2005	6*
Solomons	FSC	FRA2000	43
South Africa	FSC	Country information	60.7 - natural forest 1,108.346 - plantation
Sri Lanka	FSC	FRA2000	13
Swaziland	FSC	Country information	101 - plantation
United Kingdom	UKWAS	Country information	1,500

Source: Information from country websites and FRA 2000

* derived from % quoted in ITTO 2005

** CFA Newsletter #33, June 2006 reported that 570,000 ha will be certified by FSC

TABLE 2.4 *Areas certified, 2000 and 2005*

Country	Area certified '000 ha	
	2000	2005
Australia	0	6,280
Canada	4,360	119,800
Malaysia	55	9,660
New Zealand	363	620
South Africa	828	1,169
Swaziland	0	101
UK	958	1,500

subject to independent verification (CFA Newsletter #31, December 2005).

An approximate estimate of the area of forest certified in Commonwealth countries, derived from Table 2.3, is 140 M ha, mainly natural forest but also plantations, that is about 17% of the Commonwealth's forest area. But the total area figure is out of date and is likely to have increased considerably even since some of the recent country information was gathered. For example, a comparison of some of the figures in Table 2.3 with FRA2000 show marked increases.

It remains to be seen whether this rapid rate of increase will be maintained, but recognition of certified

products by the general public is probably increasing; for example the public opinion survey carried out by the Forestry Commission in 2005 showed that 44% of respondents had been shopping for wood products in the last few years and of these respondents, 38% recognised the FSC symbol and 8% recognised the PEFC symbol (Forestry Commission, UK. 2005).

Participation by local people in forest management

A significant shift in thinking in the last 20 years about the management of all types of forests has been the development of participatory processes, which has involved reduction in centralised government management of forests. It has often been accompanied by political decentralisation or devolution of responsibilities². A great many Commonwealth countries have reported experience in developing and implementing community and participatory management schemes.

India, which has a long history of local participation in forest management, was among the first to formalise the arrangements for community involvement in recent years, with the concept of Joint Forest Management (JFM) in 1990 (Bahuguna, 2005 and Singh 2006). Before then the previous Social Forestry and Wastelands Programme, which had aimed to support reforestation under the supervision of the authorities, had failed to arrest deforestation and degradation. The objective of JFM was still to rehabilitate depleted state forests but with the direct involvement of forest-dependent communities in their protection and management, although the government has retained ownership of the land (Singh, 2006 gives a very full account of the development of participatory forest in India).

The criticism has been made that bureaucratic attitudes still influence the implementation of JFM. A recent study of several hundred senior and middle-level managers of four state forest services which are implementing JFM shows a disparity between the participatory ethos of JFM and the value system of bureaucracies (Kumar and Kant. 2003). The study points out that the implementation of a participatory policy requires also the reform of legal and administrative frameworks, while a study in Cameroon notes the need for conflict resolution between the various interests. Before decentralization such conflicts were vertical, afterwards they were horizontal (Madingou 2003).

Another example comes from Tanzania where it is estimated that more than 90% of people use firewood for domestic energy (Meghji, 2003). Strategies have been introduced which involve communities and stakeholders in forest management under Participatory Forest Management (PFM); high priority has been given to the implementation of these programmes in the national forest policy and in the National Forest Programme, with legal and institutional changes to support implementation. Over 900 out of 10 000 villages practise PFM, with nearly 442 000 ha of woodland under Community Based Forest Management, and over 396 000 ha under Joint Forest Management.

But participatory forestry is not only about wood. Cameroon has reported a project (supported by UK) in the development of community participation in wildlife management, including the lucrative bushmeat trade (Akumsi, 2003) while Mozambique has revised forest policy and laws to create an environment to enable community forestry and wildlife management in 61 community-based pilot initiatives (Mansur and Zacarias 2003).

The management of woods by communities is by no means confined to developing countries. The UK started to facilitate the management of former state-owned woodland by communities almost twenty years ago, and now there are 230 woods fully or partially-controlled by communities in Scotland. One of the features of management by local groups in Scotland has been the emphasis on native broad-leaved species, with long-term plans for the conversion of several of the former commercial conifers to broadleaved species

² Decentralization refers to the shift of power to a lower level - often within the same organization. Devolution refers to the shift of power out of the original organisation, generally to a lower level. The latter is the sounder basis for participatory management.

and the encouragement of native wildlife such as otters. Some examples include www.wooplaw.org.uk and www.creetown-walks.co.uk

Some recent Commonwealth initiatives in sustainable forest management

There are two important Commonwealth-led global initiatives in forest management: the Iwokrama International Centre for Rain Forest Conservation and Development, and the Canadian Model Forest Program.

The Iwokrama International Centre for Rain Forest Conservation and Development is located in Guyana and is supported by the Commonwealth. It originated in an offer in 1989 – a time of intense global debate on tropical rain forests - by the then President of Guyana to the Commonwealth Heads of Government Meeting (CHOGM) in Malaysia. An Agreement, made at the CHOGM of 1995, defined the objectives, functions, and organisation of Iwokrama, and this Agreement formed part of the enabling legislation which was subsequently passed by the Guyanese Parliament in 1996.

The Centre, described as a model partnership of traditional knowledge, science and business, is an autonomous non-profit institution. It manages the Iwokrama Forest of nearly 371,000 hectares in central Guyana with the aim of demonstrating how tropical forests can be conserved and sustainably used to provide ecological, social and economic benefits to local, national and international communities. Its mission statement is:

Promoting the conservation and the sustainable and equitable use of tropical rain forests in a manner that leads to lasting ecological, economic, and social benefits to the people of Guyana and to the world in general, by undertaking research, training, and the development and dissemination of technologies.

There are three core programmes – Human Development; Conservation and Use of Forests and Biodiversity, (or forest management); and the recently added Business Development - and three cross-cutting support programmes: Research, Monitoring and Evaluation; Information and Communications; and Stakeholder Processes and Governance. In order to implement the programmes the Centre follows collaborative and cooperative approaches with a wide range of local, national and international organisations, and promotes participation by local communities and other stakeholders in management and all research and development programmes. It aims to use indigenous knowledge and practices in the development of sustainable management systems; to promote human resource and institutional development for capacity building; to offer education and training; and to make contributions to national and forest policy development, in Guyana, and globally.

In 2003, however, a significant reduction in donor funding forced considerable cost-cutting and led to a modification of Iwokrama's programmes better to achieve the mission, with a move from being a pioneer programme to becoming an established experimental business institution that provides practical demonstrations of financially viable sustainable forest management. A business development plan (2005-10) has been prepared with the aim of becoming a self-sustaining enterprise through environmentally-friendly and socially responsible niche markets for market-driven products and services (such as eco-tourism), as well as a base of private charitable support;

Iwokrama offers a model of forest governance and management which has been widely recognised. Its achievements include:

- Increased understanding of the options for sustainable forest business, including agreements on international property rights and benefit sharing. A study of the carbon sequestration potential of Guyana's forests was carried out – which suggests that this potential benefit may be less than had been thought. Studies on reduced-impact logging and on market feasibility for timber and non-timber products have been made and certification of the outputs from the forest will begin in 2007.
- Systems and institutional capacity have been developed for collaboration with local people.
- Partnerships have been established for natural resource management with a wide range of agencies,

NGOs and institutions at national and international levels.

- The ecosystems of Iwokrama itself are better understood through research, including the documenting of local knowledge.
- Forest stakeholder capacities and skills have been raised.
- Public outreach programmes have been developed.

A description of the work of the Iwokrama Centre is available on www.iwokrama.org while detailed information on some of its programmes was included in the CFA Newsletter no. 34, of September 2006.

The second initiative in forest management of global significance is Canada's Model Forest Program, which was launched in 1992. It emphasises the importance of engaging people with a direct interest in the forest in all aspects of forest management. *A Model Forest is both a geographic area and a specific partnership-based approach to SFM* according to the website. There are three basic elements underlying the program: relevance to local values and needs; diverse and dynamic partnerships; and sustainable forest management. Science and technology support decision-making, along with education in the theory and practice of sustainable management. There are 11 Model Forests in Canada covering 19.8 M ha, (see www.modelforest.net).

The Canadian Government announced at UNCED in 1992 the formation of the International Model Forest Network (IMFN), with the following goal: *To support, through Model Forests, the management of the world's forest resources in a sustainable manner, reflecting environmental and socio-economic issues from the perspective of local needs and global concerns.* The IMFN now comprises 21 sites in 14 countries other than Canada, covering 8 M ha (see www.imfn.net). A further 8 countries, including India, are exploring the possibility of joining. Networking and learning from one another has been fundamental to the success of the Program.

CIDA has supported the IMFN with over CDN\$3 M to date, while the International Development Research Centre (IDRC) has supported the Secretariat with over CDN\$2.5 M, and benefits in kind.

Some common features of the approaches in JFM, model forests and Iwokrama:

- Participation by local and other stakeholders is essential;
- Capacity-building is required for effective stakeholder involvement;
- Research is needed to develop models of sustainable management, but traditional knowledge may be as important as science;
- There has to be acceptance of the need for management by both the people and the government;
- Policy and administrative reforms are required, with reorientation of the attitudes of the staff of the forest service.

Plantations

Plantations or planted (enriched) semi-natural forest, now known collectively as planted forests, are crucial to the various developments in forest management described above. Most of the resistance to plantations of fifteen or twenty years ago has been rationalised through better understanding of the need for planted trees to meet supplies of wood and fibre and to take pressure off natural forests, and greater sensitivity by plantation managers towards the rights of local people. The eucalyptus controversy has subsided, through widespread selection of the species for planting by farmers and communities, and also better understanding by extension workers of the need to match species to site and to adjacent agricultural practice. The feared loss of growth and yield of plantation crops grown in succession on the same site has been investigated in plantations of *Pinus patula* in Swaziland up to four rotations (Evans, 2005) and no loss of growth or yield has been found. Further research is, however, still needed into other sites and other species.

Some high-value hardwoods have always been grown in plantation, teak (*Tectona grandis*) being the best-known example. But recently possible shortages of luxury hardwoods led to a UK-funded project to investigate the then current situation in the 1990s and to make predictions and recommendations for the

future (Varmola and Carle 2002). Ghana, Fiji and the Solomons are examples of Commonwealth countries growing high-value hardwoods, where fast growth rates for certain species, such as *Terminalia* spp. or *Swietenia macrophylla*, combined with incentives, make up for the relatively long rotations.

Forest Landscape Restoration – the bigger picture

A further development, in which Commonwealth countries are playing a part, is the idea of Forest Landscape Restoration (FLR), which urges us to “see the bigger picture” and puts forest and woodland in the context of the wider landscape. FLR, which has been promoted by IUCN and WWF, means restoring the goods, services and ecological processes that forests can provide at the broader landscape level rather than solely promoting increased tree cover at a particular location <http://www.iucn.org/themes/fcp/.htm>. The elements of FLR include:

- Restoring the benefits of the forest to people in terms of products and services, at the same time as the environmental functions of forests;
- Connecting forest fragments between protected and well-managed forest areas;
- Reducing the vulnerability of forests to threats (such as pests or fires or climate change);
- Planning, identifying and addressing solutions acceptable to all and the root causes of forest loss and degradation; and
- Valuing forest goods and services in order to quantify and evaluate how stakeholders can benefit from them.

The Forest Landscape Restoration Implementation Workshop was hosted by Brazil in Petrópolis in April 2005, organized by the Global Partnership on Forest Landscape Restoration – a network of governments, organizations, communities and individuals. Over one hundred participants from a wide range of backgrounds shared knowledge of good practices and opportunities in forest landscape restoration, to stimulate political support and to demonstrate its implementation around the world.

TABLE 2.5 *Management of the Protection Tropical Permanent Forest Estate in some ITTO member countries (%)*

Country	Attr. to IUCN Cat I-IV	For soil & water protection	With man. plan	Sustainably managed
Africa				
Cameroon	68	n.d.	n.d.	n.d.
Ghana	49	n.d.	n.d.	108
Nigeria	100	n.d.	n.d.	n.d.
Asia & Pacific				
Fiji	1	7	15	23
India	12	n.d.	n.d.	n.d.
Malaysia	44	100	100	100
PNG	21	n.d.	n.d.	n.d.
Vanuatu	0	n.d.	n.d.	n.d.
Americas				
Guyana	100	n.d.	25	25
Honduras	27	n.d.	n.d.	n.d.
Trinidad & Tobago	49	n.d.	20	n.d.

The workshop concluded with the agreement on the *Petrópolis Challenge*, which defined FLR as “a vehicle for delivering internationally agreed commitments on forests, biodiversity, climate change and desertification”, and noted its key role in achieving the Millennium Development Goals. The *Challenge* noted that there is no blueprint for successful forest landscape restoration, but highlighted examples of its role in restoring key goods and services in degraded or deforested lands to improve livelihoods in several countries. For more information see: www.unep-wcmc.org/forest/restoration/globalpartnership

CONSERVATION

Responsible forest management incorporates not only wood production but the conservation of the site and its biological diversity, nevertheless in most Commonwealth countries certain protected areas have been set aside with the main aim of protection of ecosystems. They may perform many functions, including the conservation of biological diversity, the provision of vital services, such as the protection of watersheds and soils and of human communities from natural disasters. Many are important to local communities, especially indigenous peoples who depend for them for a number of resources. They often protect places of cultural importance or provide tranquillity; some are important for research and education while others can contribute to local economies through eco-tourism.

IUCN - the World Conservation Union - defines a protected area as: *an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means*. A description of the six IUCN protected area categories is at Annex 3.5.

The main feature of the management of natural forest with protection function in the eleven Commonwealth ITTO countries is that, apart from Malaysia and the figures on the attribution of protection areas to one of the IUCN conservation categories, there is a lack of data. Partly this is because many countries consider that all permanent forest estate, including managed forest, has protected area status.

In the light of threats posed to forest ecosystems from deforestation, several countries recognise the need to protect examples of them. For example, two Commonwealth countries, Malaysia and Brunei Darussalam, have combined with Indonesia to establish, with the assistance of WWF, the Heart of Borneo Initiative (HOB). A network of protected areas covers an expanse of transboundary highlands which includes unique biological diversity. See www.wwf.or.id

Forests continue to surprise the world with hitherto undiscovered species. A recent report from WWF notes that the forests of Borneo (the Malaysian States Sabah and Sarawak, and Kalimantan the Indonesian part of Borneo) in which 422 new plant species have been found in the last 25 years, contain plants which are potentially a “medical treasure trove”. In 2006, twenty-eight new species of orchid were discovered in the

TABLE 2.6 *Distribution of botanic gardens in the Commonwealth, 2006*

Region	Number of Botanic Gardens
Africa	88
Americas	122
S Asia	145
SE Asia & Pacific	168
Europe	106
Total	629

Source: BGCI 2006

forests of Papua New Guinea (reported in the London *Evening Standard* of 15.10.06). An example of the discovery of a new tree species was the Wollemi Pine, *Wollemia nobilis*, which was discovered in 1994 west of Sydney, Australia. There are less than 100 individuals, and the exact location of the site is still a secret. Previously the genus had been known only from fossil records. Now some plants have been bred and a few have been distributed to major botanic gardens. See <http://www.wollemipine.com>

A form of *ex situ* tree conservation, which may be overlooked by foresters, is the botanic garden. Botanical gardens, which in Europe developed from the monastery herb gardens for raising medicinal plants, have a long history in the Commonwealth. Several were started by foresters as arboreta and many tree species, both ornamental and economic, were introduced through them.

According to Botanic Gardens Conservation International (BGCI) there are over 1 800 botanic gardens in the world, and although several of them are devoted to plant forms other than trees, there are few which do not contain some specimen trees. BGCI has defined botanic gardens as *institutions holding documented collections of living plants for the purposes of scientific research, conservation, display and education*. (Botanic Gardens Conservation International <http://www.bgci.org/worldwide/home/>) and based on that definition the following data on botanic gardens in the Commonwealth has been derived.

Although much of the work of botanic gardens will continue to be scientific research and conservation, their educational and recreational purposes will become increasingly important with growing urbanisation.

THREATS TO SUSTAINABLE FOREST MANAGEMENT

There are a number of threats to the practice of sustainable forest management, of which three – fire, attack by insects and disease, and illegal logging – are considered here.

Fire (unless otherwise stated, the main source for this section is FAO. 2007).

Forest fires have been, and still are, a major threat to forests throughout the world, and three Commonwealth countries, Australia, Canada and India, are particularly affected. The world's attention was caught by the fires of 1997-98 in SE Asia and in 2002 and 2003 by severe fires near Canberra and in British Columbia. It is reported that 3.7 M ha of forest are currently affected annually by fire causing damage estimated at \$107 M. Many African countries sustain yearly fires in savanna woodland, and the impact of fires is severe on the livelihoods of rural people in all developing countries, especially the poorest people, the disadvantaged, minorities and women. The health of the people of some Asian countries has suffered in recent years (including 2006) from the effects of smoke and haze from fires in their neighbours' forests, while developed economies spend large sums every year on suppression and (to a lesser extent) prevention. Yet despite the losses of human lives and property and damage to the environment there is a shortage of information on the problem and – possibly in consequence – a lack of public pressure or political will, once memory of the tragedy is fading, to take long-term action.

But it must be appreciated that fire is necessary for the regeneration of some naturally fire-dependent ecosystems, such as savanna woodlands or the boreal forest in Canada, and fire may be used as a tool for land management in many ecosystems. The positive and negative roles of fire must be understood by an increasingly urban population and the need for the broad management of fires, rather than just fire suppression.

People are nearly always the main cause of fires, either through carelessness or deliberate arson, but in Canada lightning is the cause of 35% of fires and 85% of the area burned, because such fires occur in remote areas. It is not easy to prevent arson; in the 2002-03 fire season Australia reported 10,000 cases of actual or potential arson, but there were only 43 convictions. And people contribute to the damage cause in other ways. Rural-urban migration in developing countries means that fewer people available to put out fires, and the problem has been made worse where HIV and AIDS has caused high mortality. Urban people

have a poor appreciation of the threat posed by fires and both Canada and Australia report the poor siting of houses in high-risk locations in the wildland urban interface (WUI). Furthermore, urban dwellers perceive all fires as harmful to the environment and public pressure in Australia has led to fuel accumulation – with eventually more severe fires.

Simple means of fire control are common in many countries; for example Botswana, Namibia and South Africa prepare every year an extensive network of fire breaks. Sophisticated means of fire detection and suppression have been introduced in developed economies, but at a high cost. Australia has reported that aerial support to fire suppression cost \$80 M in 2002-03, while Canada has drawn attention to recent changes in fire weather patterns leading to much greater variability in hazard and thus in suppression costs; the annual mean cost has been \$382 but it may range up to double that figure. In fact, Canada warns that present fire suppression practices may not be sustainable due to increasing costs, with possible effects on wood supply and the competitiveness of the forest industry.

The main challenge facing Commonwealth countries in fire management is the people – their understanding of the dangers of fire and of the consequences of unintentional or intentional setting of fires, their education in the need for early burning and even in the positive effects of fire. This has been summarised by Handmer (2003) for Australia but his words are relevant elsewhere: *Those creating the risk [of fires] historically have no direct interaction with those dealing with the results. Worse perhaps is the absence of any useful engagement with those creating the future risk [which] fire and emergency services will be dealing with in the future* [factors such as climate change, urban expansion, changes in lifestyle etc]. Since many fires arise from burning for clearing agricultural land other challenges are institutional, with the programmes of Agricultural Departments, or concerned with policies which promote burning.

There are great opportunities for the exchange of information and experience in fire protection and prevention, such as the development of simple early-warning systems, public education and institution building. Africa has developed a network for the exchange of information, AfriFireNet, established in 2002, while India hosted the Asia-Pacific workshop Scientific Dimensions of Forest Fires in 2000. Many countries could learn techniques for community participation in Community Based Fire Management (CBFiM) from Mozambique, Namibia and South Africa, which have pioneered the concept, and India has given Joint Forest Management Committees responsibilities to protect forests from fire, with significant reductions in forest fires of up to 90% in some regions.

Insects and disease

Damage to trees and forests from insects and disease has received much less attention, either from foresters or the general public, than damage from fires – with two possible Commonwealth exceptions. The first was the almost universal elimination of elms (*Ulmus*) in the United Kingdom in the 1970s, from Dutch elm disease (*Ophiostoma ulmi*) spread by elm bark beetle *Scolytus scolytus* and *S. multistriatus*. The second is more recent: the infestation of mountain pine beetle (*Dendroctonus ponderosae*) in British Columbia, which attacks all pines. Since 1994 an estimated 240 M m³ of timber has been lost, spread over 11.3 M ha at an estimated cost of \$1.7 M yearly. The invasion has spread to Alberta and the USA, and now threatens the jack pine of the boreal forest FAO 2006.

Figures from New Zealand put the threat from pests and diseases into perspective. Forest industry in that country spends \$0.6 per hectare on monitoring pest and disease outbreaks, but \$3.50 on fire protection. Yet the average yearly losses due to pests and disease is \$137 M, compared with losses of \$682,000 from fire (Hocking, 2003).

Other serious, but less-noticed disease and insect attacks have affected pines and cypress in eastern and southern Africa. The earliest, dating from the 1950s, was the fungus *Dothistroma pini*, a needle blight which affected *Pinus radiata* grown in Kenya, Tanzania and Uganda, which ultimately spread to New Zealand. They were accidentally introduced in the 1970s, illustrating the threat from invasive species that may be spread by increasing passenger and freight air traffic. They include the pine woolly aphid (*Pineus*

boernerii), the pine needle aphid (*Eulachnus rileyi*) and the cypress aphid (*Cinara cupressivora*). By 1990 it was estimated that the last-named had caused damage worth \$44 M and was continuing to cause loss of increment valued at \$14.6 M yearly (FAO, 2006).

Illegal logging³

Illegal activities associated with the timber trade cover a very wide range, from illegal logging (for example, in breach of the contract or outside the concession area), smuggling (often across national borders and sometimes of species restricted under CITES), misclassification and corruption - either on a large scale or petty. One estimate has suggested that illegal activities may account for over one tenth of value of the global timber trade, worth over \$150 billion yearly (Brack, 2003) while a review of the timber harvesting industry between 2000 and 2005 in Papua New Guinea found that most were not only ecologically and economically unsustainable but also illegal (Forest Trends, 2006).

Illegal activities not only prevent the sustainable management of a country's forest and deprive it of revenue, but also undermine its good governance by condoning disregard for the law and the tolerance of corruption. The constraints to dealing with illegal logging include:

- Lack of national capacity for the enforcement of forest (and other) laws, and co-ordination
- The ease with which timber may be moved across national borders
- The difficulty of distinguishing between legal and illegal timber
- The frequent absence of a legal framework in importing countries to use against timber produced illegally elsewhere.

Certification is part of, but not the complete answer to, combating illegal logging. Section (f) above has shown that probably more than 17% of the forests of the Commonwealth are already covered by certification schemes. Certification is, however, costly for small or community-owned woodlands; even the scheme of the Forest Stewardship Council for Small and Low Intensity Managed Forest Scheme is expensive (Butterfield *et al.* 2005).

Some high-tech solutions have been proposed to curb illegal logging - for example, Cameroon has entered into partnership with the World Resources Institute's Global Forest Watch to map logging roads from satellite imagery (CFA Newsletter #28, March 2005), while the Indian State of Kerala proposed embedding microchips in sandalwood trees to track them by remote sensing (CFA Newsletter #27 of December 2004). But illegal logging will not be reduced without good governance and competent and motivated staff to enforce the forest laws.

SUMMARY

There is evidence that forest management in Commonwealth countries has moved towards more sustainable practices in recent years. For example more (but not all) of the permanent forest estate is regulated by management plans than twenty years ago, not only in the developed economies but in developing member countries, and more concessions are controlled by license. Information is far from complete, and the existence

³ The Special Issue of the International Forestry Review 5 (3) of September 2003 is an authoritative review of illegal logging and the illegal trade in forest and timber products. More recently, a joint meeting of the Commonwealth Forestry Association and the Royal Commonwealth Society devoted to Trees, cash and politics: why good wood means good business reviewed the both the international situation and the particular case of the UK. The two presentations on that occasion, by Brack and Roby, are available on the CFA website See also www.illegal-logging.info

of a management plan is not proof of the implementation of sustainable management, but taking into account other information discussed below it appears that management practices have improved. Bruenig (2006), in discussing the ITTO studies which form the basis of Tables 2.1 and 2.2, noted that *a much greater input of funds, qualified personnel, methodology ... is necessary to procure an accurate, reliable and sufficient data base for the state and role of SFM in the tropical forests and forestry economy.*

Forty-one Commonwealth countries are members of one or other of eight Criteria and Indicator Processes, the exceptions being some Caribbean countries. Several have placed at least some forest area under one of the certification schemes, and four have developed their own schemes; the UK government and several large UK timber retailers use certified timber exclusively. Over 17% of the forest area of the Commonwealth appears to be certified.

The global trend towards participatory processes has been reflected in forest management in several Commonwealth countries. Three initiatives - Joint Forest Management (JFM), the Iwokrama International Centre for Rain Forest Conservation and Development and the International Model Forest Network (IMFN) - have participation at the heart of their programmes and Iwokrama and the IMFN are disseminating their experience of sustainable forest conservation and use to other countries. A more recent concept, Forest Landscape Restoration (FLR) considers forest management and restoration within the broader landscape rather than solely the tree cover at a particular location; the partners in FLR are also disseminating this message.

But these developments in forest management are concerned with temperate and tropical/sub-tropical moist forest types. Apart from the Dry-zone Africa and the Dry Forest in Asia Processes there appears to be little development of forest management techniques for savannah woodlands.

Planted forests will be a component of all forms of forest management in all zones. Large-scale plantations will continue to be established by industry, but there will be increasing emphasis on planted forests established by smallholders (see Chapter 1), often to produce raw material for industry. Government policies and incentives will have a crucial role to play in encouraging this (see Chapter 4), but investors' perceptions of economic and political stability will determine where plantation programmes are established.

There is much less information on the conservation of forests, partly because of difficulties in defining forest conservation areas and distinguishing them from the permanent forest estate. There are, however, examples of countries establishing forest conservation areas and of acting in partnership to establish cross-boundary protected areas. There are many botanic gardens in Commonwealth countries, which are a form of *ex situ* conservation.

The sustainable management of forests in the Commonwealth has been constrained by a number of institutional factors, including shortages of funds and capacity. The development of effective forestry institutions and good governance at the national level will also be essential in combating the other major threat to sustainable management of illegal logging. The illegal activities largely occur in developing countries, but combating it will require not only the country of origin but also the developed countries of destination. International action is now being taken, but whether it will be sufficient remains to be seen. Neither does certification appear to be the complete answer.

REFERENCES

- AKUMSI, A. 2003. Community participation in wildlife management: the Mount Cameroon experience. Paper to 12th World Forestry Congress, Canada, 2003.
- ASAMAOAH ADAM, K., PINARD, M.A. and M.D.SWAIN. 2006. Nine decades of regulating timber harvest from forest reserves and the status of residual forests in Ghana. *International Forestry Review* 8 (3)
- BAHUGUNA, V.K. 2005. Participatory forest management in India: sharing governance with the people. *CFA Newsletter #31*, December 2005.

- BRACK, D. 2003. Illegal logging and the illegal trade in forest and timber products. *International Forestry Review*, 5 (3)
- BRUENIG, E. 2006. Review of Status of Tropical Forest Management 2005.. *International Forestry Review* 8 (3)
- DAWKINS, H.C. and M.S. PHILIP. 1998. Tropical moist forest silviculture and management: a history of success and failure. CAB International, UK
- EVANS, J. 2005. Growth rates over four rotations of pine in Swaziland. *International Forestry Review* 7 (4)
- FAO. 2002 Global Forest Resources Assessment 2000. Forestry Paper 140. FAO, Rome.
- FAO. 2006 Global Forest Resources Assessment 2005. Forestry Paper 147. FAO, Rome.
- FAO. 2007. Fire management – global assessment 2005. Forestry Paper 151. FAO, Rome
- FOREST TRENDS. 2006 www.forest-trends.org Also reported in *CFA Newsletter #34*, September 2006.
- FORESTRY COMMISSION, UK. 2005. Summary of Forestry Commission Statistics www.forestry.gov.uk/statistics
- HANDMER, J. 2003. In: *Australia burning; fire ecology, policy and management* (G.Cary, D. Lindenmeyer, and S.Dover, eds). CSIRO publishing, 268, pp. 142
- HOCKING, D. 2003. More on forest health. *New Zealand Tree Grower*, August 2003, pp27-28.
- LØYCHE WILKIE, M. HOLMGREN, P. and CASTAÑEDA, F. 2003. Sustainable forest management and the ecosystem approach: two concepts, one goal. Forestry Department Working Paper FM 25. FAO, Rome
- ITTO 2006 Status of Tropical Forest Management 2005. International Tropical Timber Organization, Yokohama, Japan
- KUMAR, S. and S. KANT. 2003. Community-based forest management in bureaucratic organizations: are they compatible? Paper to 12th World Forestry Congress, Canada, 2003.
- MADINGOU E. 2003. Conflicts arising from the decentralization of forest resources in Cameroon: the situation and perspectives. Paper to 12th World Forestry Congress, Canada
- MANSUR, E. and A. ZACARIAS. 2003 From policies to practices: lessons from community forestry in Mozambique. Paper to 12th World Forestry Congress, Canada
- MEGHJI, Z.H. 2003. Participatory forest management in Tanzania. Paper to 12th World Forestry Congress, Canada
- POORE, D. 1989. No timber without trees: sustainability in the tropical forest. Earthscan, London, UK
- SHYAM SUNDER, S. 1995. Wildlife conservation and forestry: concerns and policy developments in India. *Commonwealth Forestry Review* 74 (1), 35-40
- SINGH, R.V. 2006. History of participatory forest management in India. Draft
- SWAMY, P.S., M. KUMAR and S.M. SUNDARAPANDIAN. 2003. Spirituality and ecology of sacred groves in Tamil Nadu, India. *Unasyva*, 213, vol 54, 53-58.
- VARMOLA, M.I. and CARLE, J.B. 2002. The importance of hardwood plantations in the tropics and subtropics *International Forestry Review* 4 (2). 110-121.

Chapter 3

Benefits from the forest

Gary Q. Bull Associate Professor and **Steven Northway**, Research Scientist
Faculty of Forestry, University of British Columbia, Vancouver, BC, Canada, V6T 1Z4

This chapter covers the many tangible and intangible benefits that come from forests. It considers first industrial products, such as sawn timber, panels and paper, and then looks at fuelwood, a product that is often overlooked by policy-makers and planners but is of (literally) vital importance for the provision of domestic energy in developing countries – and is becoming more important as a source of renewable energy in developed economies. Next the chapter briefly reviews non-wood forest products – like fuelwood, largely ignored in national accounts, but often of major importance to the livelihoods of rural people in developing countries, and, again like fuelwood, of increasing importance in developed countries. Finally, this chapter considers the intangible benefits – the environmental services that forests provide, such as watershed control, protection of farmland and livestock from the effects of weather, or the sequestration of carbon, and the social and cultural benefits that accrue from the production of goods and services.

INDUSTRIAL PRODUCTS

Production and consumption of industrial roundwood in Commonwealth countries are summarised in Table 3.1. Complete figures are available in Annex 4.1

Roundwood production in the Commonwealth is 21% of the global total. The largest Commonwealth roundwood producer is Canada, by a long way. Other significant producers (more than 19 M m³/year) include Australia, Malaysia, South Africa, India, New Zealand, but none of them are more than 10% of Canada's total.

The principle Commonwealth roundwood importing countries (more than 100 thousand m³/year) are Canada, followed by India, UK, Bangladesh, Pakistan and Malaysia, while the principle Commonwealth

TABLE 3.1 *Regional summary of Commonwealth industrial roundwood production and consumption, 2004 (1,000 m³)*

Region	Production	Consumption	Consumption/head
Africa	44,361	43,826	0.12
Caribbean	355	442	0.08
North and Central America	198,120	200,048	6.07
South Asia	22,801	25,255	0.02
S.E. Asia & Pacific	71,281	56,659	0.92
Europe	8,049	8,065	0.13
Total Commonwealth	344,967	334,295	0.18
World	1,644,318	1,646,667	0.26

Source: State of the World's Forests, 2007. FAO, Rome

roundwood exporting countries (more than 100 thousand m³/year) are Malaysia, New Zealand, Canada, Papua New Guinea, Australia and Solomon Islands. The Caribbean SIDS are roundwood importers, but the Pacific island SIDS are often exporters.

Roundwood consumption does not necessarily mean that the production figure net of imports and exports is all used domestically; it may be processed and exported, or imports may be re-exported.

Figures for the production of processed wood products by some Commonwealth countries are summarised in the Table below; they include sawnwood, wood-based panels (plywood, particleboard, fibreboard etc), pulp and paper and paperboard.

TABLE 3.2 *Production of processed wood products by some Commonwealth countries, 2004*

Country	Sawnwood 1,000 m ³	Wood-based panels 1,000 m ³	Pulp for paper 1,000 tonnes	Paper and paperboard 1,000 tonnes
Canada	60,952	16,617	26,222	20,599
India	17,500	2,341	3,425	4,129
Malaysia	5,598	6,963	124	981
New Zealand	4,369	2,219	1,596	920
Australia	4,038	2,083	1,107	3,097
UK	2,783	3,533	344	6,442
South Africa	2,171	1,022	1,709	3,774
Nigeria	2,000	95	23	19

Source: State of the World's Forests, 2007. FAO, Rome

Canada is by far the largest producer in all four categories of processed wood products. Other important producers of sawnwood include India, Malaysia, New Zealand, Australia, the United Kingdom, South Africa and Nigeria. After Canada, the main producers of wood-based panels are Malaysia, the United Kingdom, India, New Zealand, Australia and South Africa, and the main producers of pulp for paper, after Canada, are India, South Africa, New Zealand and Australia. Finally, the main producers of paper and paperboard, after Canada, are the United Kingdom, India, South Africa and Australia.

Issues

From a business point of view, 'mainstream' forest products industries are grappling with a number of related issues. They include competition from other industries, subsidies to other industries by certain countries, lack of innovation in product development, changing consumer tastes, and new trade complexities.

The industrial forest products industry is undergoing a period of rapid change. On the one hand it is facing significant competition from other materials such as plastics, steel, and aluminium in various applications; on the other hand, it is facing competition from other industrial sectors such as energy, where cogeneration processes are competing for wood for use in pellet plant installations.

The industrial challenges that have emerged with these two changes are further compounded by the eagerness of governments to assist – some refer to this support as subsidies. This distorts product pricing, raw material flow, land use economics and even market acceptance.

It is also generally agreed that the industry is not being particularly innovative; its investment in research and development is relatively low compared to other industries and there is a distinct lack of new product development. The blame for this is largely laid at the feet of the financial indicator 'return on

capital employed', which has been relatively low for a long period of time.

The industrial forest products industry is also facing a new type of final consumer, one whose tastes are changing, at least in many cases, to a non-rational use of wood or related products. The consumer is demanding greener products too, and as a result the industry as a whole has had to adopt standards, such as certification, that aim to demonstrate that the wood product is coming from a sustainably managed forest.

Forest products trade is being hampered by the coupling of the forest as a raw material source to the profitability of the manufacturing sector. This means that in many countries barriers are erected to the free flow of logs. In addition, there has been a rise in non-tariff trade barriers such as certification and phytosanitary standards which may discourage trade.

Trends

The broad industrial trends indicate an increase in consumption in most industrial wood product categories, an increase in global trade in forest products despite the constraints on growth mentioned earlier, an increase in the use of engineered wood products, and an increase in material substitution.

The economics of wood supply, a very important component of forest management, have been turbulent, especially in those countries dominated by natural forests. There are the normal business cycle trends (such as in the housing markets), there is a marked increase in natural disturbances of the forest, such as wind, fire, insect and disease which affect both long term and short term supply, and there are competing uses of the forest leading to stronger log prices which can expand the economic zone.

At the macro level, there has been industrial restructuring in four ways: 1. the industry is further amalgamating, creating larger companies on the global stage where the head offices are not in Commonwealth countries; 2. they are downsizing their manufacturing in some regions due to ageing plants, inefficient facilities or inappropriate product lines; 3. they are finding new business partners such as the energy sector or agribusiness; or 4. they are shifting their investments to locations with low input costs (e.g. labour), new emerging markets (e.g. India) or to areas where land management is not as complex (e.g. private industrial timberland).

At a more specific level the manufacturing sector has seen a marked decline in some specific industries such as newsprint, but a growth in industries such as Oriented Strand Board (OSB) and Medium Density Fibreboard (MDF) panels. There has also been a shift in production between countries.

In many Commonwealth countries, where property rights are unclear, there has been an increase in conflict over land use. The challenge is to create industrial processing capabilities that are both viable and can incorporate the high costs of the 'transition period'.

FUELWOOD

"Fuelwood" refers to wood consumed for energy production purposes, whether for industrial, commercial or domestic use. It includes wood converted to charcoal. Table 3.3 shows fuelwood consumption in the Commonwealth, by region, while Annex 4.2 shows fuelwood consumption by country in 2004.

Fuelwood consumption in Commonwealth countries represented 34% of total world consumption in 2004. Some country data are missing, however, and even where there are figures they are indicative only and in absolute terms may be quite unreliable.

Woodfuel is most important as a source of energy in Commonwealth developing countries, and is especially important in African Commonwealth countries, where consumption is estimated as 0.59 m³/head.

India consumes the most wood fuel in the world (followed by China and Brazil). Within the Commonwealth India is followed by Nigeria, Uganda, Bangladesh, Pakistan, Kenya and Tanzania (see Annex 4.2). But

TABLE 3.3 *Summary of Commonwealth fuelwood consumption, 2004*

Region	1,000 m ³	m ³ /head/year*
Africa	218,804	0.59
Caribbean	608	0.12
North and Central America	3,815	0.12
South Asia	362,788	0.28
S.E. Asia & Pacific	12,096	0.20
Europe	92	0.00
Total Commonwealth	599,203	0.33
World	1,766,278	0.28

Source: State of the World's Forests, 2007. FAO, Rome

* population data from Annex 1

even countries with developed economies use significant quantities of woodfuel e.g. Australia and Canada.

Issues

Fuelwood use in the Commonwealth is still growing, since biomass energy is seen to be a relatively clean and renewable energy and it is currently viewed as a 'growth' industry. In developed economies many governments or utilities are now offering significant incentives (also known as subsidies) for investment in biomass energy. In developing economies the non-industrial consumption of wood is continuing to rise and is on the whole desirable in being from renewable sources. The challenge is finding the sustainable combination of land use practices that still produces fuelwood while at the same time providing food crops and other environmental services.

Trends

All statistics indicate that fuelwood consumption in developing countries is continuing to rise. The challenge with the growing population will be determining the sustainability of the 'green revolution'. That is, is there really a clever way that the inputs in fuelwood production can be manipulated, for example through the use of fertilisers or irrigation or through improved growth rates by genetic engineering? In developed countries recent figures indicate that new technologies can increase the use of fuelwood for wood pellets, ethanol and bio-refining and co-generation in industrial facilities.

In both developed and developing economies the property rights assigned to fuelwood are often very poor, the production of fuel is not seen as economically significant and there are no clear targets for production that are linked to sustainability. These present major challenges to the users of fuelwood irrespective of the status of the economy.

NON-WOOD FOREST PRODUCTS

Non-wood forest products (NWFP) have been defined as *goods of biological origin other than wood, derived from forests, other wooded land and trees outside forests*¹. There is a vast range of non-wood

¹ This is the working definition adopted by FAO in 1999. The evolution of the definition is described in Towards a harmonized definition of non-wood forest products. Unasylva 198: 63-64

forest products, from plant products used for food and fodder, the raw material for medicines, dyes and local tools and utensils, through exudates such as gums to animal products such as honey, bushmeat and even living animals. Non-wood forest products are increasing in importance in developed Commonwealth economies and have been important for some time in developing economies.

In developing countries NWFP can make an essential contribution to livelihoods where many are of great importance the daily needs and employment of the poorest rural people. Most are traded locally and a few are traded internationally but although the recent Global Forest Resources Assessment (FAO, 2006) attempted to quantify the removals and value of NWFP there is in fact reliable information on production or value of very few (Vantomme, 2003). A study of the marketing of NWFP in the humid forest zone of Cameroon, however, estimated that the value of the trade was the equivalent of millions of US dollars and that it offered income opportunities not only for large specialized traders but also for many small traders, most of whom were women (Ruiz Pérez *et al.* 1999).

In most tropical countries fodder is locally important in the dry zones while palm leaves, which are extensively used for thatching, are in even more demand where the tourist trade is important to provide the roofing for “authentic” huts. Wood is used for carvings and raffia and other fibres are used to make crafts for the tourist trade.

Considering the Commonwealth countries of Africa, honey and beeswax are important exports from Tanzania and Zambia, with some 10,000 beekeepers obtaining employment in Zambia (FAO Non-wood News, 2007). Some species such as the leaves of *Gnetum* spp and the fruits of *Irvingia gabonensis* provide food in the “hungry season” in West Africa, while the nuts of *Cola acuminata* are traded locally and nationally. Bushmeat is of great importance in rural diets in many East and West African countries, where it provides a low-cost and high-return supplement to farming; the poor may benefit in particular but less from their own consumption and more from market sales (Brown and Williams, 2003). Shea Butter (derived from the savannah tree *Vitellaria paradoxa*) is used both internally and exported from West

BOX 3.1 *Rattan*

An important non-wood forest product in international trade is rattan, used mainly for furniture but with a wide range of other uses from carpet beaters, walking sticks, umbrella handles, sporting goods, ropes, bird-cages, matting and baskets. The market for rattan furniture in Europe, North America, Japan and other industrialized nations has grown steadily, but the trade in rattan furniture probably represents less than 4 percent of world trade of all furniture

Rattan is a spiny climbing or trailing plant with around 600 species, found in tropical Asia and the Pacific where ten of the 13 known genera are found, and equatorial Africa. The main genus for commercial production is *Calamus*, but *Daemonorops*, *Korthalsia* and *Plectocomia* are also important. The largest producer country is Indonesia, but Malaysia, one of the centres of greatest species diversity, is another important producer that has made great strides in developing the industry in recent years.

Almost all rattan is collected from natural forests but in recent years uncontrolled harvesting and deforestation have seriously depleted the natural stocks in many countries. More than 31 000 ha have been planted in Malaysia with the large-diameter *Calamus manan* of which 7 000 ha are in rubber plantations. In addition, large plantations of mainly *Calamus caesioides* and *Calamus trachycoleus* have been established on a total of 10 000 ha. Malaysia banned the export of unprocessed rattan in the 1990s and has since seen an increase of almost 200% in the export value of rattan products. A Small-Scale Entrepreneurs Development Unit (SSEDV) has been created, with financial support from the World Bank and the government, to provide technical and training support to the industry. An Agroforestry Unit established at FRIM has provided training and planting material for rattan planting in rubber plantations by smallholders. The results of all these efforts are increased foreign exchange earnings and employment opportunities in both the rural and urban sectors

African countries such as Ghana and Nigeria.

Cinnamomum camphora is grown in plantations in India and Sri Lanka, and essential oils e.g. *Citronella* sp. and gums such as Gum Tragacanth (*Sterculia* sp.) are harvested in India. Sandalwood (*Santalum album* and other *Santalum* species) is a root parasite from which a valuable essential oil is distilled; it grows in India (as well as Australia, Fiji, Kenya, Tanzania and Vanuatu) but its high price in recent years has caused over-exploitation and supplies are threatened so Australia has established sandalwood plantations – with some Indian companies investing there (FAO Non-wood News, 2007). In both India and Bangladesh NWFP (including sandalwood oil) are used in Ayurvedic medicine, widely used by much of the population.

But in fact the most valuable non-wood forest product of all is from the temperate zone and a developed economy - maple syrup, from Canada. In 2004, 26.9 M litres of syrup were produced, with a gross value of \$Can151.9 M and 23.6 M litres were exported (Canadian Forest Service, 2006). In Scotland a survey found that for many people the collection of NWFP was important for personal satisfaction rather than commercial reasons; over 200 products re collected from 97 vascular plants and 76 fungi and non-vascular species, with edible uses the most popular (Emery *et al.*, 2006). In developed economies decorative foliage and Christmas trees have large markets.

Issues

The critical issues with NWFP are: finding the statistics to capture their importance, finding methods to estimate a sustainable harvest level, developing new markets for these products in developed countries, determining an appropriate property rights systems for resource allocation, determining a fair method of taxation and getting the appropriate technical support to those whose economic activity is dependant on the NWFP.

A great deal of the buying and selling of these products occurs in informal markets. Therefore it is difficult to describe to policy actors their significance to government revenues, their contribution to local livelihoods and their contribution to the increasing interest in ‘local’ foods. A few non-Commonwealth countries have developed statistical systems to capture their social and economic importance but these are not widespread in the Commonwealth.

Although statistics are usually either unavailable or unreliable there is strong world-wide interest in NWFP and a great many networks and sources of information have developed. A partial list of networks is available in the 1999 issue of *Unasylva* devoted to Non-wood forest products and income generation (volume 50, number 198, p. 56) while the Non-Wood News of FAO (www.fao.org/orestry/nwfp/nonwood.htm) provides a six-monthly digest of current developments in this field.

Trends

The trends indicate that NWFP are growing in importance economically, particularly in developed economies where recognition of their importance is relatively new. In developing economies, in many instances their social and economic value is much higher than the timber value and the products produced frequently benefit those in the lower income brackets the most.

EMPLOYMENT

Issues

Employment in the forest or in the processing of wood in the formal or informal economy is often quoted as one of the important forestry contributions to sustainable rural livelihoods. Unfortunately there are few

reliable figures, even on the formal economy, and even fewer on the informal economy.

Annex 4.3 gives figures for employment in the forest and in primary production in forestry for selected Commonwealth countries. The importance of the forestry sector to total numbers employed in the developing economies of India, Malaysia and South Africa can be seen, and also to the developed economies of Canada and the United Kingdom. But only in Canada (2.3%), Malaysia (2.0%), New Zealand (1.8%) and South Africa (1%) does the forestry sector contribute more than a very small proportion of the total labour force.

Trends

Forest sector employment as a proportion of the total labour force has decreased slightly in developed economies since 1990, largely due to a reduction in the numbers employed in the forest, but in developing economies it has held steady.

MARKETS FOR ENVIRONMENTAL SERVICES

In addition to timber and non wood forest products, forests provide many environmental services. Those values which are commonly described include biodiversity, water, carbon and aesthetics. Since many of these services are poorly defined it is a challenge for them to get the recognition they need and deserve, irrespective of the economy.

Issues

As with any product or service, an appropriate definition is critically important. Surprisingly perhaps, there is no clear agreement on what biodiversity or aesthetics are, and while water and carbon are more tangible values, nonetheless they bring their own complexity.

Once the environmental service is defined the next challenge is to find an appropriate level of removing the service or adding the services to a forested ecosystem: in other word, a sustainable level has to be defined.

The next issue, among the myriad of issues, is the transaction costs of measuring and monitoring the environmental services of interest. It is not possible to afford to manage something which does not cover these transaction costs. And once these obstacles have been overcome, the other issues are developing the markets and finding buyers for them, addressing issues of equity or fair distribution of the income generated, identifying appropriate levels of taxation, and developing an appropriate system of property rights.

Trends

Despite what seems to be a long list of complex issues there is a growing interest in environmental services and products. The obvious question is: Why? The relatively straightforward answer is that while for decades people have tried to find non-market or regulatory mechanisms to protect or enhance environmental services and products, the fact is that many of these efforts have not been successful.

So environmental services markets have become mainstream in parts of countries like Australia, the trends in many Commonwealth countries will be for an increase in their use as a mechanism to manage for these services. It has a number of potential advantages: 1. the transaction costs should be lower, 2. it allows new policy actors (e.g. industry, NGOs, Foundations) to participate with traditional actors (levels of government and banks) in finding a more acceptable solution to an environmental challenge 3. It allows for market rigour in terms of accountability and transparency.

Forest industries are increasingly aware of these trends and are showing themselves to be adept at recognizing opportunities that have both commercial and non-commercial values.

SOCIO-CULTURAL BENEFITS

Increasingly the forest industry has recognized that in many areas it needs a social license to operate, particularly on public land and that cultures, particularly indigenous cultures, are an important part of finding a sustainable business solution. The challenge is to define the boundaries of this new business environment and many Commonwealth countries have made remarkable progress in the last decade.

Issues

The socio-cultural issues facing the industry are formidable and complex. Perhaps the most significant group that industry is working with is the indigenous people whose rights are increasingly recognized by the courts, at least in some countries, and who are demanding a part of the action. Yet the first challenge is where to start to build meaningful relationship. Frequently there has been a history of mistrust and ignorance; there is a lack of a skilled workforce, there is lack of financial capital to participate in an economic activity, there are other political forces that would try to disrupt a business relationship developing and there are tremendous global competitive forces that severely limit what an industrial partner is able to do.

Trends

Once again, the forest industries have been one of the leading industrial sectors to address socio-cultural issues. There have been efforts to create many joint venture companies, to develop skills training program, to provide new business opportunities and share resources. Other industrial sectors, such as mining, have been learning from forest industries and are employing many of the same techniques.

SUMMARY

1. The consumption of fuelwood in Commonwealth countries, at nearly 600,000 m³/year, is 74% greater than the consumption of roundwood – whereas the global figures for roundwood and fuelwood consumption are nearly the same. Another comparison of Commonwealth and global figures is that while the Commonwealth roundwood consumption is one fifth of the global total, fuelwood consumption is one third. Or again, the consumption per head of fuelwood in the Commonwealth is nearly twice that of roundwood, but the consumption of fuelwood per head in African Commonwealth countries is nearly five times.

The trends suggest that fuelwood use in Commonwealth developing countries will remain steady or may even increase, while in developed Commonwealth countries it will grow strongly, albeit from a much lower base.

The continuing importance of fuelwood shows clearly the need to develop sustainable supplies in Commonwealth countries, especially in dry areas where there are limited areas of natural forest. It also highlights the importance of policy interventions and technical developments to encourage sustainable fuelwood use. Such sustainable use not only gives zero carbon emissions but contributes to human health by thorough cooking of food and boiling of water.

2. Statistics. Given the important, but often unquantified, contribution of employment as well as fuelwood and non-wood forest products to the rural economy, especially but not only, in developing countries, Governments must develop and maintain systems for the collection of reliable, current, data.
3. Valuing and marketing the intangible benefits. Given the contributions that forest goods and services make to the economy, to environmental and cultural values – especially to climate change amelioration – there is an urgent need to develop methods for valuing them if they are to be provided for in national policies and planning, and if markets for them are to grow.
4. All Commonwealth countries are important consumers of processed wood products; Canada dominates the production of roundwood and processed wood products, but some other Commonwealth countries are major producers also, and others, such as India and Malaysia, will become more important. Consumers of wood products are becoming aware of environmental issues and are increasingly demanding proof, through certification, that they are sourced from sustainably managed supplies (the growth of forest areas managed under various certification schemes is discussed in Chapter 2).

REFERENCES

- BROWN, D and A. WILLIAMS 2003. The case for bushmeat as a component of development policy: issues and challenges. *International Forestry Review* 5(2)
- CANADIAN FOREST SERVICE. 2006. The State of Canada's Forests 2004-2005. Canadian Forest Service, Natural Resources Canada.
- EMERY, M., MARTIN, S. and A. DYKE. 2006. Wild Harvests from Scottish Woodlands. Forestry Commission, Great Britain (available on-line at www.forestresearch.gov.uk)
- FAO. 2007. Non-wood News no. 14. FOIP, Rome
- KUMAR, A. and SASTRY, C.B. 1999. The International Network for Bamboo and Rattan. *Unasylva* Vol. 59, no. 198. FAO, Rome
- RUIZ PÉREZ, M, NDOYE, O. and EYEBE, A. 1999. Marketing of non-wood forest products in the humid forest zone of Cameroon. *Unasylva* Vol. 59, no. 198. FAO, Rome
- VANTOMME, P. 2003. Compiling statistics on Non-Wood Forest Products as policy and decision-making tools at the national level. *International Forestry Review* 5(2)

Chapter 4

Forest policy, law and administration

Jim Ball Chair, Commonwealth Forestry Association

The UN Conference on Environment and Development (UNCED) in 1992 was a major catalyst worldwide for the revision of forest policies and legislation and for re-thinking administrative arrangements for forests. This chapter describes how the forest services of the Commonwealth have been in the forefront of these changes.

The chapter also includes information on the various Commonwealth forestry associations and technical publications related to forestry published in Commonwealth countries.

POLICY

The trends in forest policy development worldwide since UNCED have been:

- decentralisation of decision-making, often accompanied by devolution of responsibility
- provision for community involvement in forestry,
- privatisation especially of plantations
- involvement of the public in policy development

Decentralisation is a feature of the forest administration in several Commonwealth countries; India, for example, decentralised control of forest resources to State level many years ago, as has Australia (to the States), Canada (to the Provinces), Malaysia and Nigeria (to the States) and, more recently, the UK (to Scotland, Wales and England). Details of these countries and others are in the Country Forestry Profiles. Generally the national body is responsible for the development of national forest policy and the enforcement of national laws related to forests (including conservation and protection) and forest products, for representation at international level, and for relations with other countries. But the division or responsibilities is not always clear and, furthermore, provinces or states may have their own development policies and priorities, so that tensions may arise between federal and state levels and coordination presents a challenge. Malaysia, for example, has a National Forestry Council, responsible for promoting collaboration in the implementation of national forest policy.

Control has been devolved further to the level of communities in several countries, including Canada, Ghana, India, Uganda and the UK. The people's involvement in forest management has already been described in Chapter 2, but since much of the forest estate in Commonwealth countries is publicly-owned (see Chapter 1) there has been a strong move to public participation in the process of forest policy development as well, in line with the trend in the 1990s towards more participatory democracy. In Canada the process of public participation in forestry decision-making, including policy development, has been encouraged for some time (see for example, Duinker 1998) while Coates and Fenton (1999) describe the uses of social assessment to incorporate social issues in policy development and the Australian Regional Forest Agreements. But public participation has not been confined to countries with developed economies; Wyatt *et al.* (1999) for example describe the creation of a local consultation process for stakeholder involvement in forest policy involvement in Vanuatu.

The UK Forestry Commission carries out regular surveys of public opinion on forestry matters; the latest,

in 2005, showed that 89% of respondents selected at least one public benefit as a good reason to support forestry with public money. As in previous years the four top reasons to support forestry were to provide places for wildlife to live, to provide places to visit and walk in, to help prevent the 'greenhouse effect' and global warming, and to improve the countryside landscape (see www.forestry.gov.uk/statistics).

Privatisation of forest resources has gone furthest in New Zealand and the UK, catalysed by the free-market philosophy of the 1980s. In New Zealand the first phase was to "corporatise" the commercial functions of the New Zealand Forest Service, i.e. to transfer these functions to a state-run enterprise. Between 1990 and 1992 the government moved to privatise much of the forest resource, and sold more than 350 000 ha of planted forests to the private sector. An additional 188 000 ha of government-owned forests were sold in 1996. The Maori people have, however, made claims on ownership of most forests on the North Island and all forests on the South Island since the right of New Zealand's indigenous people to claim land that is rightfully theirs is preserved in legislation. The process of resolving these claims has been slow (Clarke 1999).

ADMINISTRATION

A few Commonwealth countries include "forestry" in the title of the responsible Ministry; they include Cameroon (Ministry of the Environment and Forest Resources), and Ghana (Ministry of Lands, Forestry and Mines). With the reduced importance of production functions and the increased importance of the service and environmental functions, several other countries have established or have recently moved their forest services from "production" to "service" Ministries: Kenya (Ministry of Environment & Natural Resources), Malawi (Ministry of Mines, Natural Resources & Environment), Namibia (Ministry of Environment & Tourism), Nigeria (Ministry of the Environment), Seychelles (Ministry of Environment & Transport), Uganda (Ministry of Water & Environment). Sierra Leone has both production and service functions in the title of the Ministry – Agriculture, Forestry and Environment. In the UK the Ministry of Environment, Food and Rural Affairs is responsible for forestry in England as well as for international affairs and plant health, for example, while a Scottish Minister has responsibility for forestry in Scotland and the Welsh Assembly Government has responsibility for forestry in Wales.

Malaysia, on the other hand, has divided responsibility for forestry at federal level between the Ministry of Natural Resources and Environment and the Ministry of Plantation Industries and Commodities – which presents a challenge in coordination. In some other countries forestry has a subordinate role: South Africa, for example, emphasises water supplies, and the forest section is part of the Department of Water Affairs and Forestry while in Swaziland it is a section of the Department of Agriculture & Cooperatives. In many of the Commonwealth SIDS of the Caribbean forestry is a small section of another Ministry

Whatever the formal title of the Ministry, the development of land-use policies and legislation that do not cause conflict between sectors, and the promotion of cooperation continue to be major challenges.

FINANCIAL SUPPORT TO PRIVATE FORESTRY

Several countries give financial or other support to private growers. Malaysia, for example, established in 2006 the Forest Plantation Programme, with initial government funding of RM200mil to support landowners and plantation companies farming on state-lease forest land who are expected to plant some 375,000ha with species like rubberwood, and *Acacia mangium* over the next 15 years (Asia Business Monitor 26 May 2006).

In Uganda the Sawlog Production Grant Scheme (SPGS) is an EC-funded project that provides subsidies for private sector tree planters as well as technical support and practical training. The first phase of the project (2004-2006) achieved its target of 5,000 hectares of plantations and a second 2-year phase

has recently been approved, which should subsidise a further 5,000ha of private sector tree planting. See www.sawlog.ug

Canadian Provinces offer different levels and types of support to private growers. Dansereau (2003) compared the policies of Québec and Ontario Provinces. The former actively supported private forest owners by providing a technical and financial support programme, land tax reimbursement, a mechanism and loan guarantee programme for the purchase of land and equipment, plants free of charge for reforestation, and protection services for insects and disease. Ontario only offered land tax reduction. The rate of reforestation on private land was 12 times higher in Quebec, in terms of trees planted yearly.

PROFESSIONAL INSTITUTIONS AND ASSOCIATIONS, AND TECHNICAL JOURNALS

Despite the physical isolation of many foresters as they practise their profession, they have long exchanged information and experience, either through formal or informal meetings or through the medium of a journal. The Royal Scottish Forestry Society dates from 1854 for example, while the *Indian Forester* was first published in 1875. This section describes the professional institutions (responsible for accreditation to the profession), and professional associations, as well as their journals.

Australia, Canada, New Zealand and the United Kingdom have developed professional institutions, which offer professional accreditation. By this is meant that they, to a greater or lesser extent, control admission to the profession, monitor professional practice, lay down requirements for continuing professional education/development and, as independent bodies, lobby their national governments on issues concerning the forestry sector. They require members to hold indemnity insurance thus offering security to those who employ them, and they control the conduct of members.

The Institute of Foresters of Australia (IFA) www.forestry.org.au has over 1200 members spread across all States and Territories. The Association of Consulting Foresters of Australia (ACFA) www.australianconsultingforesters.org is a smaller independent body of consultant foresters who also are Voting members of the Institute. Negotiations are currently in train concerning a possible merger of the two bodies. IFA members are bound by a Code of Ethics to guide professional conduct. Admission to voting membership is not restricted to persons with forestry degrees. Within the limited resources of an Institute scattered over a large continent, the IFA plays an active part in policy formation.

The impending introduction of forest certification on a major scale prompted the IFA to launch a Registered Professional Forester (RPF) program in 1999. In order to achieve government recognition (still under discussion) and avoid the accusation of restrictive trade practice, membership has to be open to any person that can prove that they meet prescribed professional standards. The RPF Registration Committee establishes an applicant's credentials for the particular specialization by an appropriate examination or other evidence. Wilkinson (2006) has recently argued for a change to the title of Registered Forestry Professional because many forestry professionals (e.g. forest ecologists, forest economists, modelers etc.) may not see themselves as Professional Foresters. This proposal has yet to be considered by the IFA Board, although 'general practicing forester' would clearly have to be retained as one of the specializations.

Canada has around 8 000 registered professional foresters (RPF), grouped within independent provincial professional organizations in seven of the ten Canadian provinces (Gauthier, 2003). A list of them is available at the Canadian Federation of Professional Foresters Associations, which is hosted by the Canadian Institute of Forestry <http://www.cif-ifc.org> These provinces have "right to title" legislation that states that only registered professional foresters have the right to use the title "forester" or to practice forestry. This can be problematic, as what constitutes the required training for a forester in one jurisdiction may not count in another.

A typical example is that of the Association of British Columbia Forest Professionals, whose website www.abcfp.ca states that under the BC Foresters Act it is their responsibility to uphold the public interest respecting the practice of professional forestry by ensuring the competence, independence, professional

conduct and integrity of our members. Standards of education and qualifications have been established to ensure that foresters are qualified and remain up-to-date on changes in their field. The Act and the association's bylaws (including codes of conduct and standards of practice) govern their members. Furthermore, anyone who wants to practice professional forestry in British Columbia must be a member of the Association of BC Forest Professionals.

The New Zealand Institute of Forestry www.forestry.org.nz/ which has around 740 members was founded in 1927. It aims to encourage the highest standards of ethical and professional performance amongst its members through education, accountability and codes of ethics and performance standards.

The professional institution in the UK is the Institute of Chartered Foresters (ICF), the professional body for foresters and arborists in the United Kingdom (the only one of the Commonwealth forestry institutes that includes the practice of arboriculture). See www.charteredforesters.org The ICF has 1,057 members, of whom 777 are Fellows and Professional members. Its Mission Statement is *To lead the profession and promote excellence amongst foresters and arborists, ensuring the sustainable development of forests, woodlands and trees throughout the UK.* The Institute sets and maintains the standards for the profession and safeguards the public interest in matters relating to forests, woodlands and trees, as well as regulating the standards of entry to the profession, offering examinations for professional qualifications and keeping under review the status of Chartered Foresters and the profession. All members are bound by a Code of Ethics and Professional Conduct.

South Africa offers a different approach. The South African Institute of Forestry was established in 1968 with the primary aim of registering professional foresters, but it was soon found that the small number of foresters made this very difficult to achieve. In 1982 therefore they joined a society of natural scientists and registered as professional natural scientist consultants in forestry science. Since then 23 have registered; forestry technicians, possessing a forestry diploma, can also register.

Professional associations provide some of the functions of institutions in that they support the exchange of information, generally through journals and often newsletters, they provide the opportunity for networking and often offer in-service training courses or other professional development. Many of them are involved in public education. They are independent of governments, and may often lobby on behalf of the forestry sector or even environmental interests. But they do not control the right to practice as a forester, as the institutes do.

Annex 5.1 lists 33 forestry institutions and associations of the Commonwealth. It covers associations and societies which deal with the subject of forestry rather than with wood-processing or other forestry-related subjects but some of the latter associations have been included where they are of particular interest to foresters. It is undoubtedly an incomplete list, and it is hoped that readers will provide information on omissions so that any revisions of this publication may give a more complete picture.

Annex 5.2 lists 29 forestry journals, defined as periodical publications, produced more-or-less at regular intervals (e.g. quarterly, yearly) devoted mainly to forestry issues. But since the issues covered by forestry journals may include technical aspects not only of the growing but also the conversion or utilisation of trees, or research into such topics, the coverage of this annex is broader than for the forestry associations.

The only countries to practice professional forestry accreditation in the Commonwealth are Australia, Canada, New Zealand and the UK, but it is probable that the need for professional accreditation will grow, as governments become less involved in operational functions and the private sector's involvement increases; countries with few foresters may follow South Africa's example. All professional associations which are truly independent of governments, whether offering accreditation or not, could offer mechanisms for improving standards within the profession, for lobbying, and for public education and information.

SUMMARY

Commonwealth countries have been in the forefront of policy and organizational changes in the forestry sector especially since UNCED in 1992. Decentralization of responsibility for forestry was the case in several Commonwealth countries in fact long before UNCED, but others have now followed and the devolution of responsibility to local levels is now more widespread, especially to communities and through provision for public involvement in policy development. Forest resources which were formerly owned by the state have been privatized in some countries, and there is widespread government support for private forest owners through a variety of incentives.

There are a number of forestry institutions and associations in the Commonwealth. They have potential for improving standards within the profession, for lobbying, and for public education and information.

REFERENCES

- CLARKE, M. 1999. Devolving forest ownership through privatization in New Zealand. *Unasylva* 50#199
- COATES, S. and FENTON, M. 1999. The application of social assessment in the Australian Regional Forest Agreement process. *International Forestry Review* 1(1)
- DANSEREAU, J-P. 2003. Pertinence of public financial support for forestry activities. Paper to 12th World Forestry Congress, Québec City, Canada
- DUINKER, P.N. 1998. Public participation's promising progress: advances in forest decision-making in Canada. *Commonwealth Forestry Review* 77(2)
- GAUTHIER, J. 2003. The practice of forestry in Canada: the Québec example. Paper to 12th World Forestry Congress
- WILKINSON, G. 2006. Professional foresters and forestry professionals - the future of the RPF scheme. *The Forester* 49(3):6-7
- WYATT, S., BARTLETT A. and MATHIAS, A. 1999. Developing forest policy in a small nation: the Vanuatu national forest policy. *International Forestry Review* 1(2)

Chapter 5

Training at professional and technical levels

John L. Innes¹ *FRBC Chair of Forest Management, Faculty of Forestry, University of British Columbia, Canada* and **David M. Ward**² *Head, Scottish School of Forestry. 1983-1997 (previously of the Federal Department of Forestry, Nigeria)*

5.1 PROFESSIONAL EDUCATION IN FORESTRY

INTRODUCTION

The education of foresters in the Commonwealth has a long history. The earliest formal education appears to have been the programme established at the Royal Engineering College (Coopers Hill, England) in 1885 by German silviculturalist William Schlich, which was specifically intended to train foresters for the nascent Indian Forest Service. It was broadened in scope in 1905, when the School of Forestry was transferred to the University of Oxford (Burley *et al.* 2004), where training was provided for forest officers serving throughout the then British Empire. Other programmes quickly followed, notably those at the Universities of Aberdeen, Edinburgh³ and Toronto (Canada) in 1907 with Wales (Bangor) in 1908, many countries within what is now the Commonwealth had one or more forestry schools.

The rapid expansion in forestry education at the beginning of the 20th century was mirrored by a decline in forestry education at the close of the century. Declining enrolments and the changes in the skills sets needed by professional foresters has caused considerable uncertainty. Over the past 20 years, the university-based education of foresters throughout the Commonwealth has been undergoing major and, at times, radical change. As indicated in the companion section on technical education, the role of professional foresters is evolving dramatically, as are the institutions that provide them with the necessary education.

This review focuses on the professional education leading to degrees in forestry at Commonwealth universities. Although the distinction between many diploma courses and degrees has become blurred, a possibly artificial distinction has been made between programmes that lead to diplomas (considered as technical education) and programmes that lead to degrees (considered as professional education). This means that no consideration has been given to institutions such as the Cyprus Forestry College, which only offers diplomas in forestry.

Technical vs. professional

The relationship between technical training and professional training is complex. At what point does training in technical matters, traditionally taught in technical education courses become training in knowledge-based skills, traditionally taught in professional schools? This debate is complicated by the blurring of roles between forestry professionals and trained technicians: for example, the Association of British

¹ John L Innes wrote section 5.1

² David M Ward wrote section 5.2

³ A lectureship was established in forestry at Edinburgh in 1889, with the B.Sc in Forestry first awarded in 1907.

Columbia Forest Professionals now includes both Registered Professional Foresters and Registered Forest Technologists, although the two categories are kept very separate in relation to permitted activities.

The artificial distinction between diploma-based and degree-based programmes fails to take into account that many universities will provide credits to those with a diploma, enabling them to enter into the later years of a degree programme. In some cases, such courses have been successful but in others, such as Makerere University, Uganda, the programme designed to enable diploma students to upgrade to a full degree has not been well-received. The first jobs of many professionally trained foresters are in technical positions, and the skills that they have learnt at university may quickly be lost. The relatively low pay and often difficult working conditions associated with such positions can also act as a disincentive to those entering the profession. In addition, many practising foresters consider that there is too much superfluous material taught in degree programmes, whereas the material (particularly the field skills) they really need is not taught in sufficient depth.

Enrolment

A trend that is apparent in some parts of the Commonwealth is the falling numbers of individuals seeking to study for a traditional forestry degree. This trend is not restricted to the Commonwealth, and is now recognised as a global crisis facing the professional education of foresters (Van Lierop 2003, Miller 2004). While many Commonwealth countries, particularly the small island nations, have no forestry education capacity, others are closing their institutions (such as the Oxford Forestry Institute). Great Britain has seen a dramatic drop in applications for traditional forestry courses, from 325 in 1996 to 156 in 2003 (Burley *et al.*, 2004). Figures for Canada are similar to those in the UK. The number of students enrolled in forestry programmes has decreased from 1,881 in 1995-1996 to 1,463 in 2003-04 (Innes 2004), and if the students studying in areas such as natural resources conservation and wood science and technology were excluded, the drop in numbers would be far greater. At the same time, this trend is not nearly so apparent in the allied sciences and increasing numbers of individuals now practising forestry do not have a traditional forestry degree.

What's in a name?

Can forestry be considered a discipline worthy of a university education, or is it a technical subject for which a non-university diploma is sufficient? Forestry as a broad academic discipline includes the full range of forest-related natural and social sciences. However, in most universities, forestry has never been considered sufficiently important to rank its own Faculty. Where it has, these faculties are often small relative to the rest of the university and in danger of amalgamation with other faculties. This partly reflects the decline in enrolment into traditional forestry programmes, and a number of different approaches have been adopted in an attempt to shore up student enrolment. Some universities have changed the names of their forestry departments in the belief that the terms 'forestry' and 'forester' has too many adverse connotations. Others have lowered their entrance standards, a policy that has repeatedly been shown to be ill-advised.

There are no clear answers to whether or not the discipline of forestry should remain distinctive. For some, there are advantages in maintaining the whole, especially with the rise of interest in environmental issues and tracking the origin of products. Wood products are increasingly linked to their origin through the chain-of-custody requirements of certification – many people wish to know whether a product they are purchasing is derived from a sustainably managed resource. Those working in forestry faculties generally have a common interest, namely forests and their products, and the synergies that can be developed through people from different academic backgrounds working together on common problems is substantial. Those advocating the dissolution of forestry as a discipline point to the falling enrolments in traditional forestry programmes, the advantages of 'forestry' students receiving training in a range of different faculties, and

the advantages associated with having faculty members located throughout a campus rather in one single place. A few forestry schools have been able to avoid the trend for reduced enrolments, but generally, forestry faculties have been amalgamated with other faculties, or forestry has been dropped altogether. In Australia, for example, there have never been separate forestry departments (Kanowski 2004) and the School of Forest and Ecosystem Science at the University of Melbourne is a part of the Faculty of Land and Food Resources. The forestry programme at the Australian National University is based in the School of Resources, Environment and Society, whereas the forestry programme at Southern Cross University is based in the School of Environmental Science and Management. At the University of Queensland, the forestry programme is based in the School of Natural and Rural Systems Management, and the Bachelor of Science in Sustainable Forestry at Edith Cowan University in Perth is housed in the School of Natural Sciences. It is a feature of these academic units that only one of the four mentions the word ‘forest’, and the term ‘forestry’ is absent altogether, yet all consider ‘forestry’ sufficiently important that they offer degrees in the subject.

Elsewhere, the Department of Forestry and Range Management at the University of Arid Agriculture, Rawalpindi (Pakistan) is located within the Faculty of Livestock and Range Management. In the UK, the Department of Forestry at the University of Aberdeen merged with the Departments of Agriculture, Zoology and Plant and Soil Science to form the School of Biological Sciences, and the School of Agricultural and Forestry Sciences at the University of Wales in Bangor was renamed the School of the Environment and Natural Resources and located in the College of Natural Sciences. Like the University of Oxford, the University of Edinburgh no longer offers an undergraduate degree in forestry (although an honours degree in Ecological Science, with a specialisation in forestry, is available), but an MSc in forest ecology and management is offered by the School of Geosciences.

The School of Agriculture, Rural Development and Forestry of the University of Venda, South Africa, provides an interesting example of how the term ‘forestry’ is no longer used. Although present in the title of the school, both the vision statement,

The vision of the School is “To become a ‘Centre of Excellence’ in agriculture, rural development and natural resources management in the region

and the mission statement,

The main role of the School of Agriculture, Rural Development and Forestry is to provide professional training to under and post graduate students, providing appropriate knowledge and skills relevant to the needs of government, private sector and farming community. The school aims at excellence in teaching, research and active participation in community outreach programmes in order to promote sustainable livelihoods in rural areas

omit any mention of forestry in the description of what the School does. Instead, the focus is on some of the critical issues faced by southern Africa, more closely related to poverty alleviation and resource management than traditional forestry. The University of Stellenbosch, South Africa, is similar, with their Department of Forest and Wood Sciences (in the Faculty of AgriSciences) offering undergraduate programmes in Forest and Natural Resource management and in Wood Products Sciences; again there is no mention of forestry. In another example, a three-year degree programme in “Sustainable Woodland Management” at the University of Worcester, England, is described as an Environmental Management degree, and its aims are described as follows:

The course is designed to teach students to apply their knowledge, derived from aspects of ecology, physical geography and the underpinning scientific principles, to management of the natural environment.

These subtle (and sometimes not so subtle) changes in orientation reflect the profound manner in which forestry itself is changing.

Some forestry schools have maintained their connections to the subject. The New Zealand School of Forestry at the University of Canterbury, New Zealand, the Department of Forestry at the Papua New Guinea University of Technology and the Faculties of Forestry at the University of British Columbia, Canada, and Universiti Putra Malaysia are examples. Sokoine University of Agriculture in Morogoro, Tanzania, has a Faculty of Forestry that still contains many of the Departments that have largely disappeared elsewhere, namely Forest Biology, Forest Economics, Forest Engineering, Forest Mensuration and Management and Wood Utilization. However, very few Commonwealth universities have Forestry Faculties that integrate across the full range of forestry activities, from the forest to the product, and many universities now only provide education in a part of the range of forestry activities.

The modern forestry academic

Concurrent with the changes in the nature of the forestry profession, the background of those teaching forestry has changed, sometimes to the chagrin of those with more traditional views of the discipline (Nair 2004; Temu *et al.* 2006). Traditionally, it was viewed as a discipline rooted firmly in the natural sciences. Key contributions to a programme were made by courses in biology, chemistry, physics and other natural sciences. However, a range of contributions from the social sciences has been increasingly incorporated. As a result, a teaching unit dealing with forest management might still contain silviculturalists, neo-classical economists and biometricians, but these would be augmented by geographers, anthropologists, psychologists, planners, business managers, hydrologists and engineers.

This broadening of the discipline of forestry has created problems. Many universities now offer a forestry degree that consists of an amalgam of courses provided by a range of departments and faculties across the university. Although there are notable exceptions, some such programmes have little cohesion, may not be accredited by the professional forestry association of the country, and may lack teaching in some of the basic skills demanded of foresters. This appears to be the case with many of the programmes offered by British universities.

A second problem associated with forestry's broadening mandate is that the range of material that a 'general forestry practitioner' is now expected to know is so great that there is little chance of acquiring this within a three- or four-year degree programme, especially as the first year of many university programmes is spent trying to remedy some of the deficiencies of the school system. One possibility may be to move a new system of education, with the required basic social and/or natural science being offered in a three- or four-year first-degree programme, and a more specialised knowledge in a particular aspect of forestry being developed in a post-graduate degree. In Europe, there has already been substantial progress towards two-cycle degrees, as agreed through the Bologna Process⁴, and second-cycle degrees, such as the MSc programmes in Sustainable Tropical Forestry and Sustainable Forest and Nature Management offered through the European Erasmus Mundus programme⁵ are heavily over-subscribed (one Commonwealth university, the University of Wales, is associated with this exciting initiative).

These problems have also created opportunities. The diversity of knowledge has enabled the broadening of the expertise in some faculties, encouraging more inter-disciplinary research. The changing requirements have enabled the more adaptable universities to move forward and to explore new programme delivery methods such as on-line courses using technologies such as 'webct' and 'Blackboard' (<http://www.webct>).

⁴ The Bologna Process of reforms and standardization of European higher education. See http://ec.europa.eu/education/policies/educ/bologna/bologna_en.html

⁵ The Erasmus Mundus programme is a co-operation and mobility programme in higher education, which promotes the European Union as a centre of excellence in learning around the world. See http://ec.europa.eu/education/programmes/mundus/index_en

com). A range of new teaching techniques are being explored, and forestry lends itself to some of these. This in turn has pushed many forestry academics into exploring new technologies and new areas of research and teaching, to the benefit of all (Nair 2004). However, many of these new technologies have yet to be exploited to their full potential (Längin *et al.* 2004).

Networking

Traditionally, a large number of professional foresters in the Commonwealth were trained by the University of Oxford. However, with the decline and eventual demise of forestry as an academic subject at that university, there have been questions raised about a successor. Disappointingly, there has been little interest in filling the gap. Many universities are hampered by local forestry accreditation requirements, a system that has ensured that traditional standards are maintained but which have often resulted in priority being given to local issues. A notable exception is the School of International Tropical Forestry at the Universiti Malaysia Sabah. This school offers undergraduate degree programmes in 'International Tropical Forestry', 'Nature Parks and Recreation', 'Forest Plantation and Agroforestry' and 'Wood Fibre Industry and Technology', and an MSc in Agroforestry. It specifically caters to international students. In a move reminiscent of the origins of professional forestry education in the Commonwealth, curriculum development is receiving considerable support from the Deutsche Gesellschaft für Technische Zusammenarbeit GmbH (the overseas development agency of Germany).

Some schools have succeeded in adopting a leadership role in the professional education of foresters, such as the forestry programmes offered in South African universities (principally the University of Stellenbosch, but with new programmes emerging in other universities, such as the University of KwaZulu-Natal). The University of KwaZulu-Natal in particular is attempting to fulfil a regional need by organising International Forestry Schools. For countries such as Swaziland and Lesotho, this may be one of the few opportunities for professional forestry education. There have been some interesting networking opportunities that have developed. For example, using the Canadian University partnerships in Cooperation and Development Programme, the Centre for Advanced Wood Processing at the University of British Columbia, Canada, has teamed up with Stellenbosch University and Nelson Mandela Metropolitan University to deliver first-degree educational programmes in value-added wood processing. A specific objective of this programme is to strengthen partnership between South Africa's forestry educational institutions and the private sector and the communities they serve, and increase the educational opportunities for persons from disadvantaged backgrounds.

Outside South Africa, several forestry schools in Africa, including the University of Ibadan (Nigeria), Makerere University (Uganda) and Sokoine University of Agriculture (Tanzania) played important roles in educating foresters from a number of countries in the 1970s and 1980s, but the level of international recruitment at each of these institutions has declined since the 1990s (Temu *et al.* 2006). Similarly, the degree of cooperation between the various forestry schools has declined, and efforts to revive cooperation and coordination have met with mixed success (Kiyiapi 2004).

A special case that deserves mention is the Réseau des Institutions de Formation Forestière et Environnementale d'Afrique Centrale (RIFFEAC). This francophone network of Central African forestry training institutions includes the University of Dschang in Cameroon, and appears to have been reasonably successful in promoting cooperation in forestry education in the region (Kiyiapi 2004). However, like many such programmes, it suffers from inadequate resourcing.

Examples of forestry degrees on offer

Despite the rapid changes, there are still many potential opportunities for forestry degrees throughout the Commonwealth. For example, in addition to the South African programmes mentioned above, several universities in Kenya offer forestry and/or forestry-related courses. The programme at Moi University in

Kenya appears to be particularly strong, with undergraduate degrees offered in Forestry, Agro-forestry and Rural Development and Wood Science and technology. In addition, graduate programmes are offered in forestry and in wood processing, with the latter including specialisations in wood composites, wood bio-deterioration, wood preservation, pulp and paper science, sawmilling, wood mechanics and timber engineering. At Makerere University, Uganda, the Faculty of Forestry and Nature Conservation offers Bachelor's degrees in forestry, community forestry, and wood science and technology and postgraduate degrees in forestry and agro-forestry. The National University of Science and Technology in Bulawayo, Zimbabwe, offers a Bachelor of Environmental Science in Forest Resources Management, and a degree in forestry is also offered by the Universidade Eduardo Mondlane in Mozambique. In Ghana, Kwame Nkrumah University of Science and Technology in Kumasi previously only offered a BSc in Natural Resources management but, in 2005, it introduced a new BSc programme in Forest Technology.

Some universities offer degrees that incorporate one or more courses in forestry. For example the Faculty of Science and Agriculture at the St Augustine campus (Trinidad and Tobago) of the University of the West Indies offers a single course in Tropical Forest Ecology and Management, which can be taken as part of a non-forestry degree. Similarly, the BSc in Natural Resources Management offered by the University of Belize has a single forest-related course, in forest ecology and management. Such courses, while valuable, are clearly not designed to train professional foresters in all the skills that they now require.

The Commonwealth countries in Asia also have a range of options although they differ markedly between countries. For example, in India, a number of State agricultural universities and general universities have started first degree forestry courses, based on the recommendations of National Commission on Agriculture. However, many forestry professionals are initially trained in a non-forestry subject, and then go on to study forestry at a post-graduate level at an institution such as the Indian Institute of Forest Management in Bhopal, or to receive career-oriented training at the Forest Research Institute Deemed University in Dehradun.

The Department of Forestry and Environmental Science of the University of Sri Jayewardenpura in Sri Lanka offers a BSc programme in Forestry and Environmental Science. The University of Peshawar, Pakistan, partners with the Pakistan Forest Institute to offer both a BSc and an MSc in Forestry. In Malaysia, forestry degree programmes are offered by the Universiti Putra Malaysia and the Universiti Malaysia Sabah. Such opportunities ensure that there is at least a trickle of professional foresters being trained in the Asian Commonwealth countries.

A variety of forestry degrees are on offer in the United Kingdom, Canada, Australia and New Zealand. These range in content and structure, from very applied courses specifically designed for those entering a forestry career to more theoretical or science-based courses designed for individuals pursuing careers in the forest sciences or other non-forestry careers. For example, the University of Melbourne, Australia, offers an Associate Degree in Forestry Management, designed for those employed in or wishing to enter forestry or the forest industry. They also offer a Bachelor of Forest Science (Honours) degree for those seeking a fuller education experience or envisaging a career in research or science. The Australian National University has a different approach offering a range of degrees with varying forestry-related content. These include a Bachelor of Interdisciplinary Studies (Sustainability), a Bachelor of Science (Forestry), and a Bachelor of Science (Resource and Environmental Management). It is also possible to combine the BSc(Forestry) with another subject to acquire a joint degree. The programme offered by Southern Cross University is a Bachelor in Applied Science (Forestry).

The New Zealand School of Forestry at the University of Canterbury offers a Bachelor of Forestry Science degree, and also offers a combined engineering and forestry degree (Bachelor of Engineering (Honours)). In Canada, amongst many programmes on offer across the country, the University of British Columbia offers five distinct Bachelor of Science degrees, in wood sciences, forest operations, forest resources management, forest science and natural resources conservation. The University of New Brunswick offers two Bachelor of Science degrees, in Forestry and Forest Engineering, whereas Laval University

(Quebec) offers three first-degree programmes: Forest Operations, Wood Science and Forest Management and Environment. A range of other degrees is available in Canada, depending on the university.

Accreditation⁶

The proliferation of degree programmes containing an element of forestry has presented a challenge to those trying to ensure that the standards of forestry education are maintained. The Institute of Foresters in Australia, the Institute of Chartered Foresters in the UK and the Canadian Forestry Accreditation Board are examples of organisations that specify the requirements of forestry education. Should attempts be made to suppress such courses, thereby both ensuring that standards are maintained and protecting the more traditional forestry programmes from competition? To a certain extent, this is already occurring within the profession. Within Canada, for example, a number of provinces have right to title legislation that states that only registered professional foresters have the right to use the title “forester” or practice forestry. This can be problematic, as what constitutes the required training for a forester in one jurisdiction may not count in another. Much the same applies to universities. For example, the Faculty of Graduate Studies at the University of British Columbia does not recognise the degrees and certificates issued by the Indian Institute of Forest Management, but does recognise the Indian Forest Service qualifications issued by the Forest Research Institute Deemed University in Dehradun.

Professional forestry education at Commonwealth universities: outlook

The teaching of forestry at Commonwealth universities faces some significant challenges. In countries such as the UK, Canada, Australia and New Zealand, forestry no longer has the attraction for students that it once did, despite the availability of jobs. Similar trends are reported from the African forestry universities (Temu *et al.* 2006). The universities have tried various tactics to stop this decline, with varying degrees of success. It is apparent that many programmes at traditional forestry universities are failing to adapt to the changing requirements for foresters, creating an opportunity for new programmes to develop in Canada. For example, the forest management programmes at the Universities of British Columbia and Northern British Columbia are experiencing difficulties with local recruitment (although international recruitment is increasing at UBC), whereas a new programme developing at Thompson Rivers University, which is much more flexible in its approach, appears to be successful.

Forestry programmes in some of the African countries do not appear to have issues with student numbers. Instead, there are a range of other problems, including lack of teaching capacity and lack of equipment in some universities (Dyer and Wingfield 2004). Many of the African forestry programmes have adapted to the changing needs of forestry professionals, strengthening the social aspects of forestry and providing better opportunities for fields such as agro-forestry. In some quarters, there is a strong feeling that forestry education should better address the needs of individual countries in sub-Saharan Africa, specifically poverty eradication and food security, in addition to the global needs of employment and a clean environment.

A major problem facing the forestry programmes in most Commonwealth universities is the way in which they are viewed within their respective universities. Forestry is often seen as little more than technical training, and is sometimes viewed as a subject taken as a last resort by struggling students. This view was not helped by some schools dropping their entry standards in an attempt to bolster applications. There is little evidence of forestry being seen on an equal footing to other disciplines, a problem that is

⁶ See also Chapter 4 for a description of professional forestry institutes and associations

BOX 5.1 *International Partnership for Forestry Education*

Background

Post-secondary forestry education is facing serious problems related to enrolment in forestry schools, curricula and quality of graduates. While the magnitude and consequences of the specific problem(s) vary from one country to another, the issue has become a global concern. Many reports have shown that enrolment in forestry schools is declining in several countries, and that some schools are producing graduates with qualifications insufficient to steward and manage forest resources. Both public and private investments in forestry education have dwindled to seriously low levels. The reasons for such a decline are many; ranging from public perception of forests and foresters to economic decline in the sector to competition from other disciplines, such as informatics, in attracting young students.

As a reaction to declining enrolments, many post-secondary institutions have cancelled, suspended or down-sized their forestry programmes, while others have combined forestry with other natural resource management disciplines such as agriculture or soft sciences such as sociology and geography. Meanwhile, many popular education programmes have emerged purportedly to fill the void and there are fears that forest sciences and innovation would suffer, while the assault on forests continues unabated. Eventually, many government agencies and private industries may not be able to meet their staffing needs both in numbers and quality of professional foresters.

Notwithstanding the difficulties facing forestry education, there are serious national and global efforts to revitalise the sector mainly through identifying the challenges that have led to its decline and developing strategies that would enable revitalisation. One of the approaches to fill the gap created by the absence of global fora addressing forestry education is to establish an international partnership among concerned institutions.

The idea of developing a new partnership for forestry education emerged from discussions at the University of British Columbia's 50th anniversary celebrations in December 2001. At the XII World Forestry Congress in Canada (2003), a few universities, networks and international organizations discussed the issue and agreed to establish a mechanism for coordinating efforts to improve forestry education. Later in 2003 the International Partnership of Forest Education (IPFE) entered into its development phase through the support of World Bank Development Grant Funding which continued until the end of 2004. Broader consultation on the concept was sought in organized sessions and in open meetings at SILVA Meeting (2004), and at the UNFF 4 meetings in May 2004. During these sessions the IPFE's role to enhance forest education was further refined and developed into a means of supporting and complimenting existing institutions and partnerships. The model that emerged was that the partnership was a "network of networks" that linked different networks and their interests in forest education together under common themes.

The International Partnership on Forest Education (IPFE) was formally launched at an international meeting on forest education held at the FAO, Rome in April 2006. Future governance structure and next steps were the central issues at the meeting in Rome. Hosny El Lakany, Adjunct professor at the University of British Columbia, Faculty of Forestry was elected to Chair the IPFE initiative. Three Vice Chairs were also named: Paavo Pelkonen, Vice-Dean, Faculty of Forestry, and member of SILVA Network, University of Joensuu; August Temu, Leader, Training and Education Programme, ICRAF; Nairobi, Kenya; , Finland and Osvaldo Encinas, Director, Postgrado Forestal, Universidad de Los Andes. Merida, Venezuela.

Mission

Helping institutions concerned with forestry education meet societies' needs, through facilitating forestry educators' and students' engagement with relevant knowledge and understanding among each other and with society.

Focus

Strengthening university-level education about forests and forestry worldwide by facilitating and supporting collaborations that capitalise on the comparative advantages of and synergies among the diverse institutions committed to education about forests and forestry. IPFE envisages such collaborations in various forms and scales, and for a variety of specific objectives.

IPFE acknowledges and seeks to draw on the many perspectives and the diversity of knowledge about forest and tree values, products and services, and management to sustain them. Thus, IPFE's scope includes the full range of topics and disciplines relevant to forests, their sustainable management, and their products and services.

Objectives

- Improve the quality and relevance of forestry education
- Raise the profile of forestry education nationally and globally and
- Improve generation and dissemination of knowledge on forestry education among institutions, networks and concerned international organizations.

Development Phase

Currently the University of British Columbia in Vancouver, Canada and the University of Joensuu in Finland co-host the IPFE secretariat with some seed funds from the Canadian Forest Service and Finnish Government, respectively.

IPFE has strong linkages with the Global Forest Information System (GIFS) of IUFRO, SILVA Network, the International Forestry Students Association, and with the Forestry Department of FAO.

During this phase membership will be strengthened and an expanded multi-year proposal for funding will be prepared. Preparations are underway to convene a workshop on “Improving the quality of forestry education in Africa, to be co-hosted by World Agroforestry Centre (ICRAF), African Forest Research Network (AFRONET) and SILVA Network in Nairobi, Kenya.

Dr. Hosny El Lakany, IPFE Chair

Adjunct Professor, Faculty of Forestry, UBC,
Vancouver, B. C. Canada
hosny.ellakany@ubc.ca

particularly acute because of the affinity of most programmes with the natural sciences. This is a common problem for subjects that span a number of basic disciplines.

Finally, the Commonwealth provides a huge potential for networking, yet this is hardly used. There are no opportunities such as the Erasmus Mundus programme of the European Union, despite the clear possibilities for developing such exchanges. Furthermore, we have not been successful in training students with an international perspective who could play an active role in some of the critical discussions surrounding the future of the world’s forests (El-Lakany 2004). There is a significant lack of cooperation and coordination amongst the forestry programmes offered by Commonwealth universities. Modern technologies, such as distance education, have opened up enormous opportunities, but to date have not been properly exploited. Establishing a useful and production system for coordination and collaboration amongst the different universities offering professional forestry programmes throughout the Commonwealth would be an invaluable objective.

5.2 TECHNICAL EDUCATION AND TRAINING IN FORESTRY

Technical education in forestry used to refer to the training of forest officers below the professional level. Before about 1970 it aimed to produce a grade of staff often referred to as “foresters” or sometimes “forest rangers” throughout the Commonwealth, whose task was to support the university-trained staff. The forestry schools, which had a high *esprit de corps*, were nearly always part of the Forestry Department. Typically the students had a good basic education and were well-motivated; on successful completion of the course they passed directly from forest school to the forest service, the sole employer. Foresters were almost exclusively male and their training called on them to be self-reliant since their work was in isolated places although they were also closely integrated into the local community.

Since the 1970s a number of changes have occurred in technical and professional training. Forest management no longer exists in isolation but interacts with other disciplines and forms of land use outside the forest, as well as with society. More, and more complex skills, are required, often related to the use of computers but including also matters such as health and safety regulations, the laws of access, the

requirements for certification and so on. Women joined the profession, not only at university-level but also in the formerly all-male bastions of the forestry schools.

At first such developments occurred in the developed economies but soon all Commonwealth countries were adapting to the new pressures, hastened perhaps by post-independence needs and developments. As outlined in *Technical vs Professional* in the section on professional education above, the distinction has become blurred. One change has been to upgrade the forest schools into colleges, which in many cases became linked with Polytechnics and Universities and hence are able to offer degrees as well as diplomas. Thus the artificial distinction between diploma-based and degree-based programmes has largely disappeared.

There are currently four challenges to the technical education of forestry in the Commonwealth:

- Firstly, re-consideration of the role of the (former) foresters. Is a forester primarily a technical expert concerned with afforestation and/or harvesting, or perhaps arboriculture/urban forestry (a view prevalent in UK even in forestry circles); or are they primarily land managers concerned with sustainability and having to interact with a wide range of land users? The latter seems desirable, since otherwise many political, financial, and social issues that affect forests and forestry will be determined by others. Technical education seems to imply the first, yet there are equally valid skills and competencies that need to be acquired for the second.
- Secondly, the curriculum - which will depend to a great extent on the answer to the first challenge. Education, which is knowledge-based, and Training, which provides skills and competence, cover a spectrum of activities. How does the Institution get the correct balance through its curriculum. The courses, and ethos, provided by Technical Forestry Schools/Institutions probably should be predominantly Training, i.e. competence based, but many appear not to be. The curriculum, for example, is defined by subjects (mensuration, utilisation) and by exams; rather than by competence (operation plan for planting/harvesting a given site) and competence assessments. A major disadvantage of subject based curricula is that increased diversity and complexity leads to more subjects being added and the students work load increased, as outlined below. Competence based courses are related to the job an employee is recruited for, thus changes can be accommodated by splitting courses rather than purely adding to a single one. Competence based courses also allow for a hierarchal solution to different work situations. It is important that Institutions provide courses at different levels (how many will depend upon the circumstances) and encourage students to progress from one to another. Although there are advantages in a single long course, alternatives that provide a mix of short courses, distance learning, computer-based activities, video conferencing etc do exist and should be utilised.
- Arising from the curriculum is the third challenge, posed when the institution is no longer under the direct control of the Forestry Department. Being part of a larger education unit has advantages but how does the Forestry School fight for funds and recognition, and maintain direct links with the Forestry Service? Should there be a Forestry Education and Training Board established, however small, or advisory boards for each Institution?
- Closely linked both to the curriculum and the institution is the fourth challenge, that of complexity. Curricula have become more complex due to a number of factors - the broadening of the forestry profession, technological changes (e.g. harvesters), increased use of computers, legal requirements etc. Institutions need not only to develop the curriculum to meet these changes, and find qualified staff to teach it, but also consider how these changes impact on their student profiles and intake procedures - more people-orientated rather than machine for example, greater numbers of women. Also of concern here is the employment expectations of students and employers. Unfortunately a vicious circle can be created; greater complexity >> longer courses >> higher qualifications >> more responsibilities >> higher salary expectations >> but fewer staff because of budget limitations. Does the School

increase the length of the course but reduce the numbers or accept that only a few will get the sort of job they have trained for, the remainder will have to accept either a more lowly job or a long period of temporary or contract employment.

These challenges are common to all Commonwealth countries, so there must be a great opportunity for them to exchange experience and learn from one another. It must be remembered that technical based institutions, and their staff and students, can benefit from networking programmes as well as professional ones.

CONCLUSIONS

Although remedies and opportunities will vary from place to place, situation to situation, there are three areas currently of particular importance for technical forestry education.

1. Role and Function. Technical Forestry Schools, no matter how set up, derive their function from the forest policy of the country. Their role is to provide competent staff to meet the current (and immediate future) needs of the forestry sector as determined by the strategies and objectives adopted. Where these are clear then the courses run by the Institutions can be sharply focussed, where woolly the curricula will be vague. To provide leadership in this either a national Forestry Education and Training Board (or equivalent), or a local Forestry Advisory Panel, might exist.

2. Establishing competence based curricula. This is a must at technical and practical skill levels. Since competent staff are required then competence based teaching and assessment is required. A top down approach may be followed;

Step 1. The forest industry, public and private, defines the levels of staff they require and the jobs they do (in broad terms)

Step 2. The broad terms need to be broken down into categories; technical, supervisory, managerial etc.

Step 3. The elements of each job need to be decided.

Step 4. The assessment procedures and standards for each competence/task need to be agreed

3. A hierarchal approach. With competence based assessment it is possible to progress up from one level to the next. These levels can be expressed as 1. Practical - Operator training (and Certification), 2. Technical - how operations are carried out, 3. Supervisory - organising and controlling forest operations, 4. Managerial - medium to long term planning and organisation control, 5. Scientific - investigating improvements. As one progresses then the Education percentage of the course will increase.

It is important that institutions provide courses at different levels (how many will depend upon the circumstances) and encourage students to progress from one to another. Although there are advantages in a single long course, alternatives that provide a mix of short courses, distance learning, computer based activities, video conferencing etc do exist and should be utilised.

REFERENCES

BURLEY, J., PLENDERLEITH, K., HOWE, R. and FREER-SMITH, P. 1984. Forest education and research in the United Kingdom. In: Proceedings of the International Symposium on Forest Research and Education for the 21st Century, 12 October, Seoul, Korea. Korea Forest Research Institute, Seoul,

- pp. 1-18.
- DYER, C. and WINGFIELD, M.J. 2004. Challenges and strategies facing forest research and education for the 21st century: A case study from South Africa. In: Proceedings of the International Symposium on Forest Research and Education for the 21st Century, 12 October, Seoul, Korea. Korea Forest Research Institute, Seoul, pp. 125-135.
- EL-LAKANY, H. 2004. Looking outward: Incorporating international forestry in higher forestry education and research. *Unasylva* 55 (216), 52-56.
- INNES, J.L. 2004. Challenges facing forest educators in North America. In: Proceedings of the International Symposium on Forest Research and Education for the 21st Century, 12 October, Seoul, Korea. Korea Forest Research Institute, Seoul, pp. 136-150.
- KANOWSKI, P. 2004. Forest research and education in Australia in 2004. In: Proceedings of the International Symposium on Forest Research and Education for the 21st Century, 12 October, Seoul, Korea. Korea Forest Research Institute, Seoul, pp. 165-185.
- KIYIAPI, J.L. 2004. Forestry education in Africa: rethinking current directions. *Unasylva* 216 (55), 22-23.
- LÄNGIN, D.W., ACKERMAN, P.A. and LEWARK, S. 2004. Internet-based learning in higher forestry education. *Unasylva* 55 (216), 39-44.
- MILLER, H. 2004. Trends in forestry education in Great Britain and Germany, 1992 to 2001. *Unasylva* 55 (216), 29-32.
- NAIR, C.T.S. 2004. What does the future hold for forestry education? *Unasylva* 55 (216), 3-9.
- TEMU, A.B., OKALI, D. and BISHAW, B. 2006. Forestry education, training and professional development in Africa. *International Forestry Review* 8 (1), 118-125.
- VAN LIEROP, P. 2003. Trends in forestry education. Paper presented at the XII World Forestry Congress, Quebec City, Canada, 21-28 September 2003.

Chapter 6

Forest Research in the Commonwealth

P.J. Wood former Senior Forestry Adviser UK Department for International Development (DfID) with inputs from A.Brown (Australia), B. Chikamai (Kenya), J. Richardson (Canada), R Sands (Australia), R.V. Singh (India), W.R.J. Sutton (New Zealand)

SCOPE

Forestry research began in the different countries that now comprise the Commonwealth at varying times between the mid-19th and early 20th centuries. Research into forest and tree biology was linked to the needs of forest and plantation management, whereas harvesting and utilisation research followed industrial priorities. Countries that have developed similar models have been grouped into the following regions:

Africa	Forest research in the Commonwealth countries of Africa is largely based on the Indian model. South Africa in particular has a leading international role in research on plantations.
Australia and New Zealand:	Australia and New Zealand have high standards of forest research and are international leaders in sub-tropical and tropical plantation research
Canada	The most forest-rich country in the Commonwealth with most of its forest areas in temperate or boreal zones.
United Kingdom, Cyprus:	The UK Forestry Commission was created in 1919 with responsibilities for forest development in Great Britain, but many forest-related research institutions were based on colonial needs and were established earlier. Cyprus, the only other Commonwealth country with forest in Europe developed forest management for Mediterranean conditions
Indian subcontinent,	India is the largest Commonwealth country with the longest tradition of scientific forest management, which was based originally on central European traditions. Bangladesh, Pakistan and Sri Lanka have developed from the Indian model.
South East Asia	Malaysia is the principal country in this region, a leader in management of dipterocarp forests.
The Pacific Islands	Forestry in the Pacific Islands of the Commonwealth has many similarities with that in Australia and New Zealand, with emphasis on intensive forest management, both in natural forest and plantations. Much of the research done has relied on external assistance.
The Caribbean and South America	Including the Caribbean islands, Belize and Guyana, research has been on a small scale but to a high standard

AFRICA

History

Forest research in the Commonwealth countries of Africa was structured on the Indo-Germanic model. All countries concerned had a colonial background, although only those with cooler climates had large-scale

European settlement and not all were originally British colonies. There is thus more variation between these countries than between Commonwealth countries in other parts of the world; they are subdivided as follows:

West Africa: Nigeria, Ghana, Sierra Leone, Gambia, Cameroon

East Africa: Kenya, Tanzania, Uganda

Central Africa: Zambia, Zimbabwe, Malawi

Southern Africa: Lesotho, Swaziland, Botswana, Mozambique, Namibia, South Africa

African Islands: Mauritius, Seychelles

In all countries, but especially in the smaller ones and the islands, it has often been difficult to fund research programmes reliably even when qualified staff have been in place. Attempts to achieve economies of scale through amalgamation or through networking have therefore been common. An example of the former, now superseded, was the East African Agriculture and Forestry Research Organisation (EAAFRO).

The East African Herbarium still co-ordinates many aspects of forest and tree biology especially taxonomy, and more recently some regional forestry research has been carried out through the Southern African Development Community (SADC). The latest initiatives for African forest research networking are FORNESSA (Forest Research network for Sub Saharan Africa) sponsored by FAO and IUFRO, and AFORNET (African Forest Research Network) sponsored by the African Academy of Sciences (based in Kenya). The World Agroforestry Center (ICRAF) is based in Kenya, and CIFOR has a field station in Africa.

Major achievements

Most of the West African countries are forest-rich and research departments were established early on. Particular achievements have been detailed studies on forest botany and silvics of major species, especially in the moist forest zones. The Forest Research Institute of Nigeria, (FRIN) based in Ibadan, the Forestry Research Institute of Ghana (FORIG) in Kumasi and the Limbe Botanic Garden in Cameroon are particularly well-known. In Eastern Africa all the countries have competent and productive research institutes, covering forest biology and forest utilisation, as well as several well-established universities covering forestry in education and research. Considerable progress has been made in research on forest plantations and on community forestry as well as in forest botany and ecology. In southern Africa the outstanding capacity and facilities of South Africa have become more accessible to support research in neighbouring countries of SADC, where, however, facilities are still under-funded despite often having a good record of research activity and publication. Outstanding achievements in industrial plantation management and forest products utilisation were achieved through both government and private sector research. Research into the ecology of the major vegetation types, including for example *Brachystegia* (miombo) and *Colophospermum mopane* (Mopane) woodland has been aided by collaboration with CIFOR.

Future challenges

A major challenge throughout Africa is the continuing education, funding and retention of forest research scientists. Funding for carrying out research from national governments is restricted and forestry is very much the poor relation when compared with “food producing” sectors, especially when the budgetary source is the same for both. The myth that forestry is an integrated part of agriculture is particularly strong in sub-Saharan Africa. The importance of increasing agricultural productivity in halting or delaying deforestation is not always appreciated and the use of agroforestry in the restoration of lands degraded by agriculture is not given due prominence in inter-sectoral research. That said a number of smaller countries in Africa have developed competent forest research teams, in research institutions and universities, which

are able to attract research funding internationally. The challenge is therefore to achieve visibility as well as viability.

There is a plethora of priority research topics for Africa, identified from the interests of participants in many conferences and workshops, and from potential donors. However, for all countries, climate change is of prime importance. Within this priority, research in support of the Millennium Development Goals comprises the highest national priority areas. Other relevant topics include:

- Management of water catchments
- Genetic erosion of endemic vegetation
- Forestry as an agent for poverty reduction
- Sustainability of all products and services
- Overall inter-sectoral land management policy, planning and practice

AUSTRALIA AND NEW ZEALAND

History

Australia and New Zealand developed their forest research in parallel with developments in India and the smaller Commonwealth countries of Africa, the Pacific and the Caribbean. In New Zealand significant research started in 1920 and a single Forest Research Institute was established to cover all aspects of forestry, ecology and timber technology in 1946, supported by research from universities and other government institutions. Uniquely both timber and forest research were carried out on the same site. Research in forest economics was boosted when agricultural exports declined after the UK joined the European Union.

Research priorities in New Zealand were initially to select (mostly exotic) trees for a viable plantation industry and the highly efficient programmes of *Pinus radiata* silviculture, genetic improvement and utilisation were the result (Roche, 1990). A comprehensive account of New Zealand forest research to 1985 is given by Kinimonth, 1997. In Australia government-funded forest research institutions were set up separately by the states and the federal government (Carron, 1985). Since 1991 cooperation between industry, the universities and government agencies has been fostered through a series of Cooperative Research Centres (CRCs)¹. For the last 12 years the Forest and Wood Products Research and Development Corporation (FWPRDC)² has had an increasingly-important role as a coordinator and funder of research. Established in 1980, the Australian Centre for International Agricultural Research (ACIAR)³ has supported research of mutual interest to Australia and partner countries. In 2004 the two largest Australasian forestry R&D providers, CSIRO Forestry and Forest Products and NZ Forest Research Institute Ltd (Scion), pooled their resources in a joint venture, Ensis⁴.

Major achievements

Extensive work on the taxonomy, ecology, silviculture and utilisation of the indigenous forest flora has been carried out in both countries. Many Australian endemic species are of importance for plantation development in other countries, and now nearly 1.8 million ha mainly of pines and eucalypts have been

¹ <http://www.crc.gov.au/Information/default.aspx> and <http://www.crcforestry.com.au/>

² <http://www.fwprdc.org.au/>

³ <http://www.aciar.gov.au/>

⁴ <http://www.ensisjv.com/> ; Rick Ede, Chief, CSIRO Forestry and Forest Products: Ensis – Joining Forces for Trans-National Benefit at <http://www.iufro.org/events/congresses/2005/>

established in plantations in Australia, much in the last 15 years. Major research has been undertaken on plantations of indigenous and exotic species⁵, an important output being the protocols developed for *Pinus radiata* in both New Zealand and Australia. In New Zealand, over 1.8 million ha of plantations, largely of this species have been established, dating from the 1920s. Timber technology research, including the development of pulp and papermaking from eucalypts, has supported highly efficient wood industries, and has been internationally recognised by the award of two Marcus Wallenberg prizes⁶.

Future challenges

Human resources for research

Despite the establishment of Ensis, research capacity in forestry and forest products in coming decades may be constrained not least by significant reductions in the staff numbers of traditional research providers, an increased emphasis on short-term projects, and the diversion of staff from research projects to monitoring and consultancies. Many of the skilled personnel who have been ‘downsized’ have remained on call in the workforce as contractors or consultants, but their former contributions to institutional memories and the mentoring of younger colleagues are being lost, and their effectiveness is inevitably being eroded by increasing age and isolation. Future research capacity is also threatened by a marked down-turn in undergraduate numbers (Kanowski, 2006) a problem in many countries (described in Chapter 5). Although contemporary forestry problems may often be best addressed by teams including specialists from other disciplines, the consequent broadening of the potential pool of talent may be insufficient to meet national needs at a time both of expansion of the forest industry and of threats to it.

Some topics for research are described briefly below.

New horizons for plantations

In Australia, the large area of maturing eucalypt plantations established in the last decade for fibre production presents a significant challenge for harvesting and marketing, as well as an opportunity to establish important processing capacity in Australia. The ability to grow commercially-successful plantations in the seasonally-dry tropics of northern Australia, and in low-rainfall areas in southern Australia (e.g. some areas now used for wheat) would be valuable: in the first case, to expand and diversify regional economies (Underwood, 2006), and in the second to ameliorate land degradation resulting from salinisation (Maslin and McDonald 2004).

The hardwood dilemma

Australia and NZ have been very successful in developing timber industries based on softwood plantations, and more recently short-rotation hardwoods for fibre. However, research is still needed into the technical, economic and commercial challenges of establishing durable hardwoods from Australian native forests in plantations (Kile, 2005)

Forest protection and sustainability

Both native forests and plantations may be threatened by pests, diseases, weeds, droughts and fires. Sustaining productivity will require ongoing research in stand management, nutrition and genetics.

Water and climate change

Climate change is expected to have a profound effect on Australasian forests and on the research necessary to maintain them. In Australia, it is expected that an already very variable climate will become even more erratic, and that there will be more prolonged droughts and higher temperatures over extensive areas. These changes will certainly affect forest growth, and are likely to increase vulnerability to pests and diseases, and particularly fires. In some regions of southern Australia droughts and fires have already

⁵ Exemplified in IUFRO World Congress 2005 Host Scientific Awards to Drs Nambiar and Nikles, IUFRO News, Special issue, page 6 from <http://www.iufro.org/events/congresses/2005/>

⁶ <http://www.mwp.org/prizewinners.cfm>

significantly damaged the forest estate. The influence of forests on the quality and quantity of water yield from catchments has come to public attention as most cities in Australia face significant water shortages. Competition for water is increasing (see for example Clifton *et al.* 2006, and Nambiar and Ferguson 2005) and research on forested catchments is urgently required into management practices to maintain or increase water yield.

CANADA

History

Canada, like India and Australia, is a federal nation so that the greater part of forestry activity is decentralised, with responsibility for forest management lying with the Provinces. Canada's forest traditions owe more to the ideas of Pinchot, who was the founder of the US Forest Service, than to the Germanic/Indian tradition that lies behind the structure of forestry in the other Commonwealth regions.

The Canadian Forest Service, which celebrated its 100th anniversary in 1999, is the primary agency for forest research at the federal level. The research is conducted in a series of regional centres and also, for a period, in several national research institutes. A separate Forest Products Research branch, with two laboratories, provided research in solid wood products until the 1970s when it was privatised. Forest industry funded and set up Pulp and Paper Research Institute of Canada and later the Forest Engineering Research Institute of Canada. The work of these labs and institutes has continued to be supported by the federal government as well as by the forest industry, and is currently being combined into an integrated Fibre Centre.

Most of the Provinces have had their own forest research divisions, but presently only the British Columbia, Ontario and Quebec still maintain separate forest research groups. Universities have always been an important part of the forest research effort in Canada. Four universities have a long history of forestry education and research – University of British Columbia, University of Toronto, Université Laval (Quebec City) and University of New Brunswick. Since the 1970s, three more universities have developed specific forest research programs, and a number of others have faculty members involved in forest-related research.

Major achievements

Much expertise has been developed and results published in forest health - entomology and pathology - as well as in silviculture, ecology and fire management. Driven by Canada's vast geography, particular progress has been made with applications of remote sensing and geographic information systems to forest inventory and management. The results of research have been applied in the innovative "Model Forests" programme, which includes an international component developed through partners in other countries (described in Chapter 2).

Future challenges

In common with the rest of the world, Canada faces significant challenges as a result of climate change. For forests, the greatest impact is expected to be in the Prairie Provinces where the grassland area is predicted to extend farther north, as a result of higher temperatures and lower precipitation, into areas presently covered by boreal forest. Forest fire incidence is likely to increase, and devastating insect outbreaks become more frequent, widespread and severe. Challenges of this nature are already being faced. Partly as a result of global warming, but also related to increased globalization of trade and international movement of forest products, alien and invasive species – both plants and insects – are also

beginning to present challenges. Socio-economic issues which are increasing in importance include the challenge to Canada's forest industry to survive in the face of stiff competition from countries with warmer climates able to produce wood fibre more quickly and cheaply, resource-dependent communities faced with major economic changes, and the related impact of urbanization with an urban-based population making decisions of which they may have no first-hand knowledge or experience.

GREAT BRITAIN, CYPRUS

History

The British Forestry Commission was established in 1919, adopting many of the practices already developed in India, including the creation of research units within the forest service. Since Great Britain, and England in particular, was, and still is, very substantially deforested, research was largely focussed from the beginning on support to the national policy of creating a national strategic resource of mining timber. After the Second World War, emphasis gradually shifted to concerns related to the financial viability of tree growing, and subsequently to environmental and social benefits. The Forestry Departments of the four universities of Aberdeen, Bangor, Edinburgh, and Oxford carried out research mainly on British priorities but also on overseas subjects.

A number of research institutions were set up specifically to address needs for research for the developing countries of the then empire, and several of these such as the Colonial Pesticides Research Unit in Tanzania and the Imperial College of Tropical Agriculture, Trinidad were located in the developing countries themselves. The Imperial Forestry Institute was set up at Oxford University, which, in its role as the Commonwealth Forestry Institute, played a leading role on tropical forest research on a broad range of subjects. Major herbaria, timber research laboratories, pest and biological control research laboratories and specialised university departments were also established. The latter have been particularly adept at keeping in the forefront of socio-economic research needs. However, since the 1990s there seems to have been a steady decline in forestry research especially on tropical forestry.

Major achievements

For British forestry the silviculture and management of all the major species for planting have been developed and published and establishment technologies for all major site types for afforestation developed.

Future challenges

The research programmes of both the UK Forestry Commission research stations are described as '*addressing the social, economic and environmental aspects of sustainable forestry in a multifunctional landscape*'. Much research is now planned within the context of climate change and includes natural regeneration techniques and the conservation of semi-natural woodland. Other themes include *People, trees and woodlands* (developing a greater understanding of the ways in which trees benefit society and improving delivery of those benefits), *Land regeneration and urban greening* (establishing woodlands on brownfield and contaminated land), *Woodland biodiversity* (conserving and enhancing the biodiversity of forest ecosystems) and *Woodlands and the environment* (understanding the complex interactions between forests and their physical and historic environment). The protection of trees and forests from threats such as insects and disease is also important.

Cyprus is included as the only other European Commonwealth country with a significant forestry sector. Research has been carried out into reforestation and natural vegetation management, from which technologies have been developed. Future challenges include the impacts of climate change

THE INDIAN SUB-CONTINENT

By far the greatest amount of research on the forests of the sub continent has always been carried out in the country that is now the Republic of India. Most of the generalised historical account given here is a guide also to Pakistan, Bangladesh and Sri Lanka but, notwithstanding the enormous range of agro-ecological zones in the region, both the past achievements and the challenges for the future may be considered on a regional scale

History

The history of Commonwealth forestry research, like that of the art and science of forestry itself, is largely based upon the practices developed in British India at a time when the country encompassed Pakistan, Bangladesh and Sri Lanka in addition to the present day Republic of India. Research on the Indian subcontinent followed the setting up the Indian Forest Service under Lord Dalhousie in 1855. Dr Dietrich Brandis was the first Inspector General of Forests, bringing with him the experience and the principles of sustained management in the forests of Saxony and the first silvicultural principles were enacted in 1856. Government of India research institutions were set up at Dehra Dun (Imperial Forest Research Institute and College, 1906, which became the Indian Council for Forestry Research and Education in 1989) with regional centres at Coimbatore, Bangalore, Jabalpur, and Burnihat to cover a wide range of eco-zones. Research is carried out also by silviculturists in individual states; some of these research teams were already well established before 1900.

The main concerns of forest research were, from the start, the sustained yield of timber (with teak in first place), the protection of watersheds and the supply of non-timber forest products. In addition to reserved forests, game reserves were also important and, in British India until independence, large areas of forest remained in the hands of feudal landlords.

After independence, forest research in Pakistan was centred at Peshawar, in Bangladesh at Chittagong and in Sri Lanka at Kandy.

Major achievements

An enormous amount of traditional knowledge was collated and published and many major advances in knowledge also resulted from the work of the silviculturist(s), forest botanists and other scientists. Many notable publications on the natural resources and timbers of India – which at that time included Pakistan, Bangladesh, Sri Lanka and Myanmar- appeared well before 1900, the botany of the forests was well explored and forest floras and zoological treatises had also been prepared. By the 1920s the silvics of all the major tree species had been studied and published and well before the outbreak of the second world war text books on Indian forests and their silviculture were widely published and on every forest officer's shelves. Although not research, most of the forests belonging to the state were managed under carefully controlled working plans and the forest destruction that had marked the pre-Dalhousie era was a thing of the past. Research had played a key role in this. Extensive studies on properties of wood, bamboo and non timber forest products were carried out and published.

For the first half of the 20th century the pattern of State (reserved) forests with research carried out largely by professional foresters within the Forest Service was used as a model. This structure was not only adopted for the other colonies of the British Empire but also for Great Britain itself when the Forestry Commission was established in 1919.

In the post-second World War period many changes took place which put, and continue to put, great pressure on the sub-continent's forests. The most important of these, though it is not always highlighted, was very substantial population increase, not only in present-day India but equally in Pakistan and Bangladesh – more than an order of magnitude. In many Indian States Agricultural Universities have been established,

26 of which run courses in forestry, in parallel with increasing amounts of forest research, particularly in sociological subjects. Much research on the biology and management of natural forests has continued and many exotic species introduced and studied resulting in numerous publications on recommended technologies. Sociological pressures continue to build in relation to the natural forests in most parts of the region and Working Plans are becoming increasingly difficult to administer and implement. India has by far the largest forest sector in the region but Pakistan, Bangladesh and Sri Lanka exhibit similar trends, with centralised research and emphasis on . The role of NGOs and the private sector in research is also increasing steadily.

Future challenges

The challenges facing forest research today are greater than ever before. India is a leader in collaborative management of State Forests in partnership with local people (Joint Forest Management, described in Chapter 2) and in the latter half of the 20th century was a leader in “Social” forestry undertaken for communities. Many of the subjects for future research relate to changes in forest management, together with dwindling areas of productive forest, notably but by no means exclusively:

- Optimising the values of non timber forest and tree products and forest services in the rural and national economy
- Improved technologies for soil and water conservation:
- Restoration of degraded farmland;
- Improvement of agroforestry technologies
- Improved forest productivity, both rain-fed and irrigated

SOUTH EAST ASIA

History

The main Commonwealth countries in South East Asia with large areas of forest are Brunei Darussalam and Malaysia. Most forest research has been carried out in Malaysia.

Major achievements

Malaysian research on natural regeneration and the restoration of logged high forests has produced practical protocols for sustainable forest management in several countries in the region. Research into the conversion of rubber wood and its utilisation has been a major Malaysian accomplishment where natural forest and plantation silviculture and genetic improvement have also been studied.

Future challenges

Major forest research challenges for SE Asia are the development of robust techniques for community forest management, and social issues. The industry on the other hand is facing challenges in raw material supply, research on substitutes and higher value added products, and the adoption of new and more efficient technologies. The biological and social impacts of climate change will be another important research topic, as in other regions

THE PACIFIC ISLANDS (AUSTRALASIA/OCEANIA)

The countries in the region are mostly islands, including Papua New Guinea, Fiji and the Solomon

Islands

History

Most of the rain forests have been logged.

Research achievements

Research achievements include the development of protocols for management and restoration of these forests or advanced plantation technologies.

Future challenges

Maximising the effectiveness of what are in most cases very small research scientist cadres will continue to be a high priority. Developing management protocols for sustainable forestry together with realistic certification will also be important. Social and ecological issues following climate change could well be the most important of all.

THE CARIBBEAN AND SOUTH AMERICA

The Commonwealth countries of the region are mostly small islands with small areas of forest; exceptions are Guyana (for a description of Iwokrama Forest see Chapter 2) and Belize.

History

All the countries have small professional forestry cadres and few researchers. Most of the natural forests have been logged, but good progress has been made on regeneration methods and plantation technology. Forestry activity is, however, on a small scale and commonly concerned with the conservation of biological diversity, amenity (often in support of tourism) and small-scale plantations.

Research achievements

Research on plantations and natural forest regeneration has produced some valuable guidance on forest management. Forest botany and silvics of important species have been partially studied.

Future challenges

For most of the countries in the region the main future importance of research will be on effects of climate change on ecosystems and human settlement.

SUPPORT TO COMMONWEALTH FOREST RESEARCH

A number of developed Commonwealth countries have assisted less-developed countries with forest research since those countries attained independence from the UK. Australia, Canada, New Zealand and the UK have supported numerous research projects, many of which are still ongoing, in the whole of sub-Saharan Africa, parts of the Indian sub continent, Papua New Guinea and the Caribbean and the Pacific islands. Technical assistance through research training and the provision of specialised research personnel

has also been funded between Commonwealth countries.

The Department for International Development (DFID) of the UK has supported a Forest Research Programme (FRP) for developing countries (many of which are Commonwealth) since 1990 and Canada has allocated more than CND\$65 M in funding for a new research program to help the poorest adapt to climate change.

SUMMARY

Forest research has a long tradition in the Commonwealth, based as it has been for decades on the essential need for scientific investigation in support of forest management and conservation. Many countries, within and outside the Commonwealth, owe a considerable debt to the experience of India in establishing forest research within the official forest service.

Much work has been done on the development of techniques for tropical lowland forest management, although more remains to be done, and dry formations are less well investigated. The matching of species and provenances to site, and tree improvement work, has led to remarkable advances in plantation technologies and productivity throughout the Commonwealth; an example of a new priority is the need for hardwood plantations for high value veneer logs. Work on timber properties has led to the utilisation of many previously unused species, a particular example being the development of conversion techniques for rubber wood leading to the development of a major wood-working industry in Malaysia and elsewhere. Future research work will relate to tree breeding for improved recovery of wood and fibre.

Although much has been done through participatory research to develop methodologies for the involvement of civil society in the management of public forests the application still has a long way to go. India's Joint Forest management (JFM) initiatives are positive examples. Research is also still needed to increase the role of forestry in poverty reduction and to optimise the contribution of agroforestry and trees on farms in rural economies.

But more intensive management of both natural and planted forest is leading to greater risks from insect pests and disease outbreaks (discussed in relation to management in Chapter 2) and protection will constitute a priority for forest research in future.

Above all, however, all countries, whether developed or developing, tropical, temperate or boreal, emphasise the need for research into the impact on forests of climate change. Priorities will include such topics as the adaptation of species, provenances and ecosystems to drought, maintaining forest biological diversity, the effect of forest management practices on water catchment yields, fire prevention and control, and the detection and control of invasive species.

Other new directions will include social research related to the growth of an urban population with little appreciation of countryside issues, such as fire hazard, and other urban forestry issues such as tree planting for site amelioration on polluted sites.

CHALLENGES AND OPPORTUNITIES

The final chapter of Commonwealth Forests attempts to identify the main challenges facing Commonwealth forests and the people who look after them and to build on the opportunities that exist for meeting these challenges. Here are three bullet points covering the challenges in forest research as seen by the author:

- Forest research faces a considerable challenge in developing mechanisms both to adapt to the effects of climate change and to contribute to its amelioration. Among the former will be the adaptation of forest systems (including plantations) to drought and the increased risk of fire and pest attack, the maintenance of forest biological diversity, and the development of forest management practices to maintain or increase water catchment yields.

- Forest research must contribute more directly in future to informed policy-making and planning.. To do this it will increasingly need to move towards social, economic and political concerns in addition to its traditional strength in silviculture and ecology.
- But these technical challenges cannot be faced unless the funding of forest research in all Commonwealth countries improves, accompanied by the strengthening of human resources in terms both of staff numbers and training.

The opportunities will start with two overarching strengths - the shared common language, which could facilitate working together to share experiences in solving common challenges. The other is the role of the Commonwealth Forestry Conference.

One of the main opportunities in forest research is the Commonwealth-wide recognition of the imminent and usually negative impact which climate change will have on society. It offers forest researchers a unique opportunity to emphasise the shared nature of the challenge and thus the possibility of working together to find a solution - with improved support.

REFERENCES

- ANON. 2005. IUFRO World Congress Host Scientific Awards. IUFRO News, Special issue, p. 6, <http://www.iufro.org/events/congresses/2005/>
- AUSTRALIAN CENTRE FOR INTERNATIONAL AGRICULTURAL RESEARCH 2007. <http://www.aciar.gov.au/>
- AUSTRALIAN QUARANTINE AND INSPECTION SERVICE. 2007 Field Guide to Exotic Pests and Diseases: Asian Gypsy Moth. <http://www.daffa.gov.au/aqis/quarantine/pests-diseases/forests-timber/asian-gypsy-moth>
- AUSTRALIAN QUARANTINE AND INSPECTION SERVICE. 2007 Eucalyptus/Guava Rust. <http://www.daffa.gov.au/aqis/quarantine/pests-diseases/plants/eucalyptus-guava-rust>
- BAKER, R.T. 1919 The Hardwoods of Australia. Department of Education, NSW, 522 pp. and Algar, W.H. Forestry and forest products. Chapter 4, pp. 202–262 in Technology in Australia 1788–1988. Australian Academy of Technological Sciences and Engineering, Melbourne, <http://www.austehc.unimelb.edu.au/tia/202.html>
- CARRON, L.T. 1985 A History of Forestry in Australia. ANU Press, Canberra, 355 pp.
- CLIFTON, C., DAAMEN, C., HORNE, A. and SHERWOOD, J. 2006 Water, land use change and ‘new forests’: what are the challenges for south-western Victoria? Australian Forestry 69, 95–100.
- CSIRO 2006 Assessing the Impacts of Climate in Australia. <http://www.csiro.au/csiro/content/standard/ps271.html>
- DEPARTMENT OF EDUCATION, SCIENCE AND TRAINING. 2007 Cooperative Research Centres. The Department, Canberra. <https://www.crc.gov.au/Information/default.aspx> and <http://www.crcforestry.com.au/>
- ENSIS. 2007. <http://www.ensisjv.com/> ; and Ede, R. 2005 Ensis – Joining Forces for Trans-National Benefit. Presentation to IUFRO World Congress 2005, 8–13 August 2005, Brisbane, <http://www.iufro.org/events/congresses/2005/>
- FOREST AND WOOD PRODUCTS RESEARCH AND DEVELOPMENT CORPORATION. 2007 <http://www.fwprdc.org.au/>
- KANOWSKI, P.J. 2006 Forestry education — where are the students, and what should we do? Australian Forestry 69, 241–242.
- KANOWSKI, P.J., WHELAN, R.J. and ELLIS, S. 2005 Inquiries following the 2002–2003 Australian bushfires: common themes and future directions for Australian bushfire management and mitigation. Australian Forestry 68, 76–86.

- KILE, G. 2005 The hardwood dilemma. *Australian Forestry* 68, 229–230.
- KINIMONTH, J.A. 1997. A History of Forestry Research in New Zealand. New Zealand Forest Research Institute.
- MARCUS WALLENBERG PRIZE. 2007 <http://www.mwp.org/prizewinners.cfm>
- MASLIN, B. and MCDONALD, M. 2004 *AcaciaSearch: Evaluation of Acacia as a Woody Crop Option for Southern Australia*. Rural Industries Research and Development Corporation RIRDC, Canberra, Publication No. 03/017, pp. 267. http://extranet.rirdc.gov.au/eshop/en-us/dept_90.html#item_779.
- MASLIN and MCDONALD 2004. *AcaciaSearch: Evaluation of Acacia as a Woody Crop Option for Southern Australia*. Rural Industries Research and Development Corporation RIRDC, Canberra, Publication No. 03/017. http://extranet.rirdc.gov.au/eshop/en-us/dept_90.html#item_779.
- A.C. MATHESON, M.E. DEVEY, T.L. GORDON, W. WERNER, D.R. VOGLER, C. BALOCCHI and M.J. CARSON. 2006. Heritability of response to inoculation by pine pitch canker of seedlings of radiata pine. *Australian Forestry* 69, 101–106.
- NAMBIAR, E.K.S. and FERGUSON, I.S. (Eds.) 2005 *New Forests: Wood Production and Environmental Services*. CSIRO Publishing, Collingwood, 248 pp.
- POYNTER, M. 2005 Collaborative forest management in Victoria's Wombat State forest: will it serve the interests of the wider community? *Australian Forestry* 68, 192–201.
- ROCHE, M.M. 1990. *History of Forestry*. New Zealand Forestry Corporation in association with GP Books, Wellington, N.Z. 466 pp, ISBN 0477000045
- SCHIRMER, J. and TONTS, M. 2003 Plantations and sustainable rural communities. *Australian Forestry* 66, 67–74.
- TURNER, J. and LAMBERT, M. 2005 Expenditure on forest and forest products research in Australia 1981–1982 to 2001–2002. *Australian Forestry* 68, 202–210.
- UNDERWOOD, R. 2006 Prospects for high-value hardwood timber plantations in the dry tropics of northern Australia. *Australian Forestry* 69, 142–145.

Chapter 7

The Commonwealth and the international forestry dialogue

Jim Ball Chair, Commonwealth Forestry Association

This chapter describes Commonwealth countries and their participation in the “international forestry dialogue” which has been ongoing especially since the UN Conference on Environment and Development in 1992.

THE COMMONWEALTH FORESTRY CONFERENCE

The Conference is an informal forum for foresters, and all those with an interest in the forestry sector, to meet to exchange knowledge and experience. It is hosted by different Commonwealth countries and the aim has been to hold Conferences at approximately four yearly intervals. It has been the custom to issue a Declaration or Recommendations at the end of each Conference, addressed to Commonwealth governments, especially to the meetings of the Commonwealth Heads of Government (CHOGM).

A Standing Committee on Commonwealth Forestry (SCCF) was established on the occasion of the Conference in 1923. Its role is to:

- provide continuity between one Conference and the next, including close liaison with host countries in their preparations, and follow-up actions;
- determine the Conference theme and format, invite speakers, commission papers and issue appropriate guidance notes;
- issue periodic newsletters to keep interested parties throughout the Commonwealth informed of arrangements and relevant activities;
- take appropriate follow-up action on Commonwealth Conference recommendations.

The Committee consists of one representative from each independent Commonwealth government (usually the head of the Forest Service or its equivalent), together with a number of co-opted advisory members. The co-opted members include the Commonwealth Forestry Association, the Commonwealth Secretariat and the UK Department for International Development. The UK Forestry Commission provides the Secretariat.

Commonwealth Forestry Conferences have been held since 1920 when the first (Empire) Forestry Conference was held in London. Table 7.1 shows the venues and themes for recent Conferences.

Discussions in the early Conferences were related to general aspects of forest management but the themes have developed to reflect the changing priorities of the forestry sector and cover social, economic, policy and the broader environmental dimensions. At the same time the programme has evolved with the emphasis in recent years less on plenary sessions and more on discussions in small groups. Participation at the Conferences is rarely more than about 400 and the atmosphere has always been low-key and informal, facilitating discussion and the exchange of experiences between Commonwealth foresters.

TABLE 7.1 *Venues and themes of Commonwealth Forestry Conferences*

Year	Location	Theme
1920	United Kingdom (London)	
1923	Canada	
1928	Australia & New Zealand	
1935	South Africa	
1947	United Kingdom	
1952	Canada	
1957	Australia & New Zealand	
1962	East Africa	
1968	India (New Delhi)	<i>Changing Objectives of Forest Management</i>
1974	United Kingdom	<i>The Forest and Global Environment</i>
1980	Trinidad & Tobago	<i>Forestry's Contribution to Social and Economic Development</i>
1985	Canada (Victoria)	<i>Investment in Forestry - The Needs and Opportunities</i>
1989	New Zealand (Rotorua)	<i>Forestry - A Multiple-Use Enterprise</i>
1993	Malaysia (Kuala Lumpur)	<i>People, the Environment and Forestry - Conflict or Harmony</i>
1997	Zimbabwe (Victoria Falls)	<i>Forestry in a Changing Political Environment: Challenges for the 21st Century</i>
2001	Australia (Fremantle)	<i>Forests in a Changing Landscape</i>
2005	Sri Lanka (Colombo)	<i>Forestry's Contribution to Poverty Reduction</i>

Source: CFA website <http://www.cfa-international.org>. Themes were not apparent prior to 1968.

TABLE 7.2 *Venues and themes of post-WWII World Forestry Congresses*

Number	Year	Location	Theme
III	1949	Finland (Helsinki)	
IV	1954	India (Dehra Dun)	
V	1960	USA (Seattle)	<i>Multiple use of forest and associated lands</i>
VI	1966	Spain (Madrid)	<i>Role of forestry in world economic changes</i>
VII	1972	Argentina (Buenos Aires)	<i>Forests and socio-economic development</i>
VIII	1978	Indonesia (Jakarta)	<i>Forests and people</i>
IX	1985	Mexico (Mexico City)	<i>Forest resources in the integral development of society</i>
X	1991	France (Paris)	<i>Forests, a heritage for the future</i>
XI	1997	Turkey (Antalya)	<i>Forestry for Sustainable Development: Towards the Twenty-first Century</i>
XII	2003	Canada (Québec City)	<i>Forests, source of life</i>

Source: World Forestry Congress Proceedings. There do not appear to have been themes before 1960

INTERNATIONAL FORESTRY-RELATED EVENTS

This section covers the two main global forestry meetings, the World Forestry Congress and the World Congress of the International Union of Forestry Research Organisations (IUFRO), as well as recent UN forest-related years and national Forestry Days.

(a) The World Forestry Congress

World Forestry Congresses serve as a forum for governments, universities, civil society and the private sector to exchange views and experiences and to formulate recommendations for implementation at national, regional and global levels. The Congress also provides an opportunity for the sector to produce an overview of the state of forests and forestry in order to discern trends, adapt policies and raise awareness of issues among decision-makers, the public and other parties concerned.

The first and second World Forestry Congresses were organised by the International Forestry Institute, in 1926 in Rome and in 1936 in Budapest. Subsequent Congresses have been held approximately every six years, organised by a host country and sponsored by FAO, which provides the permanent Secretariat.

The functions of the Congress are advisory, not executive, and participants attend the Congress in their personal capacity. The implementation of recommendations is a matter solely for those to whom they are addressed - for example, governments, international organisations, scientific bodies or forest owners. The outcomes are brought to the attention of the FAO Conference, which may consider endorsing any declaration coming from the Congress.

One of the most influential World Forestry Congresses was the Eighth with its theme of forests for

TABLE 7.3 *Post-WWII venues and themes of IUFRO World Congresses*

Number	Year	Location	Theme
	1948	Zurich (Switzerland) Lönroth (Finland)	
	1953	Rome (Italy) Burger (Switzerland)	
	1956	UK (Oxford) Italy (Pavari)	
	1961	Austria (Vienna)	
	1967	Germany FR (Munich and Speer)	
	1971	USA (Gainesville and Jemison)	<i>Research's role in the intensification of forestry practices and activities</i>
	1976	Norway (Oslo and Samset)	<i>Forestry in a world of limited resources</i>
	1981	Japan (Kyoto) and Germany FR (Liese)	<i>Research today for tomorrow's forests</i>
XVIII	1986	Yugoslavia (Ljubljana and Mlinsek))	<i>Forestry research serving society</i>
	1990	Canada (Montréal) and USA (Buckman)	<i>Science in forestry: IUFRO's second century</i>
XX	1995	Finland (Tampere)	<i>Caring for the forest: research in a changing world</i>
XXI	2000	Malaysia (Kuala Lumpur)	<i>Forests and society: the role of research</i>
XXII	2005	Australia (Brisbane)	<i>Forests in the balance: linking tradition and technology</i>

Source: IUFRO World Congress Proceedings. No themes were found before 1971. The next Congress will be held in 2010 in Seoul, South Korea.

people. It led to greater global appreciation of the need for the participation of communities and individuals (“stakeholders”) in planning and decision-making in forest management.

The next Congress will be held in Argentina, in 2009, possibly in October.

(b) The IUFRO World Congress

The International Union of Forestry Research Organisations (IUFRO) is one of the world’s oldest professional bodies. The IUFRO World Congress, the first of which was held in 1892, is a general assembly of its members. It brings together, normally at 5-year intervals, scientists from all parts of the world to discuss technical and scientific issues related to forestry research and development.

(c) International Forestry-related Years

There have been a number of international years, each formally declared by the UN General Assembly, which have been related to forests.

The **International Year of Mountains**, 2002, drew attention to the importance of mountains and other watersheds in maintaining the flow of rivers and water quality for millions of people in the lowlands. Approximately 28% of the world’s closed forests were mountain forests at the time of the Global Forests Resources Assessment 2000; they are complex ecosystems with high biological diversity but are highly sensitive to fluctuations in climate. Mountain forests are also very important to the livelihoods of mountain people. One of the main outcomes of the YoM was the Mountain Partnership, which is a voluntary alliance of partners dedicated to improving the lives of mountain people and protecting mountain environments around the world. Presently it includes 47 countries, 15 intergovernmental organizations and 77 major groups (e.g. NGOs). See <http://www.mountainpartnership.org/>

International Year of Desertification, 2006, aimed to raise global public awareness of the advancing deserts, and of ways to safeguard the biological diversity of arid lands covering one-third of the planet and protecting the knowledge and traditions of the 2 billion people affected by the phenomenon. Desertification affects one third of the earth’s surface and over one billion people. It is caused by human-induced factors and by climate change and causes land degradation with potentially devastating consequences in terms of social and economic costs. See <http://www.iydd.org/>

The **International Year of the Forest** was proclaimed by the UN General Assembly for 2011, from a motion sponsored by the Government of the Republic of Croatia. It will be co-ordinated by the UN Forum on Forests (UNFF).

(d) International and National Forestry-related Days

The first Arbor Day was evidently celebrated in Nebraska, USA in 1872. The FAO Conference proposed in 1971 that a World Forestry Day should be held in 21st March 1973, but it does not seem to have been acted upon by FAO¹. There is a World Environment Day, 5 June, which is organised by UNEP. The theme for 2006 was Deserts and Desertification, and the slogan was “Don’t desert drylands!” (see <http://www.unep.org/wed/2006/english/>).

A number of countries have national forestry days. New Zealand has celebrated its national Arbor Day since 1892, and since 1977 has celebrated it on June 5th yearly (<http://www.doc.govt.nz/Community/002~Events/Arbor-Day/index.asp>). Malaysia celebrates World Forestry Day on a date close to 21st March each year, with an appropriate theme; in addition, each of the 12 States of the Malaysian Federation celebrates it too. The States of Victoria and New South Wales in Australia celebrate World Forestry Day,

¹ A major problem in reinstating the World Forestry Day is finding a season suitable for planting trees for all countries

the former on 27 September, the latter on 21st March every year - see <http://www.mtc.com.my/news/pr148.htm> and <http://www.dse.vic.gov.au/DSE/nrenfor.nsf/childdocs/>

A full list of environment-related days is at <http://edugreen.teri.res.in/index.asp> although there is no indication of which countries celebrate them.

COMMONWEALTH COUNTRIES AND INTERNATIONAL FORESTRY-RELATED AGREEMENTS

The main international forestry-related agreements are described in Annex 7.1. Commonwealth countries are strongly involved in all of them.

An important international issue concerns the possibility of a legally-binding instrument on forestry. Although the CBD, the UNFCCC and the UNCCD came out of UNCED and are now being implemented, the only inter-governmental agreement on forestry was the “Non-legally Binding Authoritative Statement of Principles for a Global Consensus on the Management and Sustainable Development of All Types of Forest”. Obtaining agreement on a legally-binding agreement on forests has been among the aims of the IPF and then IFF, and has continued in the UNFF. In late 2006 there appeared to be support from Canada, Malaysia, Kenya and the EU - although the EU may be moving towards a non-legally binding agreement and other African countries than Kenya are not yet ready to discuss the matter. Australia, India and New Zealand do not support a legally-binding agreement.

The UNFCCC and its Kyoto Protocol offers a potential opportunity for funding for forestry projects, described below. Australia has not ratified the Kyoto Protocol.

CITES, the Convention on International Trade in Endangered Species of Wild Fauna and Flora, affects a number of forest species (see Annex 7.2). There are seven forest species included in Appendix 1, which are endangered due to international trade and their trade is only permitted in exceptional circumstances. They are all found in Central and South America countries. There are twelve Appendix 2 forest species (that may become endangered if trade is not regulated through controls to prevent unsustainable use), including several species occurring in Commonwealth countries such as *Prunus africana* (tropical Africa) *Swietenia humilis* and *S. mahagoni* (Caribbean), *Taxus wallichiana* (S. Asia). There are six Appendix 3 species (species that are subject to domestic regulation), none of which have been declared by Commonwealth countries.

For those wishing to follow the international debates on forestry and forestry-related issues, electronic access to the Earth Negotiations Bulletin is strongly recommended. To subscribe to the free electronic mail distribution list contact <http://www.iisd.ca/email/subscribe.htm>

Codes and descriptions of best practices have been published by many international and national bodies to provide guiding principles on forest use to help policy makers and forest managers achieve desired outcomes. A full list is available on the FAO website <http://www.fao.org/forestry>

A recently published (2006) example is Planted forests code, prepared by FAO and partners and available at <http://www.fao.org/forestry/site/34031/en>. Other examples include the ILO code Safety and health in forestry work (1998) which is available at <http://www.ilo.org/public/english/support/publ/pdf/forestry.pdf>.

COMMONWEALTH COUNTRIES IN REGIONAL GROUPINGS

All Commonwealth countries are members of regional groupings, which often have developed, or are developing, forestry programmes or bodies to coordinate policies or activities. The following are some examples:

- Central African Forest Commission (COMIFAC). Eleven member countries, including Cameroon. It has a coordinating role in forest policy development among member countries. It also has a

Council, which meets at Ministerial level.

- The Southern African Development Community (SADC, formerly SADCC). There are thirteen member countries, including Botswana, Lesotho, Malawi, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Tanzania and Zambia. It has developed a forest strategy.
- The Ministerial Conference on the Protection of Forests in Europe (MCPFE) <http://www.mcpfe.org/> has forty member countries, including Cyprus, Malta and the UK. It holds Ministerial Conferences of the ministers responsible for forests in Europe, which take decisions on common aspects of highest political relevance regarding forests and forestry. It has developed a Criteria and Indicators Process.
- The Association of South East Asian Nations (ASEAN) has ten member countries, of which Brunei Darussalam, Malaysia and Singapore are Commonwealth members. It has a number of agreements on environmental matters (several of which concern the issue of smoke haze) and a Working Group of Senior Officials on Forestry (ASOF)
- The Association of Caribbean States (ACS) has 25 members, of which Antigua & Barbuda, Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Jamaica, St Kitts & Nevis, St Lucia, St Vincent & the Grenadines, and Trinidad & Tobago are Commonwealth members. The aims of the ACS are *i.a.* the strengthening of regional co-operation; preserving the environmental integrity of the Caribbean Sea; and promoting the sustainable development of the Greater Caribbean. The Caribbean Community (CARICOM) established a free trade area, while the Caribbean Regional Environmental Programme (CREP) was designed to strengthen Regional cooperation and build greater awareness of environmental issues.
- FAO has six regional forestry commissions of which all Commonwealth countries are members of one, sometimes of two. The regional commissions serve as regional fora and complement the global sessions of the UNFF.

THE MILLENNIUM DEVELOPMENT GOALS

The Millennium Development Goals (MDG) were derived from the United Nations Millennium Declaration, adopted by 189 nations in 2000. They consist of 8 Goals and a number of linked targets, which were to be achieved by 2015, based on the global situation during the 1990s. All Commonwealth countries subscribed to the Goals.

Forests are relevant to all of the Goals, although not specifically mentioned in any of them. Goal 1, *Eradicate extreme poverty and hunger*, clearly relates to several of the functions of forests, and Goal 7, *Ensure environmental sustainability* is perhaps the most directly related to forests. Target 9, *Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources*, includes one specifically forestry indicator which refers to *the proportion of land area covered by forests*. But the indicator does not mention either the absolute nor relative quantity of forest, nor does it include the quality of the forest or its ability to provide goods and services.

The website for the Millennium Development Goals, including the 2006 assessment of progress, is at www.un.org/millenniumgoals while a recent edition of ETFRN News was devoted to the topic.

FOREST LAW, ENFORCEMENT AND GOVERNANCE (FLEG)

The threat to sustainable forest management has already been described in Chapter 2. This section describes the international background to the problem.

The G8, meeting in Birmingham, England in May 1998, launched the G8 Action Programme on Forests, and considered the impact of illegal forest activities so great that a resolution (VI) was included to

reduce illegal logging². The preamble stated: *Illegal logging robs national and sub-national governments, forest owners and local communities of significant revenues and benefits, damages forest ecosystems, distorts timber markets and forest resource assessments and acts as a disincentive to sustainable forest management.* Illegal logging has continued to be mentioned in the final communiqué of more recent meetings, for example the Gleneagles summit of 2005 (see CFA Newsletter #30 of September 2005).

Besides the G8 Action Programme on Forests other international action has included:

- Forest Law, Enforcement and Governance (FLEG) Conferences in East Asia 2001, Africa 2003, Europe & N. Asia 2005
- EU Forest Law, Enforcement, Governance and Trade (FLEGT) Action Plan, 2003 - the heart of which is legislation to require evidence of legality at point of import
- USA President's Initiative against Illegal Logging, 2003
- G8 Environment/Development Ministerial 2005
- Discussions in other fora including ITTO, CITES, CBD, WSSD, FAO, UNECE, WTO.

Action by the UK, the world's fourth biggest net importer of timber, illustrates some of the challenges and options in tackling illegal logging.

Seventy one per cent of UK timber volume is imported, of which only 6.5% is from the tropics, mainly plywood and hardwoods. The UK government will now only buy timber from legal and sustainable sources³, while big building companies, which account for 70% of consumption, are adopting the same policy.

The Timber Trades Federation⁴, which represents the timber industry in the UK, is taking action through:

- an Indonesian Action Plan (with the Netherlands and Belgium);
- the EU Euro7million Timber Trade Initiative (UK, the Netherlands, France, Belgium, Malaysia, Indonesia) under which audited timber now comes from 183 mills and forests;
- sourcing verified legal timber from 147 mills in Indonesia, Malaysia, Gabon, Congo-Brazzaville and Cameroon;
- a responsible purchasing policy; (assessment of supplier base, risk management system, advice to suppliers, building credibility through independent auditing, alternative evidence of legality/sustainability, elimination of potentially illegal suppliers)

Action is clearly being taken by some Commonwealth countries to combat illegal logging and to promote good governance of forests. But there is a long way to go and more international commitment to collaboration is required.

DEBT-FOR-NATURE SWAPS

A method of financing conservation projects in developing countries is through debt-for-nature swaps. Conservation and other international organizations purchase a portion of a developing country's commercial debt at a discount, or else persuade creditor banks to donate some of debt. Foreign debt can be purchased at 50 to 90 percent of its actual value and sometimes far less.

In 2006 two African countries agreed debt for nature swaps. The first was brokered by WWF between Cameroon and France in June 2006 (WWF Press Release, 22.6.06), while the second, a Tropical Forest

² The full text of the Action Programme is available from the website of the meeting of Foreign and Finance Ministers before the Summit. <http://web.archive.org/web/19981212012854/http://birmingham.g8summit.gov.uk/>

³ See CFA Newsletter #27 December 2004

⁴ UK Timber Trade Federation www.ttf.co.uk and CFA Newsletter #30 of September 2005

Conservation and Debt Reduction Agreement, was signed between Botswana and the USA (The Voice, Francistown, 10 October 2006)

CARBON OFFSETS AND THE ROLE OF FORESTS IN AMELIORATING CLIMATE CHANGE⁵

Provisions for the definition of carbon sequestration in national greenhouse gas accounting have been made in the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. The rules for the Clean Development Mechanism (CDM) are, however, still to be agreed upon, so trade in forest based carbon services has therefore suffered from uncertainty and, although there were in 2006 about 110 projects covering a total of about 5 million hectares, is still limited.

The situation could soon change and carbon sequestration would then be the most significant forest-based environmental service in terms of international trade. New projects would relate to the two eligible activities, afforestation and reforestation.

Activities with regard to 'Land use, land use change and forestry' (LULUCF), if properly planned and implemented under right conditions, can both store atmospheric carbon and provide other environmental benefits, such as the conservation of biological diversity and watershed protection. Carbon market could thus contribute to the promotion of sustainable forest management. Unfortunately the Kyoto Protocol currently does not include natural forests which are thus left out of an international carbon sequestration market.

A review of the economics of climate change, with some mentions of forestry, which has attracted international notice, is the Stern Review Report on the Economics of Climate Change which was made to the UK Treasury in October 2006⁶. It makes a strong economic case for international action, noting there is a 70% chance of temperatures increasing by 3°C if GHG emissions are stabilized at 450 parts per million carbon dioxide equivalent (ppm CO₂e) and a 10% chance of temperatures exceeding 5°C if GHG emissions are stabilized at 550 ppm CO₂.

Stern stated that the global community should aim to stabilize GHG emissions in the range of 450-550 ppm CO₂ since 450 ppm CO₂ would be difficult to achieve given the current stock of GHGs in the atmosphere. Furthermore, the risk of "very harmful impacts" increases significantly at stabilization above 550 ppm CO₂.

Deforestation, most of which occurs in the tropics, is responsible for about one-fifth of annual emissions of greenhouse gases. By reducing deforestation that would otherwise occur in developing countries, industrialized countries could effectively "offset" emissions limits set under international agreements like the Kyoto Protocol. An analysis by Mongabay.com has pointed out that payments could be made to developing countries via an "avoided deforestation" fund financed by contributions from wealthy countries. This could help fight climate change while helping to improve living standards for some of the world's poorest people, and conserving biodiversity.

Using the FAO data on deforestation, Mongabay.com suggests that an avoided deforestation initiative could be worth \$30-346 million per year to Ghana, depending on how much deforestation it could "avoid" and the market price for carbon offsets, while Uganda could benefit by \$10.4-172.8 million per year.⁷

A "Permanent Forest Sink Initiative" has been announced by the New Zealand Government, which will apply to native forests planted since 1990 and some more recent exotic forests in which selective harvesting

⁵ See some recent IIED publications: "Climate change and forest resilience" www.iied.org/pubs/display.php?o=11054IIED "Is tackling deforestation a cost-effective mitigation approach?" www.iied.org/pubs/display.php?o=11058IIED

* "Carbon capture and storage: legal issues" www.iied.org/pubs/display.php?o=11066IIED

⁶ www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm

⁷ See mongabay.com article: Avoided deforestation could help fight third world poverty under global warming pact

will be allowed. This “carbon farming” would create an economic use for some of New Zealand’s more isolated and erosion-prone land because it does not require roads or harvesting. Land owners are to be given the right to sell “carbon-credits” generated by certain so-called permanent forests so this initiative may resolve a dispute which led to a halt in the establishment of plantations when the government retained the carbon credits⁸. There is also a European Emissions Trading Scheme (ETS) which covers only carbon dioxide emissions, although other GHG emissions may be included in the scheme in future.

SUMMARY

Forests and forestry are the focus of a great deal of international attention, and Commonwealth countries play an important role in international forestry-related conventions, agreements and meetings.

Climate change is probably the environmental issue attracting most attention world-wide; it has particular significance for the Commonwealth in view of the large number of SIDS and low-lying countries such as Bangladesh. In relation to forests the provisions of the Kyoto Protocol have considerable potential for attracting funds to the establishment of forests because of their role in sequestering carbon. Several Commonwealth countries are taking steps to implement projects under the Clean Development Mechanism, despite uncertainties over its implementation.

The other major forestry issue is the reduction of illegal logging through Forest Law, Enforcement and Governance (FLEG). There is considerable potential for Commonwealth producer and producing countries to take a lead in combating illegal logging and promoting the good governance of forests.

REFERENCES

DAVENPORT, D. 2007 UNFF-7: the way forward. CFA Newsletter. 37. 6-7

⁸ Radio New Zealand, 1 Sept 2006.

Chapter 8

Challenges and opportunities in Commonwealth forestry

Jim Ball, *Chair, Commonwealth Forestry Association*

CHALLENGES

The challenges facing Commonwealth foresters are largely the same as are faced by their colleagues world-wide, except that their impact and the emphasis given to them may differ.

The two main forestry-related challenges facing the world today are the amelioration of climate change and its impacts, and the role of forests in alleviating poverty. The impacts of climate change on forests may be bio-physical (such as shifts in the distribution of forest species, or the effect on growth from higher CO₂ levels), or socio-economic (such as effects on yields of timber or other forest products). Forests have a major role in positively or negatively influencing climate change through carbon sequestration or release when forests are cleared, and because the forests will themselves be affected by it. And the rises in sea levels associated with global warming will affect Commonwealth countries especially - not just the small island developing states but also many low-lying countries such as Bangladesh.

The contribution of forests to poverty alleviation is important to many countries in the Commonwealth with low income per head. It may consist of food such as fruits, grazing, or the collection of non-wood forest products for sale – all of which may be especially important for disadvantaged groups. In unforeseen crises or emergencies the resources of the forest may act as a “safety net” for families or communities. And climate change is likely to affect the poor the most, for example through flooding of the low-lying areas where they often live, or salinisation of the poor soils on which they rely for cultivation.

But forests (and woodlands, scrub, and trees on farms do not contribute solely to poverty amelioration but also to sustainable rural livelihoods in the form of daily household needs, or income from formal employment or informal trading. Such contributions are often seasonal.

A third important challenge facing all foresters, which has become apparent in preparing this review of forestry in the Commonwealth, is the lack of reliable and current data on forests and the forestry sector, including forest products - and it is not only confined to countries with developing economies. All of the challenges described below are affected to a greater or lesser extent by lack of data and information, which seriously impairs the possibility of developing plans or policies to address a particular issue. And the development of systems for data collection could contribute to the valuation and marketing of intangible benefits.

The challenges facing those who manage the forest resources of the Commonwealth include the following:

- Deforestation, where not only do the countries of the Commonwealth appear to have an increasing rate of deforestation - which is both higher than the global rate and has accelerated, whereas the global rate appears to have slowed. Certain African and South Asian Commonwealth countries are particularly affected.
- The high rate of deforestation is reflected in the loss of primary forest types in Papua New Guinea but to a lesser extent in certain African and South Asian countries.
- Tropical dry forest formations are important for the provision of a wide range of benefits to the poor,

and represent a high proportion of the forest types in several low-income Commonwealth countries, yet their conservation and research and development of sound management practices have been neglected.

- Deforestation is matched to a certain extent by afforestation in Commonwealth countries, and the rate of planting seems to be increasing slightly in recent years. But plantations make up only 1.8% of the 2005 Commonwealth forests, compared with a global average of 3.5% and plantations compensated for only 7% of 2000-2005 deforestation in the Commonwealth, compared with 35% world-wide.
- Decentralisation of authority and the devolution of responsibility for people's involvement in the planning and management of the forest estate are challenges for several Commonwealth countries.
- It appears that more Commonwealth forests are covered by valid working plan than was the case twenty years ago, 41 Commonwealth countries are members of one or more of the Criteria and Indicators Processes and 17% of the area of Commonwealth forests is certified under one scheme or another. Nevertheless evidence that sustainable management of Commonwealth forests is being generally practised is still lacking.
- There is even less information on the conservation of forests, but there are, however, examples of Commonwealth countries establishing forest conservation areas and of acting in partnership to establish cross-boundary protected areas.
- Illegal logging (mainly in tropical countries) and the control of forest fires (almost everywhere) are increasingly seen as serious constraints to sustainable forest management, as are general issues of forest law, enforcement and governance.

The preponderance of fuelwood in Commonwealth wood consumption shows the need to develop sustainable supplies, especially in dry areas, as a contribution to poverty alleviation, sustainable livelihoods and zero carbon emissions.

The challenges facing Commonwealth forest researchers include:

- The considerable challenge of developing mechanisms to both adapt forests to the effects of climate change, and contribute to its amelioration. Among the former will be the adaptation of forest systems (including plantations) to drought and the increased risk of fire and pest attack, the maintenance of forest biological diversity, and the development of forest management practices to maintain or increase water catchment yields. The contribution to the latter is in the form of carbon sequestration.
- Contributing more directly to informed policy-making and planning. To do this it will increasingly need to move towards social, economic and political concerns in addition to its traditional strength in silviculture and ecology.
- But these technical challenges cannot be faced unless the funding of forest research in all Commonwealth countries improves, accompanied by the strengthening of human resources in terms both of staff numbers and training.

Those responsible for forestry education face the challenge of declining student numbers – which is occurring largely throughout the Commonwealth – and the adaptation of programmes to reflect not only forestry and environmental topics but also forestry issues related to the socio-economic situation in individual countries. Another challenge for several Commonwealth universities is that forestry is seen as technical training for the academically less-gifted; changing this perception will not be easy.

OPPORTUNITIES

The common language of Commonwealth countries offers an overarching opportunity to Commonwealth foresters to work together to share experiences in solving common challenges. This is especially true of

south-south co-operation and collaboration¹. Related to that is the particular case of the Commonwealth Forestry Conference, where foresters from the 53 countries of the Commonwealth (and others) have the opportunity to come together every four years to exchange experience. Changes in the format of the Conference in recent years have increased the opportunity for foresters to get together and meet informally.

Other opportunities include specific instances where Commonwealth foresters have been leaders:

- Several Commonwealth countries, described in Chapter 2, have been pioneers in decentralisation, devolution of responsibility and the involvement of communities, and the privatisation of planted forests. They and others could learn from their experience.
- The Commonwealth includes at least 33 professional associations and institutes; although usually representing national interests, nevertheless they offer through their journals, newsletter and meetings excellent fora for networking
- There is also the opportunity for the four countries (Australia, Canada, New Zealand and the UK) with professional institutes which control the profession nationally to assist others to develop such institutes, thus strengthening the profession and enabling it to speak with one voice on national forestry issues.

Commonwealth-wide recognition of the imminent and usually negative impact of climate change on society and foresters, offers forest researchers a unique opportunity to emphasise the shared nature of the challenge and to work together to identify options for the adaptation of forests – and forest-related impacts on society – to the threat. Such research would contribute to the development of national plans for adaptation to changes in the climate.

There is an opportunity for the sharing of experience among Commonwealth countries in the marketing of intangible benefits arising from forests, in particular carbon trading where London is developing as a major centre.

The Commonwealth also offers the opportunity for researchers to exchange experience on contributing to forest and land-use policy-making and planning in other areas of global change, such as the loss of biological diversity, demographic changes, and pollution. The challenge to forest managers of preventing forest fires offers an opportunity for collaboration in exchanging experience in programmes for public education.

There are two related opportunities in forestry education. The first relates to the under-utilised potential for networking, collaboration and cooperation among staff and students of Commonwealth universities. The second is that there is now no international body to bring together those involved in forestry education to exchange experiences in facing common challenges²; there is an excellent opportunity for the forestry faculties of Commonwealth universities to take the lead in instituting such a forum.

SUMMARY

This chapter has drawn out some of the many challenges and opportunities facing the forests and foresters of the Commonwealth. Doubtless readers will identify many more. While it may not be true that every challenge represents an opportunity, nevertheless it is apparent that there are many opportunities for Commonwealth foresters, sharing a common language, to work together on common problems.

¹ UNESCO announced in April 2007 the establishment of an international centre for South-South cooperation in science, technology and innovation, to be run by the Malaysian Ministry of Science, Technology and Innovation. The aim is to create a network of national centres of excellence. See www.portal.unesco.org/en/ and www.mosti.gov.my/MostePortal/.

² The FAO Advisory Committee on Forestry Education held its last meeting in 1996

ANNEXES

ANNEX 1 COMMONWEALTH COUNTRIES LAND AREA AND POPULATION, 2004

Country	Land Area x 1000 ha	Population x1000
Africa		
Botswana	56,673	1,727
Cameroon	46,540	16,400
Gambia	1,000	1,449
Ghana	22,754	21,053
Kenya	56,914	32,447
Lesotho	3,035	1,809
Malawi	9,408	11,182
Mauritius	203	1,234
Mozambique	78,409	19,129
Namibia	82,329	2,033
Nigeria	91,077	139,824
Seychelles	45	85
Sierra Leone	7,162	5,436
South Africa	121,447	45,584
Swaziland	1,720	1,120
Uganda	19,710	25,920
United Republic of Tanzania	88,359	36,571
Zambia	74,339	10,547
Σ Commonwealth Africa^a	761,163	373,558
Σ Africa	2,962,656	868,182
Americas		
Antigua and Barbuda	44	80
Bahamas	1,001	320
Barbados	43	272
Dominica	75	71
Grenada	34	106
Jamaica	1,083	2,665
Saint Kitts and Nevis	36	47
Saint Lucia	61	164
Saint Vincent and the Grenadines	39	108
Trinidad and Tobago	513	1,323
Σ Commonwealth Caribbean^d	2,949	5,243
Σ Caribbean	22,907	39,393
Belize	2,280	283
Canada	922,097	31,902

Guyana	19,685	772
Σ Commonwealth N & C America	944,062	32,957
Σ Commonwealth Americas	947,011	38,200
South Asia		
Bangladesh	13,017	140,494
India	297,319	1,079,721
Maldives	30	300
Pakistan	77,088	49,910
Sri Lanka	6,463	19,444
Σ Commonwealth S Asia	393,917	1,289,869
South-east Asia and Pacific		
Australia	768,230	20120
Brunei Darussalam	527	361
Fiji	1,827	848
Kiribati	73	98
Malaysia	32,855	25209
Nauru	2	13
New Zealand	26,799	4061
Papua New Guinea	45,286	5625
Samoa	283	179
Singapore	67	4335
Solomon Islands	2,799	471
Tonga	72	102
Tuvalu	3	12
Vanuatu	1,219	215
Σ SE Asia & Pacific^e	880,046	61,649
Europe		
Cyprus	924	776
Malta	32	401
United Kingdom ^b	24,164	59,631
Σ Commonwealth Europe^c	25,122	60,864
Σ Europe	2,260,180	723 495
Σ Commonwealth	3,007,259	1,824,140
Σ World	13,067,421	6,335,116

Source: Global Forest Resources Assessment, 2005. FAO, Rome 2006

Some global regional totals are missing, since Commonwealth regions do not correspond to the FAO regions.

Falkland Islands and South Georgia and the Sandwich Islands excluded, since neither have any forest.

a Includes British Indian Ocean Territory and St Helena

b Includes Channel Islands and Isle of Man

c Includes Gibraltar

d Includes British Virgin Islands and Bermuda

e Includes Pitcairn Island

ANNEX 2 THE FOREST RESOURCE**ANNEX 2.1 Extent of forest and other wooded land 2005**

Country	Forest			OWL
	1000 ha	% land area	ha forest/head	1000 ha
Africa				
Botswana	11,943	21.1	6.9	34,791
Cameroon	21,245	45.6	1.3	14,758
Gambia	471	41.7	0.3	125
Ghana	5,517	24.2	0.3	0
Kenya ^c	3,522	6.2	0.1	34,920
Lesotho ^c	8	0.3	0.0	31
Malawi	3,402	36.2	0.3	-
Mauritius ^d	37	18.2	0.0	15
Mozambique	19,262	24.6	1.0	40,919
Namibia ^c	7,661	9.3	3.8	8,473
Nigeria	11,089	12.2	0.1	5,495
Seychelles ^d	40	88.9	0.5	-
Sierra Leone	2,754	38.5	0.5	384
South Africa ^c	9,203	7.6	0.2	21,409
Swaziland	541	31.5	0.5	289
Uganda	3,627	18.4	0.1	1,150
Tanzania	35,257	39.9	1.0	4,756
Zambia	42,452	57.1	4.0	3,161
Σ Commonwealth Africa ^a	178,031	23.4	0.5	170,676
Σ Africa		21.4		
Americas				
Antigua and Barbuda ^d	9	21.4	0.1	16
Bahamas ^d	515	51.5	1.6	36
Barbados ^{c d}	2	4.0	0.0	-
Bermuda	1	20.0	0.0	0
Dominica ^d	46	61.3	0.7	
Grenada ^d	4	12.2	0.0	5
Jamaica ^d	339	31.3	0.1	188
Saint Kitts and Nevis ^d	5	14.7	0.1	6
Saint Lucia ^d	17	27.9	0.1	5
Saint Vincent and the Grenadines ^d	11	27.4	0.1	2
Trinidad and Tobago ^d	226	44.1	0.2	74
Σ Commonwealth Caribbean	1,175	39.8	0.2	332
Σ Caribbean	5,974	26.1		
Belize ^d	1,653	72.5	5.8	115
Canada	310,134	33.6	9.7	91,951

Guyana ^d	15,104	76.7	19.6	3,580
Σ Commonwealth C & N America	326,891	34.6	9.9	95,646
Σ Commonwealth Americas	328,066	34.6	8.6	95,978
South Asia				
Bangladesh ^c	871	6.7	0.0	58
India	67,701	22.8	0.1	4,110
Maldives ^{c d}	1	3.0	0.0	0
Pakistan ^c	1,902	2.5	0.0	1,389
Sri Lanka	1,933	29.9	0.1	0
Σ Commonwealth S Asia	72,408	18.1	0.1	5,557
Σ S Asia				
South-east Asia & Pacific				
Australia	163,678	21.3	8.1	421,590
Brunei Darussalam	278	52.8	0.8	160
Fiji ^d	1,000	54.7	1.2	-
Kiribati ^d	2	30.0	0.0	-
Malaysia	20,890	63.6	0.8	-
Nauru ^{c d}	0	0	0.0	0
New Zealand	8,309	31.0	2.0	2,557
Papua New Guinea ^d	29,437	65.0	5.2	4,474
Samoa ^d	171	60.4	1.0	22
Singapore ^{c d}	2	3.4	0.0	0
Solomon Islands ^d	2,172	77.6	4.6	-
Tonga ^{c d}	4	5.0	0.0	1
Tuvalu ^d	1	33.3	0.1	0
Vanuatu ^d	440	36.1	2.0	476
Σ Commonwealth SE Asia & Pacific ^b	226,388	25.7	3.7	7,690
Σ SE Asia & Pacific	206,254	24.3		
Europe				
Cyprus ^d	174	18.9	0.2	214
Malta ^{c d}	n.s.	1.1	0.0	0
United Kingdom	2,845	11.8	0.0	20
Σ Commonwealth Europe	3,023	12.0	0.0	234
Σ Europe	1,001,394	44.3		
Σ Commonwealth				
Σ World	3,952,025	30.3		

Source: FAO FRA 2005

- figures not available

a Includes British Indian Ocean Territory (3,000 ha of forest) and St Helena (2,000 ha)

b Includes Pitcairn (4,000 ha of forest)

c Low Forest Cover Countries (LFCC)

d Members of the Alliance of Small Island States

The UK Overseas Territories are mostly excluded from the above, since they are not self-governing nations. The consist of: Anguilla, British Antarctic Territory, Bermuda, British Indian Ocean Territory, British Virgin Islands,

Cayman Islands, Falkland Islands, Gibraltar, Montserrat, St Helena and Dependencies (Ascension Island and Tristan da Cunha), Turk and Caicos Islands, Pitcairn Island, South Georgia and South Sandwich Islands, Sovereign Base Areas on Cyprus.

Commonwealth Members of the Alliance of Small Island States

Africa - Mauritius, Seychelles.

Americas - Antigua and Barbuda, Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Jamaica, St Kitts and Nevis, St Lucia, St Vincent and the Grenadines, Trinidad and Tobago.

SE Asia and Oceania - Fiji, Kiribati, Maldives, Nauru, Papua New Guinea, Samoa, Singapore, Solomon Islands, Tonga, Tuvalu, Vanuatu

Europe - Cyprus, Malta

ANNEX 2.2 Characteristics of forest and other wooded land, 2005 (1000 ha)

Country	Forest						OWL					
	Σ Area	1°	Mod Nat	Semi Nat	Prod	Prot	Σ Area	1°	Mod Nat	Semi Nat	Prod	Prot
Africa												
Gambia	471	-	471	-	n.s.	-	125	-	125	-	-	-
Ghana	5517	353	5004	-	160	-	0	-	-	-	-	-
Kenya	3522	704	2616	-	202	-	34920	-	34920	-	-	-
Lesotho	8	1	0	-	7	-	31	-	31	-	-	-
Malawi	3402	1132	2067	-	204	-	-	-	-	-	-	-
Mauritius	37	0	22	n.s.	11	4	15	0	15	n.s.	-	-
Mozambique	19262	-	19224	-	38	-	40919	-	40919	-	-	-
Namibia	7661	-	7661	-	0	-	8473	-	8473	-	-	-
Nigeria	11089	326	10414	0	349	0	5495	0	5495	-	0	0
Seychelles	40	2	33	-	5	-	-	-	-	-	-	-
Sierra Leone	2754	-	2751	-	3	-	384	-	198?	-	-	-
South Africa	9203	-	7777	-	1426	-	21409	0	21409	0	0	0
Swaziland	541	-	395	31	114	-	289	-	289	-	-	-
Uganda	3627	-	3591	-	36	-	1150	-	1150	-	-	-
Tanzania	35257	-	35107	-	150	-	4756	-	4756	-	-	-
Zambia	42452	-	42377	-	75	-	3161	-	3161	-	-	-
	144,843		139,510	31	2,780	4		0		0		
Americas												
Bahamas	515	-	515	-	0	0	36	-	36	-	0	0
Barbados	2	-	2	-	-	-	-	-	-	-	-	-
Dominica	46	27	19	0	n.s.	-	n.s.	n.s.	-	-	0	-
Grenada	4	1	3	-	n.s.	-	5	-	-	-	-	-
Jamaica	339	-	325	-	8	6	188	-	167	-	-	21
Saint Vincent and the Grenadines	11	-	10	-	n.s.	-	2	-	2	-	-	-
Trinidad and Tobago	226	14	197	0	15	0	74	-	74	-	-	-
	1,143	28	1,071	0	23	6						

Belize	1653	612	1041	-	-	-	115	0	115	-	-	-
Canada	310134	165424	144710	-	-	-	91951	69855	22096	-	-	-
Guyana	15104	9314	5789	-	-	-	3580	-	3580	-	-	-
Σ												
Commonwealth N & C America	326,891	175,350	151,540	-	-	-	-	-	-	-	-	-
Σ Commonwealth Americas	328,066	175,378	152,611	0	23	6						
South Asia												
Bangladesh	871	-	592	-	195	84	58	-	-	-	-	-
India	67701	-	32,943	31,532	1053	2173	4110	-	2046	1745	104	215
Pakistan	1902	-	1584	-	318	-	1389	-	1389	-	-	-
Sri Lanka	1933	167	1571	-	171	24	0	-	-	-	-	-
Σ												
Commonwealth S. Asia	72,407	167	36,690	31,532	1,737	2,281						
South-east Asia & Pacific												
Australia	163678	5,233	156,679	-	1766	-	421590	-	-	-	-	-
Brunei	278	278	-	-	-	-	160	-	156	3	1	-
Darussalam												
Fiji	1000	894	5	-	101	-	-	-	-	-	-	-
Malaysia	20890	3,820	-	15497	1573	-	-	-	-	-	-	-
New Zealand	8309	3,506	2,951	-	1832	20	2557	411	2146	-	-	-
Papua New Guinea	29437	25,211	4,134	-	92	-	4474	-	-	-	-	-
Samoa	171	n.s.	110	29	21	11	22	-	11	4	4	2
Singapore	2	2	0	0	0	0	0	-	-	-	-	-
Tonga	4	-	4	-	n.s.	-	1	-	1	-	-	-
Σ												
Commonwealth SE Asia & Pacific	223,769	38,944	163,883	15,526	5,385	31						
Europe												
Cyprus	174	22	111	36	0	5	214	-	214	-	-	--

United Kingdom	2845	0	646	275	1902	22	20	-	10	10	0	0
	3,019	22	757	311	1,902	27						
Total	772,104	217,029	493,451	47,400	11,827	2,349						

ANNEX 2.3 Change in extent of forest 1990-2000, 2000-2005

Country	Forest area (1,000 ha) ^a			Annual rate of change			
				1990-2000		2000-2005	
	1990	2000	2005	1000ha/yr	%	1000ha/yr	%
Africa							
Botswana	13718	12535	11943	-118	-0.9	-118	-1.0
Cameroon	24545	22345	21245	-220	-0.9	-220	-1.0
Gambia	442	461	471	2	0.4	2	0.4
Ghana	7448	6094	5517	-135	-2.0	-115	-2.0
Kenya	3708	3582	3522	-13	-0.3	-12	-0.3
Lesotho	5	7	8	n.s.	3.4	n.s.	2.7
Malawi	3896	3567	3402	-33	-0.9	-33	-0.9
Mauritius	39	38	37	n.s.	-0.3	n.s.	-0.5
Mozambique	20012	19512	19262	-50	-0.3	-50	-0.3
Namibia	8762	8033	7661	-73	-0.9	-74	-0.9
Nigeria	17234	13137	11089	-410	-2.7	-410	-3.3
Seychelles	40	40	40	0	0	0	0
Sierra Leone	3044	2851	2754	-19	-0.7	-19	-0.7
South Africa	9203	9203	9203	0	0	0	0
Swaziland	472	518	541	5	0.9	5	0.9
Uganda	4924	4059	3627	-86	-1.9	-86	-2.2
Tanzania	41441	37318	35257	-412	-1.0	-412	-1.1
Zambia	49124	44676	42452	-445	-0.9	-445	-1.0
Σ Commonwealth Africa	208,062	187,981	178,036	-201	-1.01	-199	-1.08
Americas							
Antigua and Barbuda	9	9	9	0	0	0	0
Bahamas	515	515	515	0	0	0	0
Barbados	2	2	2	0	0	0	0
Bermuda	1	1	1	0	0	0	0
Dominica	50	47	46	n.s.	-0.5	n.s.	-0.6
Grenada	4	4	4	n.s.	n.s.	0	
Jamaica	345	341	339	n.s.	-0.1	n.s.	-0.1
Saint Kitts and Nevis	5	5	5	0	0	0	0
Saint Lucia	17	17	17	0	0	0	0
Saint Vincent and the Grenadines	9	10	11	n.s.	0.8	n.s.	0.8
Trinidad and Tobago	235	228	226	-1	-0.3	n.s.	-0.2
Σ Commonwealth Caribbean	1,192	1,179	1,175		-0.09		-0.05

Σ Caribbean	5,350	5,706	5,974	36	0.6	54	0.9
Belize	1653	1653	1653	0	0	0	0
Canada	310134	310134	310134	0	0	0	0
Guyana	15104	15104 ^a	15104 ^a	n.s.	n.s.	0	0
Σ Commonwealth N & C America	326,891	326,891	326,891				
Σ Commonwealth Americas	328,083	328,070	328,066	n.s.	n.s.	n.s.	n.s.
South Asia							
Bangladesh	882	884	871	n.s.	n.s.	-2	-0.3
India	63939	67554	67701	362	0.6	29	n.s.
Maldives	1	1	1	0	0	0	0
Pakistan	2527	2116	1902	-41	-1.8	-43	-2.1
Sri Lanka	2350	2082	1933	-27	-1.2	-30	-1.5
Σ Commonwealth S Asia	69,699	72,637	72,408	+2,938	0.41	-229	-0.05
South-east Asia & Pacific							
Australia	167904	164645	163678	-326	-0.2	-193	-0.1
Brunei Darussalam	313	288	278	-2	-0.8	-2	-0.7
Fiji	979	1000	1000	2	0.2	0	0
Kiribati	2	2	2	0	0	0	0
Malaysia	22376	21591	20890	-78	-0.4	-140	-0.7
Nauru	0	0	0	0	0	0	0
New Zealand	7720	8226	8309	51	0.6	17	0.2
Papua New Guinea	31523	30132	29437	-139	-0.5	-139	-0.5
Samoa	130	171	171	4	2.8	0	0
Singapore	2	2	2	0	0	0	0
Solomon Islands	2768	2371	2172	-40	-1.5	-40	-1.7
Tonga	4	4	4	0	0	0	0
Tuvalu	1	1	1	0	0	0	0
Vanuatu	440	440	440	0	0	0	0
Σ Commonwealth SE Asia & Pacific	234,166	228,877	226,388	-5,289	-0.23	-2,489	-0.22
Europe							
Cyprus	161	173	174	1	0.7	n.s.	0.2
Malta	n.s.	n.s.	n.s.	0	0	0	0
United Kingdom	2611	2793	2845	18	0.7	10	0.4
Σ Commonwealth Europe	2,772	2,966	3,019	194		53	0.35
Σ Commonwealth	845,762	823,620	807,917				
Σ World	4,077,291	3,988,610	3,952,025	-8,868	-0.22	-7,317	-0.18

^a Estimates for 2000 and 2005

ANNEX 2.4 Change in extent of primary forest^a 1990-2005

Country	Area of primary forest x1000 ha			% of forest area 2005	Rate of Annual change ha/year	
	1990	2000	2005		90-00	00-05
Africa						
Ghana	353	353	353	6.4	0	0
Kenya	742	716	704	20.0	-2,520	-2,400
Lesotho	1	1	1	7.5	0	0
Malawi	1727	1330	1132	33.3	-39,700	-39,600
Nigeria	1,556	736	326	2.9	-82,000	-82,000
Seychelles	2	2	2	5.0	0	0
Americas						
Dominica	28	28	27	59.0	-86	-84
Grenada	1	1	1	16.0	-22	-23
Trinidad and Tobago	14	14	14	6.2	0	0
Americas						
Belize	612	612	612	37.0	0	0
Canada	165,424	165,424	165,424	53.3	0	0
Guyana	-	9,314	9,314	61.7	-	0
South Asia						
Bhutan	413	413	413	12.9	0	0
Sri Lanka	257	197	167	8.6	-6,000	-6,000
South-east Asia & Pacific						
Australia	-	5,233	5,233	3.2	-	0
Brunei Darussalam	313	288	278	100	-2,500	-2,000
Fiji	895	894	894	89.4	-100	0
Malaysia	3,820	3,820	3,820	18.3	0	0
New Zealand	3,506	3,506	3,506	42.2	0	0
Papua New Guinea	29,210	26,462	25,211	85.6	-274,800	-250,200
Samoa		n.s.	n.s.	n.s.	-	0
Singapore	2	2	2	100	0	0
Europe						
Cyprus	22	22	22	12.6	0	0

^a Forest of native species, in which there are no clearly visible indications of human activity and ecological processes are not significantly.

Countries with no primary forest, or with no records, omitted.

ANNEX 2.5 Designated functions of forest - primary function 2005

Country	Σ Forest x1000 ha	% of total forest whose primary function is designated as:					
		Production	Protection	Conservation	Social services	Multiple purpose	None or unknown
Africa							
Cameroon	21,245	29.3	2.7	48.6	1.0	18.4	-
Gambia	471	-	-	-	-	100	-
Ghana	5,517	22.7	6.4	0.8	1.2	-	68.9
Kenya	3,522	n.s.	100	-	-	-	-
Lesotho	8	92.5	-	-	-	-	7.5
Mauritius	37	29.7	43.2	21.6	8.1	-	-
Mozambique	19,262	17.5	-	2.3	-	80.2	-
Namibia ^b	7,661	-	-	35.9	-	16.5	47.5
Nigeria	11,089	27.6	0	49.6	0	0	22.7
Seychelles	40	2.5	15.0	5.0	20.0	15.0	42.5
Sierra Leone	2,754	10.3	1.2	2.8	-	-	85.7
South Africa	9,203	15.5	-	10.3	-	74.2	-
Swaziland	541	26.8	-	-	-	-	73.0
Uganda	3,627	14.9	-	14.8	-	-	70.2
Tanzania	35,257	71.0	-	6.0	-	22.9	-
Zambia	42,452	7.1	4.2	15.0	-	73.7	-
Americas							
Barbados	2	-	-	17.6	-	-	82.4
Grenada	4	5.1	13.5	56.0	-	-	25.1
Jamaica	339	2.4	4.5	21.3	0	6.0	65.8
Saint Lucia	17	-	-	-	-	58.8	41.2
Trinidad and Tobago	226	19.5	13.3	6.2	1.3	0	59.7
Belize	1,653	-	-	37.0	-	-	63.0
Canada	310,134	1.3	-	4.9	-	86.7	7.1
Guyana	8,063	0	0	4.0	0	31.5	64.4
South Asia							
Bangladesh	871	31.7	7.8	20.9	1.1	38.5	0
Bhutan	3,195	15.9	45.8	27.2	-	-	11.1
India	67,701	21.2	14.8	21.7	-	42.4	-
Pakistan	1,902	32.0	-	11.4	-	56.7	-
Sri Lanka	1,933	8.8	1.0	28.9	-	61.3	-
South-east Asia & Pacific							
Australia	163,678	8.0	-	13.1	-	77.6	1.3
Brunei Darussalam	278	62.6	6.8	29.1	1.4	-	-
Fiji	1,000	10.1	33.9	7.4	0	48.7	0
Malaysia	20,890	56.6	18.2	5.4	-	19.8	-

New Zealand	8,309	22.0	0.2	77.7	-	-	-
Papua New Guinea	29,437	24.8	-	4.6	-	4.9	65.7
Samoa	171	47.1	20.4	16.7	4.2	5.0	6.7
Singapore	2	-	-	100	-	-	-
Tonga	4	0.6	-	-	-	-	99.4
Europe							
Cyprus	174	24.7	-	2.9	10.3	55.6	5.7
Malta	n.s.	-	-	-	-	100	-
United Kingdom	2,845	33.7	0.2	5.1	3.7	53.1	4.2

a Designated function is defined by FAO's Forest Resource Assessment 2005 as the function or purpose assigned to a piece of land either by legal prescription or by the landowner/manager.

b The country provided figures for forests and OWL combined; FAO distributed them between the two. Countries with no records omitted.

ANNEX 2.6 Area of forest plantations 2005

Country	Area of forest plantations (1000 ha)			% 2005 total forest	Annual change rate (ha/year)		
	1990	2000	2005		1990-2000	2000-2005	
Africa							
Gambia	n.s.	n.s.	n.s.	0.1	0	0	
Ghana	50	60	160	2.9	1000	20000	
Kenya	238	212	202	5.7	-2600	-2000	
Lesotho	4	6	7	92.5	200	200	
Malawi	132	180	204	6.0	4800	4800	
Mauritius	16	15	15	40.5	-100	0	
Mozambique	38	38	38	0.2	0	0	
Nigeria	251	316	349	3.1	6500	6600	
Seychelles	5	5	5	12.5	0	0	
Sierra Leone	2	3	3	0.1	60	80	
South Africa	1204	1352	1426	15.5	14800	14800	
Swaziland	135	121	114	21.1	-1400	-1400	
Uganda	33	35	36	1.0	200	200	
Tanzania	150	150	150	0.4	0	0	
Zambia	60	75	75	0.2	1500	0	
Σ Commonwealth Africa	2,318	2,568	2,784	1.6	50	43	
Americas							
Bahamas	0	0	0	0	0	0	
Dominica	-	n.s.	n.s.	0.2	-	0	
Grenada	n.s.	n.s.	n.s.	5.2	0	0	
Jamaica	15	14	14	4.3	-40	20	

Saint Vincent and the Grenadines	n.s.	n.s.	n.s.	3.0	13	14
Trinidad and Tobago	15	15	15	6.6	0	0
Σ Commonwealth Caribbean	30	29	29	2.5	-1	0
South Asia						
Bangladesh	239	276	279	32.0	3700	600
Bhutan	1	1	2	0.1	0	200
India	1954	2805	3226	4.8	85100	84200
Pakistan	234	296	318	16.7	6200	4400
Sri Lanka	242	221	195	10.1	-2120	-5141
Σ Commonwealth S Asia	2,670	3,599	4,020	5.6	93	84
South-east Asia & Pacific						
Australia	1023	1485	1766	1.1	46200	56200
Fiji	80	101	101	10.1	2100	0
Malaysia	1956	1659	1573	7.5	-29700	-17200
New Zealand	1261	1769	1852	22.3	50800	16600
Papua New Guinea	63	82	92	0.3	1960	1980
Samoa	-	32	32	18.7	-	0
Singapore	0	0	0	0	0	0
Tonga	n.s.	n.s.	n.s.	0.6	0	0
Σ Commonwealth SE Asia & Pacific	4,383	5,128	5,416	2.4	75	58
Europe						
Cyprus	3	3	5	2.9	0	400
Malta	n.s.	n.s.	n.s.	100	0	0
United Kingdom	1877	1934	1924	67.6	5700	-2000
Σ Commonwealth Europe	1880	1937	1929	63.9	6	-2
Σ Commonwealth	11,281	13,261	14,178	1.8	198	183
Σ World	102,638	126,943	139,768	3.5	2,431	2,565

ANNEX 2.7a Percentage of forest by ecological zone (tropical/sub-tropical)

Country	Tropical				Sub-tropical		
	Rain forest	Moist deciduous	Dry	Montane	Humid	Dry	Montane
Africa							
Botswana			73				
Cameroon	81	16	2	1			
Gambia		24	76				
Ghana	47	32	21				
Kenya	1	18	1	53			
Lesotho							100
Malawi		48	37	15			
Mauritius		100					
Mozambique	1	18	81				
Namibia			53	3			
Nigeria	22	36	38	2			
Seychelles		100					
Sierra Leone	40	60		1			
South Africa		1	61	2			
Swaziland			86				14
Uganda	78	5	16				
Tanzania	1	18	65	3			
Zambia		49	51				
Americas							
Antigua and Barbuda	22	43	34				
Bahamas	29	54		17			
Barbados			100				
Dominica	79		21				
Grenada	71	25	4				
Jamaica	84	16					
Saint Kitts and Nevis	54	45	2				
Saint Lucia	61	37	2				
Saint Vincent and the Grenadines	56	43	1				
Trinidad and Tobago	100						
Σ Commonwealth Caribbean							
Σ Caribbean							
Belize	42	58					
Canada							
Guyana	74	23		4			

South Asia						
Bangladesh	63	37				
India	13	11	56	7		
Maldives	100					
Pakistan						31
Sri Lanka	18	20	62			
South-east Asia & Pacific						
Australia	2		39		5	6
Brunei Darussalam	100					
Fiji	100					
Kiribati	100					
Malaysia	94			6		
Nauru	100					
New Zealand					51	
Papua New Guinea	80	4	5	11		
Samoa	100					
Singapore	100					
Solomon Islands	100					
Tonga	100					
Tuvalu						
Vanuatu	100					
Europe						
Cyprus						100
Malta						100

Source FRA2000

ANNEX 2.7b Percentage of forest by ecological zone (temperate/boreal)

Country	Temperate			Boreal		
	Oceanic	Continental	Montane	Coniferous	Tundra	Montane
Australia	4		4			
Canada		13	12	40	24	9
New Zealand	34		16			
United Kingdom	85		2	10		4

ANNEX 2.8 National importance of forest ecological zones

Major forest types*	National proportion		
	Highest	Second	Third
Tropical rain forest	Cameroon (81%); Ghana (47%); Dominica (79%); Grenada (71%); Jamaica (84%); St Kitts&Nevis (54%); St Lucia (61%); St Vincent & the Grenadines (56%); Trinidad&Tobago (100%); Guyana (74%); Bangladesh (63%); Maldives (100%); Brunei Darussalam (100%); Fiji (100%); Kiribati (100%); Malaysia (94%); Nauru (100%); PNG (80%); Samoa (100%); Singapore (100%); Solomons (100%); Tonga (100%); Vanuatu (100%)	Sierra Leone (40%); Bahamas (29%); Belize (42%); India (13%);	Mozambique (1%); Nigeria (22%); Antigua&Barbuda (22%);
Tropical moist deciduous	Malawi (48%); Mauritius (100%); Seychelles (100%); Sierra Leone (60%); Uganda (78%); Antigua&Barbuda (43%); Bahamas (54%); Belize (58%);	Cameroon (16%); Gambia (24%); Ghana (32%); Kenya (18%); Mozambique (18%); Nigeria (36%); Tanzania (18%); Zambia (49%); Grenada (25%); Jamaica (16%); St Kitts&Nevis (45%); St Lucia (37%); St Vincent & the Grenadines (43%); Guyana (23%); Bangladesh (37%); Sri Lanka (20%);	South Africa (1%); Uganda (5%); India (11%); Sri Lanka (18%);
Tropical dry	Botswana (73%); Gambia (76%); Mozambique (81%); Namibia (53%); Nigeria (38%); South Africa (61%); Swaziland (86%); Tanzania (65%); Zambia (51%); Barbados (100%); India (56%); Sri Lanka (62%); Australia (39%);	Malawi (37%); Uganda (16%); Antigua&Barbuda (34%); Dominica (21%);	Cameroon (2%); Ghana (21%); Kenya (1%); Grenada (4%); St Kitts&Nevis (2%); St Lucia (2%); St Vincent & the Grenadines (1%); Guyana (4%); PNG (5%);

Tropical montane	Kenya (53%);	Namibia (3%); South Africa (2%); Malaysia (6%); PNG (11%);	Malawi (15%); Tanzania (3%); Bahamas (17%);
Sub-tropical humid	New Zealand (51%);		Australia (5%);
Sub-tropical dry		Australia (6%); Cyprus (100%); Malta (100%)	
Sub-tropical montane	Lesotho (100%); Pakistan (31%);	Swaziland (14%);	
Temperate oceanic	UK (85%);	New Zealand (34%);	
Temperate continental			Canada (13%);
Temperate montane			New Zealand (16%);
Boreal coniferous	Canada (40%);	UK (10%);	
Boreal tundra		Canada (24%);	
Boreal montane			UK (4%);

ANNEX 2.9 Forest ownership 2005 (%)

	Forest			OWL		
	Public	Private	Other	Public	Private	Other
Africa						
Botswana	71.0	5.0	24.0	71.0	5.0	24.0
Cameroon	100	-	-	100	-	-
Gambia	100	ns	0	100	0	0
Ghana	100	0	0	100	-	-
Kenya	97.8	2.2	0	90.0	10.0	0
Lesotho	100	0	0	100	0	0
Malawi	-	-	-	-	-	-
Mauritius	52.6	47.4	0	11.8	88.2	0
Mozambique	100	-	-	100	-	-
Namibia	-	-	-	-	-	-
Nigeria	100	0	0	100	0	0
Seychelles	77.5	22.5	-	-	-	-
Sierra Leone	-	-	-	-	-	-
South Africa	66.0	34.0	-	84.3	15.7	-
Swaziland	-	-	-	-	-	-
Uganda	29.8	70.2	-	20.8	79.2	-
Tanzania	99.8	0.2	-	100	-	-
Zambia	100	-	-	-	-	100
Americas						
Antigua and Barbuda	-	-	-	-	-	-
Bahamas	80.0	20.0	-	80.1	19.9	-

Barbados	4.1	95.9	-	-	-	-
Dominica	-	-	-	-	-	-
Grenada	69.0	31.0	-	69.0	31.0	-
Jamaica	27.6	65.1	7.3	5.1	91.1	3.5
Saint Kitts and Nevis	-	-	-	-	-	-
Saint Lucia	47.1	52.9	-	4.0	96.0	-
Saint Vincent and the Grenadines	-	-	-	-	-	-
Trinidad and Tobago	75.4	24.6	-	100	-	-
Belize	-	-	-	-	-	-
Canada	92.1	7.9	ns	97.9	2.1	0
Guyana	66.3	-	33.7	66.3	-	33.7
South Asia						
Bangladesh	98.2	1.8	0	100	-	-
India	98.4	1.6	0	98.4	1.6	0
Maldives	-	-	-	-	-	-
Pakistan	66.0	34.0	-	66.0	34.0	-
Sri Lanka	92.5	7.5	-	-	-	-
South-east Asia & Pacific						
Australia	72.0	27.1	0.9	-	-	-
Brunei Darussalam	100	0	-	94.8	5.2	-
Fiji	6.8	93.2	0	-	-	-
Kiribati	0	100	0	-	-	-
Malaysia	93.4	6.6	0	-	-	-
Nauru	-	-	-	-	-	-
New Zealand	63.4	36.6	0	-	-	-
Papua New Guinea	3.1	0	96.9	3.1	0	96.9
Samoa	98.2	1.8	-	90.9	9.1	-
Singapore	100	0	0	-	-	-
Solomon Islands	-	-	-	-	-	-
Tonga	100	-	-	-	-	-
Tuvalu	-	-	-	-	-	-
Vanuatu	-	-	-	-	-	-
Europe						
Cyprus	61.2	38.8	0	23.7	76.3	0
Malta	100	0	0	-	-	-
United Kingdom	36.2	63.8	0	0	100	0

- Information not available or not relevant.

Countries with no information available omitted.

ANNEX 3 MANAGEMENT AND CONSERVATION TABLES

ANNEX 3.1 Management of the Production Tropical* Permanent Forest Estate (000 ha)

Country	Natural					Planted		
	Total Area	Concessions/ under licence	With management plan	Certified	Sustainably Managed	Total Area	With management plan	Certified
Africa								
Cameroon	8,840	4,950	1,760	0	500	17	n.d**.	0
Ghana	1,150	1,035	1,150	0	270	97	97	0
Nigeria	2,720	1,060	650	0	n.d.	375	175	0
Asia & Pacific								
Fiji	0	n.a.	n.a.	n.a.	n.a.	113	90	0
India	13,500	13,500	9,720	0	4,800	32,600	8,150	0
Malaysia	11,200	6,790	11,200	4,620	4,790	183	183	183
PNG	8,700	5,600	4,980	19	1,500	80	n.d.	0
Vanuatu	117	n.d.	0	0	0	2.1	2.1	0
Americas								
Guyana	5,450	3,800	3,730	0	520	12	0	0
Honduras	1,590	1,070	671	37	187	48	28	0
Trinidad & Tobago	127	75	75	0	15	15.4	15.4	0

Source: ITTO 2005

* except India, whose tropical and non-tropical PFEs could not be differentiated so the figures cover both types

** n.d. - no data

ANNEX 3.2 Management of the Protection Tropical* Permanent Forest Estate (000 ha)

Country	Total area	Attr. to IUCN Cat I-IV	For soil & water protection	With management plan	Sustainably managed
Africa					
Cameroon	3,900	2,650	n.d.	n.d.	n.d.
Ghana	353	174	n.d.	n.d.	108
Nigeria	1,010	1,010	n.d.	n.d.	n.d.
Asia & Pacific					
Fiji	241	3	18	37	55
India	25,600	3,060	n.d.	n.d.	n.d.
Malaysia	3,210	1,400	3,210	3,210	3,210
PNG	1,700	362	n.d.	n.d.	n.d.
Vanuatu	8.37	0	n.d.	n.d.	n.d.
Americas					

Guyana	980	980	n.d.	243	243
Honduras	1,600	434	n.d.	n.d.	n.d.
Trinidad & Tobago	59.1	29.2	n.d.	12	n.d.

Source: ITTO 2005

* except India, whose tropical and non-tropical PFEs could not be differentiated so the figures cover both types

** n.d. - no data; n.a.- not applicable

ANNEX 3.3 Commonwealth member countries of International Processes on Criteria and Indicators for Sustainable Forest Management

Process*	Commonwealth Member Countries
African Timber Organization	Cameroon, Ghana, Nigeria, Tanzania.
Dry Forest in Asia	Bangladesh, Bhutan, India, Sri Lanka,
Dry-zone Africa	Botswana, Gambia, Kenya, Lesotho, Malawi, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Uganda, Zambia
International Tropical Timber Organization** http://www.itto.or.jp	Cameroon, Fiji, Ghana, Guyana, Honduras, India, Malaysia, Papua New Guinea, Togo, Trinidad and Tobago, Vanuatu
Lepaterique Process of Central America	Belize, Honduras,
Montreal Process http://www.mpci.org/links_e.html	Australia, Canada, New Zealand
Near East	Cyprus, Malta, Pakistan,
Pan-European Forest Process http://www.mcpfe.org	United Kingdom
Tarapoto proposal	(No Commonwealth member)

* Details of all Processes are available on

<http://www.fao.org/forestry/foris/webview/forestry2/index.jsp?siteId=4462&sitetreeId=16587&langId=1&geoId=0>

** Members to the ITTO process are exclusively the producer countries

ANNEX 3.4 Commonwealth Countries with some forests under Certification Schemes

Scheme	Commonwealth Member Countries
Forest Stewardship Council (FSC)	Namibia, South Africa, Swaziland, Uganda Belize, Canada, Honduras, India, Malaysia, Pakistan, Sri Lanka New Zealand**, PNG, Solomons UK
Canadian Standards Association (CSC)	Canada
Malaysian Timber Certification Council (MTCC)*	Malaysia

* For a description of the certification scheme of the Malaysian Timber Certification Council see CFA Newsletter #30 September 2005

** New Zealand is establishing its own National Standard, which will be subject to independent verification (CFA Newsletter #30, December 2005)

ANNEX 3.5 IUCN protected area categories

1. Strict Nature Reserve/Wilderness Area: protected area managed mainly for science of wilderness protection
2. National Park: protected area managed mainly for ecosystem protection and recreation
3. Natural Monument: protected area managed mainly for conservation of specific natural features
4. Habitat/Species Management Area: protected area managed mainly for conservation through management intervention
5. Protected Landscape/Seascape: protected area managed mainly for landscape/seascape protection and recreation.
6. Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems.

Categories I-IV are referred to in the ITTO countries quoted in Tables 6.1 and 6.2.

Unfortunately there are several anomalies in assessing protected forest areas and it was not possible to distinguish them in other countries from available data¹; for example, many countries consider that all permanent forest estate, including managed forest, has protected area status. The World Database on Protected Areas therefore refers to a number of types of forest-protected areas, such as Classified and Community Forest, Forest Park, Forest Reserve and Forest Station, National Forest and Protection Forest, and even Reforestation Area.

¹ The authoritative source is the IUCN/UNEP World Database on Protected Areas (WDPA) 2006, issued by the WDPA Consortium and available from IUCN.

ANNEX 4 WOOD PRODUCTION AND CONSUMPTION**ANNEX 4.1 Production, Trade and Consumption of Industrial Roundwood in Commonwealth Countries, 2004 (000 m³)**

Country/Region	Production	Imports	Exports	Consumption*
Africa				
Botswana	105	0	0	105
Cameroon	1,800	0	29	1,771
Gambia	113	1	2	111
Ghana	1,350	3	1	1,351
Kenya	1,792	2	5	1,788
Lesotho	-	-	-	-
Malawi	520	1	0	520
Mauritius	8	20	1	27
Mozambique	1,319	16	89	1,246
Namibia	0	0	0	0
Nigeria	9,418	1	42	9,377
Seychelles	0	0	0	0
Sierra Leone	124	0	1	122
South Africa	21,159	38	371	20,827
Swaziland	330	0	0	330
Uganda	3,175	0	4	3,171
Tanzania	2,314	6	74	2,246
Zambia	834	0	1	834
Σ Commonwealth Africa	44,361			43,826
Americas				
Antigua and Barbuda	0	0	0	0
Bahamas	17	67	4	80
Barbados	5	5	0	10
Dominica	0	1	0	1
Grenada	0	0	0	0
Jamaica	282	3	0	285
Saint Kitts and Nevis	0	1	0	1
Saint Lucia	0	7	0	7
Saint Vincent and the Grenadines	0	2	0	2
Trinidad and Tobago	51	5	1	56
Σ Commonwealth Caribbean	355			442
Belize	62	3	0	65
Canada	197,577	5,961	3,889	199,639
Guyana	481	0	138	344

Σ Commonwealth C & N America	198,120			200,048
Σ Commonwealth Americas				
South Asia				
Bangladesh	282	344	1	625
India	19,146	1,933	9	21,069
Maldives	0	0	0	0
Pakistan	2,679	202	0	2,881
Sri Lanka	694	1	15	680
Σ Commonwealth S Asia	22,801			25,255
South-east Asia & Pacific				
Australia	25,685	2	1,048	24,639
Brunei Darussalam	217	0	0	217
Fiji	346	4	7	342
Kiribati	0	0	0	0
Malaysia	22,000	116	5,459	16,657
Nauru	0	0	0	0
New Zealand	19,722	2	5,240	14,484
Papua New Guinea	2,200	0	2,012	188
Samoa	61	14	1	74
Singapore	0	35	14	22
Solomon Islands	1,020	0	1,011	9
Tonga	2	1	0	2
Tuvalu	0	0	0	0
Vanuatu	28	2	4	25
Σ Commonwealth SE Asia & Pacific	71,281			56,659
Europe				
Cyprus	7	0	0	7
Malta	0	0	0	0
United Kingdom	8,042	625	608	8,058
Σ Commonwealth Europe	8,049			8,065
Σ Commonwealth				
Σ World	1,644,318	122,008	119,659	1,646,667

Source: State of the World's Forests, 2007. FAO, Rome

- figures not available

* consumption net of production, imports and exports may not agree because of rounding

ANNEX 4.2 Woodfuel consumption in Commonwealth Countries 2004

Country	1,000 m³
Africa	
Botswana	655
Cameroon	9,407
Gambia	6,38
Ghana	20,678
Kenya	20,370
Lesotho	2,047
Malawi	5,102
Mauritius	6
Mozambique	16,724
Namibia	-
Nigeria	60,851
Seychelles	-
Sierra Leone	5,403
South Africa	12,000
Swaziland	560
Uganda	36,235
Tanzania	21,503
Zambia	7,219
Σ Commonwealth Africa	218,804
Americas	
Antigua and Barbuda	-
Bahamas	0
Barbados	3
Dominica	0
Grenada	-
Jamaica	570
Saint Kitts and Nevis	-
Saint Lucia	0
Saint Vincent and the Grenadines	0
Trinidad and Tobago	35
Σ Commonwealth Caribbean	608
Belize	126
Canada	2,823
Guyana	866
Σ Commonwealth C & N America	3,815
Σ Commonwealth Americas	4,423
South Asia	
Bangladesh	27,694
India	303,839

Maldives	0
Pakistan	25,599
Sri Lanka	5,656
Σ Commonwealth S Asia	362,788
South-east Asia & Pacific	
Australia	3,092
Brunei Darussalam	12
Fiji	37
Kiribati	0
Malaysia	3,121
Nauru	0
New Zealand	0
Papua New Guinea	5,533
Samoa	70
Singapore	1
Solomon Islands	138
Tonga	2
Tuvalu	0
Vanuatu	90
Σ Commonwealth SE Asia & Pacific	12,096
Europe	
Cyprus	4
Malta	0
United Kingdom	88
Σ Commonwealth Europe	92
Σ Commonwealth	599,203
Σ World	1,766,278

Source: State of the World's Forests, 2007. FAO, Rome
- data not available

ANNEX 4.3 Employment in Selected Commonwealth Countries in the forestry sector 2000

Country	Employment in the Forestry Sector		
	% of Labour Force	Full-time equivalent, thousands	Breakdown by categories*
Africa			
Cameroon	0.5	32	02 (20); 20 (12)
Ghana	0.3	32	02 (7); 20 (25)
Kenya	0.1	20	02 (2); 20 (10); 21 (8)
Nigeria	0.1	48	02 (27); 20 (3); 21 (18)
South Africa	1.0	172	02 (46); 20 (82); 21 (44)
Asia			
Bangladesh	0.0	22	02 (3); 20 (11); 21 (8)
India	0.1	417	02 (200); 20 (52); 21 (166)
Malaysia	2.0	189	02 (28); 20 (128); 21 (33)
Pakistan	0.1	45	02 (29); 20 (3); 21 (12)
Sri Lanka	0.4	35	02 (16); 20 (14); 21 (4)
Europe			
United Kingdom	0.6	192	02 (14); 20 (81); 21 (97)
The Americas			
Canada	2.3	373	02 (89); 20 (168); 21 (116)
Honduras	0.9	21	02 (3); 20 (14); 21 (4)
Oceania			
Australia	0.7	73	02 (9); 20 (47); 21 (17)
New Zealand	1.8	34	02 (9); 20 (17); 21 (7)
Papua New Guinea	0.7	16	02 (16)

Source: Trends and current status of the contribution of the forestry sector to national economies. 2004. FAO, Forest Products & Economics Division.

* Categories: 02 – Forestry, logging and related service activities

20 - Manufacture of wood and wood products, except furniture

21 - Manufacture of paper and paper products

Note that totals may not agree due to rounding

Employment refers to formal employment related to the growing and extraction of raw material, the primary production of goods, the provision of services, and unspecified forestry activities. Secondary wood processing is excluded.

The figures quoted are for countries with a total of more than 20,000 full-time equivalent jobs

ANNEX 5 COMMONWEALTH FORESTRY ASSOCIATIONS AND FORESTRY JOURNALS

ANNEX 5.1 Professional forestry associations in the Commonwealth

This list of professional forestry associations in the Commonwealth primarily covers associations and societies which deal with the subject of forestry rather than with wood-processing or other forestry-related subjects but some of these associations (and their journals - see Annex 5.2) have been included where they are of particular interest to foresters. The associations listed generally aim to promote the exchange of information among professional foresters, but accrediting institutions have also been included (Chapter 5).

Country	Name	Website
Australia	Australian (and New Zealand) Pulp and Paper Industry Technical Association (APPITA).	http://www.appita.com.au/
	Institute of Foresters of Australia (IFA).	http://www.forestry.org.au/
	Australian Forest Growers	http://www.afg.asn.au
Canada	The Canadian Institute of Forestry / Institute Forestier du Canada	www.cif-ifc.org
	Association des consultants en foresterie du Québec (ACF)	http://www.acfquebec.com/
	Association of British Columbia Forest Professionals	http://www.abcfp.ca
	Association of Registered Professional Foresters of New Brunswick L'Association des forestiers agréés du Nouveau-Brunswick	http://www.arpfnb.ca/
	Association of Saskatchewan Forestry Professionals	http://www.asfp.ca
	Canadian Forestry Accreditation Board	http://www.cfab.ca
	Canadian Federation of Professional Foresters Associations	http://www.cif-ifc.org
	College of Alberta Professional Foresters	http://www.professionalforesters.ab.ca/
	Ontario Professional Foresters Association (OPFA)	http://www.opfa.ca/
	Ordre des ingénieurs forestiers du Québec	http://www.oifq.com/
Newfoundland and Labrador Registered Professional Foresters Association	http://cif-rpf-nlsection.com	
Registered Professional Foresters Association of Nova Scotia (RPFANS)	http://www.rpfans.ca/	
India	Society of Indian Foresters	
	Academy of Forests and Environmental Sciences (AFES)	
	Indian Academy of Wood Science (IAWS)	
	Indian Society of Tree Scientists	
	Society for Promotion of Wastelands Development (SPWD)	
Kenya	Kenya Forestry Society (KFS)	
Nigeria	Forestry Association of Nigeria (FAN)	www.forestrynigeria.org
South Africa	Southern African Institute of Forestry (SAIF)	

Sri Lanka	Association of Ex-Professional Foresters	
Tanzania	Tanzanian Association of Foresters (TAF)	http://www.tafonline.20m.com/
United Kingdom	Institute of Chartered Foresters (ICF)	www.charteredforesters.org
	Royal Scottish Forestry Society (RSFS)	www.rsfs.org
	Royal Forestry Society of England, Wales and Northern Ireland (RFS)	http://www.rfs.org.uk/
	The Arboricultural Association (AA)	www.trees.org.uk
	Forestry and Timber Association	
	Small Woods Association	
	The Tree Council	
	The Woodland Trust	

* The list includes associations which exist to promote the exchange of information among professional foresters, as well as accrediting institutions (Chapter 5). It excludes associations representing industry or NGOs

ANNEX 5.2 Commonwealth forestry journals

A forestry journal is defined as a periodical publication, produced more-or-less at regular intervals (e.g. quarterly, yearly) devoted mainly to forestry issues. Such issues may include both technical aspects of the growing, conversion or utilisation of trees, or research into such topics.

Country	Title	Frequency*	Publisher/Contact	on-line version**
Commonwealth	<i>International Forestry Review</i>	Q	Commonwealth Forestry Association, Craven Arms, Shropshire, UK	www.cfa-international.org
Australia	<i>Australian Forestry</i>	Q	Institute of Foresters of Australia, PO Box 7002 Yarralumla ACT 2600	www.forestry.org.au
	<i>Australian Forest Grower</i>	Q	Forest Industries House, 24 Napier Close, Deakin ACT 2600	www.afg.asn.au
	<i>APPITA Journal</i>	B	Australian (and New Zealand) Pulp and Paper Industry Technical Association, Carlton Clock Tower Suite 47, 255 Drummond Street Carlton Victoria 3053	www.appita.com.au
	<i>International Journal of Wildland Fire</i>	Q	CSIRO, ACT	www.publish.csiro.au/nid/114.htm
	<i>Tasforests</i>	A	Forestry Tasmania	www.forestrytas.com.au/forestrytas
	<i>Agroforestry News</i>	Q	Private Forestry Southern Queensland Inc.	http://www.agroforestrynews.com.au/
	<i>Australian Wood Review</i>	Q	Interwood Holdings Pty. Ltd.	http://www.woodreview.com.au/
	<i>Between the Leaves</i>	Semi-annually	D P I Forestry	
	<i>Forest Logger & Sawmiller</i>	M	Australasian Forest Logger & Sawmiller	http://www.austforest.com.au/forestloggermagazine/
	<i>Rain Forest News</i>	Q	Australian Rainforest Conservation Society Inc.	
	<i>Southern Queensland Forestry News</i>	Q	Private Forestry Southern Queensland Inc.	
	<i>Tree Line</i>	Q	Private Forests Tasmania	http://www.privateforests.tas.gov.au/pubmain.htm
	<i>Trees and Natural Resources</i>	Q	Natural Resources Conservation League of Victoria	

Australia/New Zealand	<i>Ensis Link</i>	Q	ensis	http://www.ensisjv.com/Default.aspx?tabid=282
Bangladesh	<i>Bangladesh Journal of Forest Science</i>	S	Bangladesh Forest Research Institute, Chittagong	www.bffri.gov.bd
Canada	<i>Canadian Journal of Forest Research</i>	M	National Research Council of Canada, Ottawa ON K1A 0R6	pubs.nrc-cnrc.gc.ca/cgi
	<i>Forestry Chronicle</i>	B	Canadian Institute of Forestry, 151 Slater Street, Suite 504 Ottawa, ON K1P 5H3	www.cif-ifc.org
	<i>Canadian Silviculture</i>	Q	Canadian Silviculture Association	www.canadiansilviculture.com
	<i>Logging and Sawmilling Journal</i>	?Q		www.forestnet.com
	<i>BC Forest Professional</i>	B	Association of British Columbia Forest Professionals	www.abcfp.ca
	<i>Truck Logger</i>	Q	Truck Loggers Association	www.tla.ca
	<i>Interior Trucker and Logger</i>	Q	Interior Logging Association	www.interiorlogging.org
	<i>BC Journal of Ecosystems and Management</i>	Irregular	FORREX, British Columbia	www.forrex.org/publications/jem/jem.asp
	<i>Canadian Trees</i>	?	Tree Canada Foundation	www.tcf-fca.ca/index_e.htm
	<i>International Journal of Forest Engineering</i>	Semi-annually	University of New Brunswick, Faculty of Forestry and Environmental Management	
	<i>Canadian Forest Industries</i>	9/yr	J C F T Forest Communications	www.forestcommunications.com/cfi/
	<i>2 x 4</i>	B	Editions C.R. Inc.	
	<i>Atlantic Forestry Review</i>	B	DVL Publishing	www.countrymagazines.com/afr.html
	<i>Le Bois et sa Sous - Traitance</i>	B	Alain Beland	
	<i>Business Logger</i>	M	Bellwether Publishing Ltd.	www.bellpub.com/
	<i>Forest People</i>	Q	Forest People	
	<i>Forest Products Carrier</i>	Semi-annually	Craig Kelman & Associates Ltd.	
	<i>Forêt Conservation</i>	B	Association Forestiere Quebecoise Inc.	

	<i>Hiballer Forest Magazine</i>	M	H B Publishers Ltd.	
	<i>Interlog Quarterly Review</i>	Q	Image Fast Productions Inc.	
	<i>Log Hauler</i>	Q	Association Publications Ltd.	
	<i>Madison's Canadian Lumber Reporter</i>	weekly	Madison's Canadian Lumber Reporter (1973) Ltd.	
	<i>Mill Product News</i>	B	Baum International Media	www.bauminternational.com/publications/mpn/mpnmg_main.htm
	<i>Mise en Marche du Bois de la Foret Privee du Quebec</i>	A	Natural Resources Canada, Federation des Producteurs de Bois du Quebec	
	<i>Operations Forestieres et de Scierie</i>	Q	J C F T Forest Communications	www.forestcommunications.com/of
	<i>Our Forest</i>	Q	Ontario Forestry Association	
	<i>Professional Forester</i>	Q	Ontario Professional Foresters Association	
	<i>Resam Forestier</i>	M	Les Editions Forestieres	
	<i>Tree Physiology</i>	M	Heron Publishing	www.heronpublishing.com/tphome.html
	<i>Treelines</i>	Q	Saskatchewan Forestry Association	
	<i>Wood</i>	Q	Canadian Wood Council	
Dominica	<i>The New Forester</i>	A	Ministry of Agriculture, Forestry & Wildlife Division	
Ghana	<i>Ghana TIDD Gazette</i>	variable, 1-3 p.a.	Timber Industry Development Division, Ghana Forestry Commission, Takoradi	www.ghanatimber.org
	<i>Ghana Journal of Forestry</i>	S	Forestry Commission, Forestry Research Institute of Ghana	
India	<i>Indian Forester</i>	M	Post Office New Forest, Dehradun (Uttaranchal) - 248 006	www.icfre.org/institutes2/FRI-Indian%20Forester
	<i>Indian Journal of Forestry</i>	Q	23-A Connaught Place, PO Box no. 137, Dehra Dun 248001 Uttaranchal.	www.scientific.thomson.com/contact/
	<i>Timber Development Association of India - Journal</i>	Q	Timber Development Association of India, Dehra Dun	www.journalofforestproducts.com

	<i>Wood News</i> ***	Q	Ganesh Publications Pvt.Ltd. 151-75/5, 20 th A Main First R Block, Rajajinagar, Bangalore 560 010	
	<i>Journal of Tropical Forestry</i> ***	Q	Society of Tropical Forestry Scientists, Jabalpur	
	<i>MYFOREST</i> ***	Q	Karnataka Forest Dept.	
	<i>Annals of Forestry: an international journal of forest sciences</i>	Semi-annually	Jyoti Publishers & Distributors	
	<i>Evergreen</i>	S	Kerala Forest Research Institute	
	<i>Forest Usufructs</i>	S	Surya International Publications	
	<i>Indian Academy of Wood Science. Journal</i>	S	Indian Plywood Industries Research Institute	
	<i>Indian Journal of Agroforestry</i>	S	Indian Society of Agroforestry	
	<i>IPIRI Journal</i>	S	Indian Plywood Industries Research Institute	
	<i>Wood News</i>	Q	Ganesh Publications Pvt. Ltd.	
Kenya	<i>East African Agricultural and Forestry Journal</i>	Q	Kenya Agricultural Research Institute	
Malawi	<i>Forestry Research Institute of Malawi. Research Record</i>	Irregular	Forestry Research Institute	
Malaysia	<i>Journal of Tropical Forest Science</i>	Q	Forest Research Institute Malaysia, Kepong, 52109 Kuala Lumpur	www.frim.gov.my/epublication/
	<i>Journal of Tropical Forest Products</i>	B	Forest Research Institute Malaysia, Kepong, 52109 Kuala Lumpur	
	<i>The Malaysian Forester</i>	Q	Forestry Department Headquarters, Jalan Sultan Salahuddin, 50660 Kuala Lumpur	
	<i>Maskayu</i>	M	Malaysian Timber Industry Board	
New Zealand	<i>New Zealand Journal of Forestry Science</i>	T	Private Bag 3020 Rotorua	www.scionresearch.com/new+zealand+journal+of+forestry+science .

	<i>New Zealand Journal of Forestry</i>	Q	NZ Institute of Forestry, PO Box 19-840, Christchurch	www.forestry.org.nz
	<i>Southern Hemisphere Forest Industry Journal</i>	Q	P.O Box 6215, Whakarewarewa - Rotorua - 3220	www.southernhemisphereforestry.co.nz
	<i>New Zealand Forest Industries</i>	M	Neilson Publishing Ltd.	
	<i>Forest Health News</i>	M	ensis	www.ensisjv.com/NewsEventsandPublications/Newsletters/ForestHealthNews/tabid/284/Default.aspx
	<i>Inwood Magazine</i>	B	Neilson Publishing Ltd	www.inwoodmag.com/index.html
	<i>New Zealand Forestry Bulletin</i>	Q	New Zealand Forest Owners Association	www.nzfoa.org.nz/file_libraries/forestry_bulletin
Nigeria	<i>Nigerian Journal of Forestry***</i>	S	Forestry Association of Nigeria, Ibadan	
Pakistan	<i>Pakistan Journal of Forestry</i>	Q	Pakistan Forest Institute, Peshawar-25120	
	<i>The International Journal of Wild Life and Environmental Research</i>	M	International Press	
	<i>Asian Timber</i>	M	First Asia Publishing Pte. Ltd.	
Singapore	<i>Yazhou Mu</i>	M	First Asia Publishing Pte. Ltd.	
South Africa	<i>Southern African Forestry Journal</i>	T	Postnet Suite 329 Private Bag X4 Menlo Park 0102	www.saif.org.za
	Will change name to <i>Southern Hemisphere Forestry Journal</i> from 2007		New journal will be published by NISC www.nisc.co.za	
	<i>SA Forestry</i>	B	Artworks Communications, PO Box 47209, Greyville 4023	www.safeforestrymagazine.co.za
	<i>Arbor</i>	M	Department of Water Affairs & Forestry	
	<i>Journal of Dendrology</i>	S	Dendrological Society	
	<i>Wood Southern Africa & Timber Times</i>	M	Malnor (Pty) Ltd.	
Sri Lanka	<i>Sri Lanka Forester***</i>	S	Sri Lanka Forest Dept., Colombo	
Tanzania	<i>Tanzania Journal of Forestry and Nature Conservation</i>	S	Faculty of Forestry & Nature Conservation, Sokoine University	www.suanet.ac.tz

Uganda	<i>Woodsman Newsletter</i>	A	Forestry Department	
UK	<i>Forestry</i>	Q	Oxford University Press, Great Clarendon St. Oxford OX2 6DP	www.forestry.oupjournals.org
	<i>Quarterly Journal of Forestry</i>	Q	Royal Forestry Society, 102 High St. Tring, Herts HP23 4AF	www.rfs.org.uk
	<i>Scottish Forestry</i>	Q	Royal Scottish Forestry Society, Hagg-on-Esk Canonbie Dumfries DG14 0XE	www.rsfs.org.uk
	<i>Arboricultural Journal</i>	Q	Arboricultural Association, Ampfield House, Ampfield, Romsey SO51 9PA	www.trees.org.uk/journal.php
	<i>Forestry and British Timber</i>	9 months	Benn Brothers, London	www.fbti.co.uk
	<i>Journal of the Institute of Wood Science</i>	S		www.iwsc.org.uk/pubs_journal.htm
	<i>Forests, Trees and Livelihoods</i>	Q	AB Academic Publishers, The Old Vicarage, Church St. Bicester, Oxon OX26 6AY	www.foreststreesandlivelihoods.co.uk
	<i>Wood Based Panels International</i>	B	Polygon Media Ltd.	www.wbpionline.com/
	<i>Journal of Forest Policy</i>	S	A B Academic Publishers	
	<i>Tree News</i>	S	Tree Council	
	<i>Tropical Timbers</i>	M	Tropical Timbers	
	<i>Timber Trades Journal</i>	10/yr	Polygon Media Ltd.	www.ttjonline.com/
	<i>Wood Material Science and Engineering</i>	Q	Taylor & Francis Ltd.	www.tandf.co.uk/journals/titles/17480272.asp

* Monthly – M; 9 – nine issues yearly; Bi-monthly –B; Quarterly – Q; three times yearly – T; half-yearly – S; annual – A

** usually available to members only

*** these publications may not have been produced for several years

ANNEX 6 INTERNATIONAL FORESTRY AGREEMENTS, CONVENTIONS AND REGULATIONS

ANNEX 6.1 International forestry-related agreements and conventions

Agreement/Convention and website	Description
Rio Declaration on Environment & Development	Arose from the 1992 UN Conference on Environment & Development (UNCED) Includes 27 Principles
Non-legally binding authoritative statement of principles for a global consensus on the management and sustainable development of all types of forest.	Agreed at UNCED
Agenda 21	The programme of action for sustainable development which arose from UNCED. Chapter 11 refers to forests.
UN Commission on Sustainable Development (CSD)	Established by the UN General Assembly on the recommendation of UNCED, to monitor progress and identify problems in the implementation of Agenda 21.
Intergovernmental Panel on Forests (IPF) and the Intergovernmental Forum on Forests (IFF)	The IPF was established in 1995 by the members of the CSD as an intergovernmental mechanism devoted exclusively to forest issues. It was followed by the IFF in 1997.
UN Forum on Forests (UNFF) http://www.un.org/esa/forests/	Established in 2000 as a subsidiary body of the United Nations Economic and Social Council (ECOSOC), to provide a forum for intergovernmental dialogue on forests. The main objective are to promote "... the management, conservation and sustainable development of all types of forests and to strengthen long-term political commitment to this end..." based on the Rio Declaration, the Forest Principles, Chapter 11 of Agenda 21 and the outcome of the IPF/IFF Processes and other key milestones of international forest policy.
Millennium Summit	Held September 2000 in New York. Adopted Millennium Declaration, which contains, <i>inter alia</i> , a number of international development goals. The themes of the Millennium Declaration were elaborated and developed into the Millennium Development Goals (MDGs)
Millenium Development Goals (MDG) http://www.un.org/millenniumgoals/	The MDGs, commonly accepted as a framework for measuring progress in development, comprise eight overarching goals, 18 targets and 48 indicators. MDG#7 - 'achieve environmental sustainability' is directly related to forests, although the others are strongly linked.
World Summit on Sustainable Development (WSSD) also called Rio +10	WSSD met in 2002 in Johannesburg, South Africa, and adopted two main documents: the Johannesburg Plan of Implementation (JPOI) and the Johannesburg Declaration on Sustainable Development.

<p>Ramsar Convention on Wetlands http://www.ramsar.org/</p>	<p>Dating from 1971 and thus one of the oldest of the environmental treaties. The Convention's mission is "the conservation and wise use of all wetlands through local, regional and national actions and international co-operation, as a contribution towards achieving sustainable development throughout the world" 153 contracting parties</p>
<p>Montreal Protocol on Substances that Deplete the Ozone Layer</p>	<p>Another long-established environmental agreement, the Protocol introduced control measures for some CFCs and halons for developed countries (non-Article 5 parties). Developing countries (Article 5 parties) were granted a grace period allowing them to increase their use of these ODS before taking on commitments. Several amendments and have been adopted, adding new obligations and additional oxygen-depleting substances (ODS), including methyl bromide, formerly used to sterilise forest nursery beds</p>
<p>Convention on Biological Diversity (CBD) http://www.biodiv.org</p>	<p>The CBD is dedicated to promoting sustainable development. Conceived as a practical tool for translating the principles of Agenda 21 into reality, the Convention recognizes that biological diversity is about more than plants, animals and micro organisms and their ecosystems – it is about people and our need for food security, medicines, fresh air and water, shelter, and a clean and healthy environment in which to live</p>
<p>Framework Convention on Climate Change (UNFCCC) http://unfccc.int/2860.php</p>	<p>The UNFCCC is a framework for action aimed at stabilizing atmospheric concentrations of greenhouse gases to avoid "dangerous anthropogenic interference" with the climate system. The gases include methane, nitrous oxide and, in particular, carbon dioxide. It came into force in 1994</p>
<p>Kyoto Protocol http://unfccc.int/resource/docs/convkp/kpeng.html</p>	<p>In 1997, delegates to a meeting of the UNFCCC in Kyoto, Japan, agreed to a Protocol to the UNFCCC that committed developed countries and countries in transition to a market economy (Annex 1 countries) to achieve emissions reduction targets. These countries agreed to reduce overall emissions of six greenhouse gases by an average of 5.2% below 1990 levels between 2008 and 2012 (the first commitment period), with specific targets varying from country to country. There are three flexible mechanisms to assist Annex I parties in meeting their national targets cost-effectively: an emissions trading system; joint implementation (JI) of emissions-reduction projects between Annex I parties; and the Clean Development Mechanism (CDM), which allows for emissions reduction projects to be implemented in non-Annex I parties (developing countries). There are 166 Parties to the Protocol.</p>

<p>Adaptation Fund http://www.undp.org/gef/adaptation/funds/04_1.htm</p>	<p>Nearly all of the MDGs will be affected by climate change. The Adaptation Fund, which is based on proceeds of the Clean Development Mechanism, is not operational as yet. The website provides links to resources on climate change and adaptation and an overview of UNDP's Adaptation Portfolio.</p>
<p>Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (CCD) http://www.unccd.int/main.php</p>	<p>The member countries of the CCD recognise the human and environmental cost of the degradation that contributes to the problem of desertification and that drylands are the location of some of the most magnificent ecosystems in the world</p>
<p>Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) http://www.cites.org/</p>	<p>CITES, which came into force in 1975, is an international agreement between governments. Its aim is to ensure that international trade in wild animal and plant species does not threaten their survival. CITES parties regulate wildlife trade through control and regulation of species listed in three appendices.</p> <ul style="list-style-type: none"> • Appendix I - species endangered due to international trade. Trade only permitted in exceptional circumstances. • Appendix II - species that may become endangered if trade is not regulated through controls to prevent unsustainable use • Appendix III - species that are subject to domestic regulation. <p>There are presently 169 Parties.</p>
<p>Global Environment Facility (GEF)</p>	<p>The GEF is a financial mechanism that promotes international cooperation and fosters actions to protect the global environment. Initially funding was provided to four focal areas: biodiversity, climate change, international waters and ozone layer depletion, to which were later added land degradation and persistent organic pollutants (POPs).</p>
<p>Intergovernmental Panel on Climate Change (IPCC)</p>	<p>Established in 1988 by WMO and UNEP. The purpose of the IPCC is to assess the scientific, technical and socioeconomic information relevant to understanding the risks associated with human induced climate change. It does not undertake new research, nor monitor climate-related data, but bases its assessments on published and peer-reviewed scientific and technical literature. The IPCC has prepared a series of comprehensive assessments, special reports and technical papers, which provide scientific information on climate change to the international community, and the public.</p> <p>This information has played an important role in the negotiations under the United Nations Framework Convention on Climate Change (UNFCCC).</p>

The International Tropical Timber Agreement (ITTA)	<p>Negotiated under the auspices of the United Nations Conference on Trade and Development (UNCTAD) and entered into force in 1985 to: provide an effective framework for cooperation and consultation between countries producing and consuming tropical timber; promote the expansion and diversification of international trade in tropical timber and the improvement of structural conditions in the tropical timber market; promote and support research and development to improve forest management and wood utilization; and encourage development of national policies for the sustainable utilization and conservation of tropical forests and their genetic resources and for maintaining the ecological balance in the regions concerned.</p> <p>The successor agreement, the ITTA, entered into force 1997. Had broader provisions for information sharing, including non-tropical timber trade data, allows for consideration of non-tropical timber issues as they relate to tropical timber; and includes the ITTO 2000 Objective for achieving exports of tropical timber and timber products from sustainably managed sources by the year 2000. Extended twice for three-year periods and now scheduled to expire upon entry into force of the ITTA, 2006.</p> <p>The International Tropical Timber Organization (ITTO), Yokohama, Japan, provides a framework for tropical timber producer and consumer countries to discuss and develop policies on issues relating to international trade in, and utilization of, tropical timber and the sustainable management of its resource base. ITTO has 59 members divided into two caucuses: producer countries (33 members) and consumer countries (26 members). They represent 90 % of world trade in tropical timber and 80 percent of the world's tropical forests.</p>
--	--

A comprehensive and still-relevant source of information on international initiatives on forestry is Soderland, M. and Pottinger, A., eds. (2001) *The world's forests - Rio+8: policy, practice and progress towards sustainable development*. Commonwealth Forestry Association.

ANNEX 6.2 Tree species subject to CITES regulations 2002

Scientific name	Common name	Native region
Appendix I		
<i>Abies guatemalensis</i>	Guatemalan fir	Central America
<i>Araucaria araucana</i> (Chile only)	Monkey-puzzle tree	Argentina, Chile
<i>Balmea stormiae</i>	Ayuque	Central America, Mexico
<i>Dalbergia nigra</i>	Brazilian rosewood	Brazil
<i>Fitzroya cupressoides</i>	Alerce	Argentina, Chile
<i>Pilgerodendron uviferum</i>	Pilgerodendron	Argentina, Chile
<i>Podocarpus parlatoresi</i>	Parlatore's Podocarp	Argentina, Bolivia, Peru
Appendix II		
<i>Aquilaria malaccensis</i>	Agarwood	S. Asia - S.E. Asia
<i>Caryocar costaricense</i>	Ajo, garlic tree	Costa Rica, Panama
<i>Guaiacum officinale</i>	Commoner lignum vitae	South America, Caribbean
<i>Guaiacum sanctum</i>	Hollywood lignum vitae	Central America
<i>Oreomunnea pterocarpa</i>	Gavilan	Central America, Mexico
<i>Pericopsis elata</i>	Afromosia	West Africa
<i>Platymiscium pleiostachyum</i>	Cristobal, Granadillo	Costa Rica, Panama
<i>Prunus africana</i>	African cherry	Tropical Africa, Madagascar
<i>Pterocarpus santalinus</i> ¹	Redsander	India
<i>Swietenia humilis</i>	Mexican mahogany	Central America
<i>Swietenia mahagoni</i>	Caribbean mahogany	Caribbean
<i>Taxus wallichiana</i> ²	Himalayan yew	S. Asia
Scientific name	Common name	Country ³
Appendix III		
<i>Podocarpus neriifolius</i>	Oleander-leafed podocarp	Nepal
<i>Talauma hodgsonii</i>	Hodgson's talauma	Nepal
<i>Tetracentron sinense</i>	Tetracentron	Nepal
<i>Swietenia macrophylla</i>	Big-leaf mahogany	Costa Rica, Bolivia, Brazil, Mexico, Peru, Columbia
<i>Thymelaeaceae gonystylus</i> spp.	Ramin	Indonesia
<i>Cedrela odorata</i>	Spanish Cedar	Peru, Columbia

Source: http://www.fao.org/docrep/007/ae017e/ae017e15.htm#P11133_1117678

1 Exemptions made for finished musical instruments, formulations, and chemical derivatives.

2 Exemptions made for medicinal products.

3 Denotes country where species is voluntarily listed. Export of species must be accompanied by CITES permit only for country listed. Exports from other countries need only be accompanied by official certificate of origin.

ANNEX 7 COUNTRY INFORMATION

ANTIGUA AND BARBUDA

NATIONAL FOREST SERVICE

Forestry Unit, Ministry of Agriculture, Lands, Marine Resources & Agro Industries
Temple and Nevis St.
St. John's
Antigua and Barbuda
Fax: (268) 462-6104
E-mail: fisheries@candw.ag

Agricultural Plant Protection Unit
Ministry of Agriculture, Lands, Marine Resources & Agro Industries
Friars Hill Road
Dunbars, St. John's
Telephone: (268) 562-1923
Fax: (268) 562-1923

The Environment Division
Ministry of Public Works, Telecommunications and the Environment
Factory Road, Government Complex
St. John's, Antigua
Telephone: (268) 462-4625/462-0651
Fax: (268) 462-6398/462-2836/460-6093
E-mail: mail@environmentdivision.info
Web site: <http://environmentdivision.info/index.htm>

NON-GOVERNMENTAL ORGANIZATIONS (NGOS)

Environmental Awareness Group (EAG)
St John's, Antigua
Telephone: (268) 462-6236
Fax: (268) 463-7740
E-mail: eag@candw.ag
Web site: <http://www.antiguanracer.org/html/partners/eag.htm>
Gilbert's Agricultural & Rural Development Center (GARDC)
P.O. Box W1675
Mercers Creek, Antigua
West Indies
Telephone: (268) 463-4121
Fax: (268) 562-0084
E-mail: gardc@candw.ag
Web site: <http://www.gardc.org/>

AUSTRALIA

NATIONAL FOREST SERVICE

Department of Agriculture, Fisheries and Forestry (DAFF).
Edmund Barton Building, Blackall Street, Barton ACT 2601, Australia.
Website: <http://www.daff.gov.au/>

Department of the Environment and Heritage (DEH).
John Gorton Building, King Edward Terrace, Parkes ACT 2600, Australia.
Website: <http://www.deh.gov.au/>

NATIONAL RESEARCH AND TRAINING INSTITUTIONS

Forest and Wood Products Research and Development Corporation (FWPRDC).
Suite 607, Level 6, Yarra Tower, World Trade Centre, Melbourne VIC 3005, Australia.
Website: <http://www.fwprdc.org.au/>

Australian Centre for International Agricultural Research (ACIAR).
38 Thynne Street, Fern Hill Park, Bruce ACT, Australia.
Website: <http://www.aciar.gov.au/>

Commonwealth Scientific and Industrial Research Organization (CSIRO).
Website: <http://www.csiro.au/>

UNIVERSITY FACULTIES/DEPARTMENTS OFFERING FORESTRY OR FOREST-RELATED TRAINING

The Australian National University (ANU) School of Resources, Environment and Society
The Australian National University, Canberra ACT 0200, Australia
Website: <http://sres.anu.edu.au/>
Southern Cross University (SCU) School of Environmental Science and Management
Southern Cross University, Military Road, Lismore NSW 2480, Australia
Website: <http://www.scu.edu.au/schools/esm/>

The University of Melbourne School of Forest and Ecosystem Science
School of Forest and Ecosystem Science, Water Street, Creswick VIC 3363, Australia

Website: <http://www.forestsscience.unimelb.edu.au/>
 The University of Queensland (UQ)
 The University of Queensland, Brisbane QLD 4072,
 Australia
 Website: <http://www.uq.edu.au/>

NATIONAL NGOS CONCERNED WITH FORESTRY ISSUES

National Association of Forest Industries (NAFI).
 NAFI, PO Box 239, Deakin West ACT 2600, Australia.
 Email: enquiries@nafi.com.au
 Website: <http://www.nafi.com.au/>

Australian Plantation Products and Paper Industry
 Council (A3P)
 Level 3, Tourism House, 40 Blackall Street, Barton
 ACT 2600, Australia.
 Email: info@a3p.asn.au
 Website: <http://www.a3p.asn.au/>

Australian (and New Zealand) Pulp and Paper Industry
 Technical Association (APPITA).
 Suite 47, Level 1, 255 Drummond Street, Carlton VIC
 3053, Australia.
 Website: <http://www.appita.com.au/>

Australian Forest Growers (AFG).
 Forest Industries House, 24 Napier Close, Deakin ACT
 2600, Australia.
 PO Box 318, Deakin West ACT 2600, Australia.
 Website: <http://www.afg.asn.au/>

Institute of Foresters Australia (IFA).
 PO Box 7002, Yarralumla ACT 2600, Australia.
 Website: <http://www.forestry.org.au/>

Australian Rainforest Conservation Society (ARCS).
 19 Colorado Avenue, Bardon QLD 4065, Australia.
 Website: <http://www.rainforest.org.au/>

Doctors for Native Forests.
 Website: <http://www.doctors.for.forests.org.au/>

Lawyers for Forests.
 PO Box 550, West Melbourne VIC 8007, Australia.
 Website: <http://www.lawyersforforests.asn.au/>

The Wilderness Society (TWS).
 57E Brisbane Street, Hobart TAS 7000, Australia.
 Website: <http://www.wilderness.org.au/>

BAHAMAS

NATIONAL FOREST SERVICE
 Department of Lands and Surveys (Forestry Section)
 Office of the Prime Minister (Government of the
 Bahamas)
 P.O. Box 592
 Nassau
 Bahamas
 Fax: 001 3 225830
 E-mail (organization): forestry@batelnet.bs
 Web site: <http://www.bahamas.gov.bs/>

Department of Agriculture (Conservation Unit)
 Ministry of Agriculture and Marine Resources
 Levy Building
 P. O. Box N 3028
 Nassau, N.P., the Bahamas
 Telephone: (242) 325-7502/9
 Fax: (242) 325-3960

Mr. Pinder, Acting Director of Agriculture
 E-mail: SIMEONPINDER@bahamas.gov.bs
 Department of Physical Planning
 Ministry of Works and Utilities
 John F. Kennedy Drive
 P O Box N 1611
 Nassau, N.P., the Bahamas
 Telephone: (242) 322-7220/1
 Fax: (242) 328-3206
 E-mail: admin@mowt.bs
 Web site: <http://www.bahamas.gov.bs>

Water and Sewerage Corporation
 Department of Public Works
 Ministry of Works and Utilities
 P O Box N 3905
 Nassau, the Bahamas
 Telephone: (242) 302-5500
 Fax: (242) 328-3896
 E-mail: admin@mowt.bs
 Web site: <http://www.wsc.com.bs/>

Bahamas Environment Science and Technology
 Commission (BEST)
 Ministry of Energy and the Environment
 Cecil Wallace-Whitfield Centre
 Cable Beach
 P. O. Box N 3217
 Nassau, N.P., the Bahamas
 Telephone: (242) 325-7502/9
 Fax: (242) 322-1767
 E-mail: bestnbs@hotmail.com
 Web site: <http://www.best.bs/>

RESEARCH INSTITUTIONS

Bahamas Environmental Research Centre (BERC)
The College of the Bahamas
Oakes Field Campus
Thompson Boulevard
P O Box N4912
Nassau, Bahamas
Telephone: (242) 302-4300
Fax: (242) 326-7834
Web site: <http://www.cob.edu.bs/BERC.php>

Bahamas National Geographic Information System
(GIS) Centre
The College of the Bahamas
Oakes Field Campus
Thompson Boulevard
P O Box N4912
Nassau, Bahamas
Telephone: (242) 302-4300
Fax: 242-326-7834
Web site: <http://www.cob.edu.bs/GIS.php>

Gerace Research Center
c/o Twin Air
498 SW 34th St.
Ft. Lauderdale, FL 33315
Telephone: (242) 331-2520
Fax: (242) 331- 2524
Web site: <http://www.geraceresearchcenter.com/>

Marine and Environmental Studies Institute (MESI)
T Block
Oakes Field Campus
Thompson Boulevard
P O Box N4912
Nassau, Bahamas
Telephone: (242) 302-4400
Web site: <http://www.cob.edu.bs/MESI.php>

UNIVERSITIES AND COLLEGES

The College of the Bahamas
Oakes Field Campus
Thompson Boulevard
P O Box N4912
Nassau, Bahamas
Telephone: (242) 302-4400
Fax: (242) 326-7834
Web site: <http://www.cob.edu.bs>

NON-GOVERNMENTAL ORGANIZATIONS (NGOS)

Bahamas National Trust (BNT)

P.O. Box N4105
The Retreat Gardens
Village Road
Nassau, Bahamas
Telephone: (242) 393-1317
Fax: (242) 393-2548
E-mail: bnt@bahamasnationaltrust.org
Web site: <http://www.thebahamasnationaltrust.org>

Friends of the Environment - Abaco, Bahamas
PO Box AB-20755
Marsh Harbour, Abaco
Bahamas
Telephone: (242) 367-2721
Fax: (242) 367-0722
E-mail: info@friendsoftheenvironment.org
Web site: <http://www.friendsoftheenvironment.org/>

BANGLADESH

NATIONAL FOREST SERVICE
Chief Conservator of Forests
Banabhaban, Agargaon, Dhaka-1207
Bangladesh
Telephone: (88) 02 8118671
Fax: (88) 02 8119453

RESEARCH INSTITUTIONS

Director
Bangladesh Forest Research Institute (BFRI)
Soloshahar, P.O.Box- 273, Chittagong 4000
Bangladesh
Telephone: (88) 031 681577
Email: bfri@spnetctg.com
Web: www.bfri.gov.bd

Director
Forest Training and Development Centre (FTDC)
Kaptai, Rangamati Hill Districts
Rangamati, Bangladesh

UNIVERSITIES AND COLLEGES

Director
Institute of Forestry and Environmental Sciences
University of Chittagong
Chittagong, Bangladesh

Head
Dept. of Forestry
Shahjalal University of Science and Technology
Sylhet-3114, Bangladesh
Telephone: (88) 0821 713491, 714479, 713850, 717850
Fax: (88) 0821 715257

Head
Forestry and Wood Technology discipline
Khulna University
Bayra, Khulna
Bangladesh

BARBADOS

NATIONAL FOREST SERVICE

Ministry of Agriculture and Rural Development
Government of Barbados
Graeme Hall
Christ Church
Barbados
Fax number: 1246 4208444
E-mail: minagric@caribsurf.com
Web site: <http://www.agriculture.gov.bb>

National Conservation Commission (NCC)
Codrington House
St. Michael
Barbados
Telephone: (246) 425-1200/1212
E-mail: ncc@caribsurf.com
Web site: <http://www.nccbarbados.gov.bb/>

RESEARCH INSTITUTIONS

Bellairs Research Institute
Holetown, St. James, Barbados
Telephone: (246) 422-2087
Fax: (246) 422-0692
E-mail: bellairs@caribsurf.com
Web site: <http://www.mcgill.ca>

National Council for Science and Technology (NCST)
Reef Road
Fontabelle
St. Michael
Barbados
Telephone: (246) 427-1820/427-5270/427-5276
Fax: (246) 228-5765
E-mail: ncst@commerce.gov.bb
Web site: <http://www.commerce.gov.bb>

UNIVERSITIES AND COLLEGES

Barbados Community College (BCC)
The Eyrie
Howells Cross Road
St. Michael
Barbados, West Indies

Telephone: (246) 426-2858
Fax: (246) 429-5935
Web site: <http://bcc.edu.bb/>

University of the West Indies
Cave Hill Campus
PO Box 64
Bridgetown
Barbados
Telephone: (246) 417-4000
Fax: (246) 425-1327
Web site: <http://www.cavehill.uwi.edu/>

NON-GOVERNMENTAL ORGANIZATIONS (NGOS)

Barbados Environment Association
P.O. Box 505
Christ Church
Barbados
Telephone: (1809) 428-4061

Barbados Museum and Historical Society
St. Ann's, The Garrison
St. Michael
Barbados
Telephone: (246) 427-0201/436-1956
Fax: (246) 429-5429
E-mail: museum@caribsurf.com
Web site: <http://www.barbmuse.org.bb/>

Barbados National Trust
Willey House
Willey
St Michael
Barbados, West Indies
Telephone: (246) 426-2421
Fax: (246) 429-9055
E-mail: natrust@sunbeach.net
Web site: <http://trust.funbarbados.com>

Barbados Small Business Association (SBA)
#1 Pelican Industrial Park
Princess Alice Highway
Bridgetown
Barbados
Telephone: (246) 228-0162
Fax: (246) 228-0613
Web site: <http://www.sba.org.bb> Caribbean

Conservation Association (CCA)
"Chelford", The Garrison
St. Michael, Barbados
Telephone: (246) 426-5373
Fax: (246) 429-8483

Web site: <http://www.ccanet.net>

Future Centre Trust (FCT) Inc.
#2 Quarters, Edgehill
St. Thomas, Barbados
Telephone: 246-425-2020
Fax: 246-425-0075

BELIZE

NATIONAL FOREST SERVICE

Forest Department
Ministry of Natural Resources, Local Government and
the Environment
23/25 Unity Boulevard
Belmopan City
Belize
Telephone: (501) 822-2079/822-1524
Fax: (501) 822-1523
E-mail: forestry@mnrei.gov.bz
Web site: <http://www.mnrei.gov.bz>

RESEARCH INSTITUTIONS

Hill Bank Field Station
PO Box 749
1 Eyre Street
Belize City, Belize
Central America
Telephone: (501)-227-5616/227-5617/227-1020
Fax: 011-501-227-5635
E-mail: pfbel@btl.net
Web site: <http://www.pfbelize.org>

Las Cuevas Research Station and Explorers Lodge
P.O. Box 410
Belmopan, Belize
E-mail: enquiries@mayaforest.com
Web site: <http://www.mayaforest.com/>

UNIVERSITIES AND COLLEGES

Galen University
P. O. Box 177
San Ignacio, Cayo
Belize
Telephone: +501-824-3226
Fax: +501-824-3723
E-mail: galenu@btl.net
Web site: <http://www.galen.edu.bz/>

Sacred Heart Junior College (SHJC)

P.O. Box 163
San Ignacio, Cayo
Belize
Web site: <http://www.shc.edu.bz/shjc/>

University Of Belize
Natural Resources Management Programme
Faculty of Science and Technology
University of Belize
P.O. Box 340
Telephone: (501) 822-3680
Fax: (501) 822-3930
E-mail: aperez@ub.edu.bz; ubboles@yahoo.com;
lcricketts@btl.net
Web site: <http://www.ub.edu.bz>

INDUSTRY

Pine Lumber Company Ltd.
63 miles Western Highway
San Ignacio Town
Cayo District
Belize
Telephone: 824-3255/2841
Fax: 824-3257
Contact: Amin Bedran

Wood Depot
P.O. Box 15
Forest Drive
Belmopan City
Cayo District
Belize
Telephone: 82-22387/2094
Fax: 82-22096
E-mail: wooddepot@btl.net
Contact: Emile and Joe Allan Mena

Yalbac Lumber & Supply
21 North Front Street
Belize City
Belize
Telephone: 22-31214/08-23974
Fax: 22-32747
E-mail: mplo@btl.net
Contact: Mike Plowey
Yalbac Lumber & Supply is a retailer of rough and
dressed lumber.

NON-GOVERNMENTAL ORGANIZATIONS (NGOS)

Belize Audubon Society (BAS)
P.O. Box 1001
Belize City, Belize

Web site: <http://www.belizeaudubon.org>

Belize Botanic Gardens (BBG)

P.O. Box 180

San Ignacio, Cayo

Belize

Telephone: (501) 824-3101

Fax (501) 824-3301

E-mail: info@belizebotanic.org

Web site: <http://www.belizebotanic.org/>

Belize Foundation for Research and Environmental Education

P.O. Box 129

Punta Gorda, Belize

Telephone/Fax: 011 (501) 614-3896

E-mail: bfree@hughes.net

Web site: <http://www.bfreebelize.net/>

Belize Natural Resource Management Strategies

San Ignacio, Belize

Telephone: (501) 602-2535

Contact: Osmany Salas

E-mail: osmany.salas@gmail.com

Belize River Valley Development Program (BELRIV)

Pobox 1577

Belize City, Belize

E-mail: belriv@btlnet

Web site: <http://members.aol.com/Belriver/Belriver>

Belize Tropical Forest Studies (BTFS)

P.O. Box 208

Belmopan, Cayo

Belize

Telephone/Fax: +501.820.4071

E-mail: info@biological-diversity.info

Web site: <http://www.green-hills.net/btfs/>

Belize Zoo and Tropical Education Center

P.O. Box 1787

Belize City, Belize

Telephone: (501) 220-8004

Fax: (501) 220-8010

E-mail: info@belizezoo.org

Web site: <http://www.belizezoo.org/index.html>

Fauna and Flora International

Joe Taylor Creek

P. O. Box 177

Punta Gorda, BELIZE

Tel: +501.722.0108

Fax: +501.722.0108

Contact: Emma Caddy

Email: emmacaddy@yahoo.com

Web site: http://www.fauna-flora.org/americas/golden_stream.html

Friends of Nature

Placencia, Belize

Telephone: (501) 223-3377

Contact: Lindsay Garbutt

E-mail: lindsaybz@btlnet

Monkey Bay Wildlife Sanctuary

P.O. Box 187

Belmopan, Belize

Central America

Telephone: 011-501-820-3032

Fax: 011-501-822-3361

Web site: <http://www.monkeybaybelize.org/>

Programme for Belize

PO Box 749

1 Eyre Street

Belize City, Belize

Central America

Telephone: (501)-227-5616/227-5617/227-1020

Fax: 011-501-227-5635

E-mail: pfbel@btlnet

Web site: <http://www.pfbelize.org/>

Protected Areas Conservation Trust (PACT)

E-mail: info@pactbelize.org

Web site: <http://www.pactbelize.org/>

Valdemar Andrade, Executive Director

E-mail: valdemar@pactbelize.org

Sarstoon-Temash Institute for Indigenous Management

Punta Gorda, BELIZE

Telephone: +501.722.0103

E-mail: satiim@btlnet

Contact: Joanna Monk

Web Site: <http://www.ecologic.org>

Society for the Promotion of Education and Research (SPEAR)

5638 Gentle Avenue

P.O. Box 1766

Belize City, BELIZE

Telephone: (501) 223-1668

Fax: (501) 223-2367

E-mail: admin@spearg.org.bz

Web site: <http://www.spearg.org.bz>

Steadfast Tourism and Conservation Association

Steadfast, Belize

Contact: Hyacinth Ysaguirre

E-mail: hya172003@yahoo.com

Toledo Institute for Development and Environment
(TIDE)
P.O. Box 150
1 Mile San Antonio Road
Punta Gorda Town
Toledo, Belize
Telephone: (501) 722-2274/2431
E-mail: info@tidebelize.org
Web site: <http://www.tidebelize.org/contact.html>

Wildtracks
P.O. Box 700
Belize City, BELIZE
Telephone: +999-9999
E-mail: office@wildtracksbelize.org
Web Site: <http://www.wildtracksbelize.org>
Contact: Paul Walker

Ya'axché Conservation Trust (YCT)
Town Office
Joe Taylor Creek, San Antonio Road
P.O. Box 177
Punta Gorda, Toledo District
Belize, Central America
Phone/Fax: (+501) 722-0108
E-mail: town.office@yct.bz

Field Centre
Golden Stream Village
Southern Highway
Toledo District
Belize, Central America
Email: field.centre@yct.bz; yct_gscp@xplornet.com
Web site: <http://www.yct.bz/>

BERMUDA

NATIONAL FOREST SERVICE

Department of Conservation Services
40 North Shore Road
Flatts FL 04
Telephone: (441) 293-2727
Web site: <http://www.gov.bm>

Department of Environmental Protection
P.O. Box HM-834
Hamilton, Bermuda
HM-CX
Telephone: (441) 236-4201
Fax: (441) 236-7582
Web site: <http://www.gov.bm>

Department of Parks
P.O. Box HM 20
Hamilton HM AX
Telephone: 441-236-4201
Fax: 441-236-3711
Web site: <http://www.gov.bm>

RESEARCH INSTITUTIONS

Bermuda Aquarium, Museum and Zoo (BAMZ)
P.O. Box FL 145
Flatts FLBX
Bermuda
Phone: (441) 293-2727
Fax: (441) 293-4014
E-mail: info.bzs@gov.bm for general inquiries to the
Bermuda Zoological Society
Web site: <http://www.bamz.org/>

UNIVERSITIES AND COLLEGES

Bermuda College
P.O. Box PG 297
Paget, PG BX
Bermuda
Telephone: (441) 236-9000
Fax: (441) 239-4008
E-mail: info@bercol.bm
Web site: <http://www.bercol.bm>

NON-GOVERNMENTAL ORGANIZATIONS (NGOS)

Bermuda Aquarium, Museum and Zoo (BAMZ)
P.O. Box FL 145
Flatts FLBX
Bermuda
Phone: (441) 293-2727
Fax: (441) 293-4014
E-mail: info.bzs@gov.bm for general inquiries to the
Bermuda Zoological Society
Web site: <http://www.bamz.org/>

The Bermuda Audubon Society
P.O. Box HM 1328
Hamilton HM FX
Bermuda
E-mail: info@audubon.bm
Web site: <http://www.audubon.bm/>

Bermuda National Trust
P.O. Box HM 61
Hamilton, HM AX
Bermuda

Telephone: (441) 236-6483
 Fax: (441) 236-0617
 E-mail: palmetto@bnt.bm
 Web site: <http://www.bnt.bm>

Bermuda Zoological Society
 Bermuda Aquarium, Museum and Zoo (BAMZ)
 P.O. Box FL 145
 Flatts FLBX
 Bermuda
 Phone: (441) 293-2727, ext. 121
 Fax: (441) 293-4014
 E-mail: info.bzs@gov.bm for general inquiries to the
 Bermuda Zoological Society
 Web site: <http://www.bamz.org/>

Keep Bermuda Beautiful (KBB)
 P.O. Box HM2227
 Hamilton HM JX
 Bermuda
 Telephone: (441) 295-5142
 Fax: (441) 292-2977
 Mobile: (441) 337-4190
 E-mail: admin@kbb.bm
 Web site: <http://www.kbb.bm>

BOTSWANA

The University of Botswana
 Private Bag UB 0022
 Gaborone
 Botswana
 Tel: [267] 355-0000
 Fax: [267] 395-6591
 Website: www.ub.bw

BRUNEI DARUSSALAM

NATIONAL FOREST SERVICE

Forestry Department
 Ministry of Industry and Primary Resources
 Jalan Menteri Besar, Bandar Seri Begawan BB3910
 Negara Brunei Darussalam
 Website: <http://www.forestry.gov.bn/>

CAMEROON

NATIONAL FOREST SERVICE

National forest service: Ministry of Environment and Forest Resources, Yaounde headed by the Minister. Recently launched a publication titled “ Interactive Forestry Atlas Of Cameroon” available at www.globalforestwatch.org/english/interactive.maps/cameroon.htm

RESEARCH INSTITUTIONS

National Research And Training Institution: Institute of Agricultural Research for Development, IRAD
 Headquarters P.O. Box. : 2067 or 2123 – Yaounde Tél. : (237) 22335 38 Fax : (237) 223 35 38, URL: www.irad-cameroon.org/program1_us.php

UNIVERSITY FACULTIES/DEPARTMENTS OFFERING FORESTRY OR FOREST-RELATED TRAINING

Bamenda University of Science & Technology, P.O. Box 277, Bamenda NW Province Cameroon Tel/Fax (237) 36-33-66

Universite des Montagnes (UdM) - Highlands University, The Universite des Montagnes, B.P. 208 Bangante, Cameroon, TEL: 48-90-89 or 20-65-89/20-72-21

NATIONAL NGOS CONCERNED WITH FORESTRY ISSUES

Association of Environmental Education Teachers and School Environmental Clubs of the North West province- Cameroon (ASEC-NW)
 Contact by email: asecnw2000@yahoo.com

Cameroon Environmental Watch, Contact: Tel: (237) 231 04 35; P.O.Box: 8332 Yaounde Cameroon; Fax: (237) 23 07 45 / 223 07 37; E-Mail: cew-aire@iccnet.cm
<http://www.aedev.org/cew/>

Congo Basin Forest Partnership, www.cbfp.org

Living Earth Foundation, www.livingearth.org.uk

CANADA

NATIONAL FOREST SERVICE

Canadian Forest Service (CFS)
Headquarters
580 Booth Street
Ottawa, Ontario K1A 0E4
Phone: (613) 947-7341
Fax: (613) 947-7397
<http://www.nrcan-nrcan.gc.ca>

Canadian Forest Service (CFS) Centres:
Pacific Forestry Centre
506 West Burnside Road
Victoria, British Columbia V8Z 1M5
Phone: (250) 363-0600
Fax: (250) 363-0775
Susan Farlinger
Director General, Pacific Forestry Centre
Telephone: (250) 363-0608; Fax: (250) 363-0775
E-Mail: sfarling@pfc.cfs.nrcan.gc.ca
Web site: <http://www.pfc.cfs.nrcan.gc.ca>

Northern Forestry Centre
5320 - 122nd Street
Edmonton, Alberta T6H 3S5
Phone: (780) 435-7210
Fax: (780) 435-7359
Gordon Miller
Director General, Northern Forestry Centre
Telephone: (780) 435-7202; Fax: (780) 435-7359
E-Mail: [gmiller@nrcan.gc.ca](mailto:gmillier@nrcan.gc.ca)
Web site: <http://nofc.cfs.nrcan.gc.ca>

Saskatchewan Liaison Office
#250, 1288 Central Avenue
Prince Albert, Saskatchewan S6V 4V8
Phone: (306) 953-8548
Fax: (306) 953-8649
Great Lakes Forestry Centre
1219 Queen Street East
Sault Ste. Marie, Ontario P6A 2E5
Phone: (705) 949-9461
Fax: (705) 541-5700
Web site: <http://www.glfc.cfs.nrcan.gc.ca>

Petawawa Research Forest
P.O. Box 2000
Chalk River, Ontario K0J 1J0
Telephone: (613) 589-3009
Fax: (613) 589-2275
Web site: <http://www.glfc.cfs.nrcan.gc.ca>

Laurentian Forestry Centre
1055 du P.E.P.S., P.O. Box 10380
Quebec, Quebec G1V 4C7
Phone: (418) 648-5788
Fax: (418) 648-5849
Normand Lafrenière
Director General, Laurentian Forestry Centre
Telephone: (418) 648-3957; Fax: (418) 648-7317
E-mail: nlafreni@nrcan.gc.ca
Web site: <http://www.cfl.scf.nrcan.gc.ca>

Atlantic Forestry Centre
P.O. Box 4000, Regent Street
Fredericton, New Brunswick E3B 5P7
Phone: (506) 452-3500
Fax: (506) 452-3525
John Richards
Director General, Atlantic Forestry Centre, Fredericton
Telephone: (506) 452-3508
Fax: (506) 452-3140
E-mail: JohnRich@nrcan.gc.ca
Web site: <http://www.atl.cfs.nrcan.gc.ca>

Corner Brook Office
University Drive
Corner Brook, Newfoundland and Labrador A2H 6P9
Phone: (709) 637-4900
Fax: (709) 637-4910
Web site: <http://www.atl.cfs.nrcan.gc.ca>

Acadia Research Forest
P.O. Box 4000
Fredericton, New Brunswick E3B 5P7
Phone: (506) 472-6928
Fax: (506) 472-7916
Web site: <http://www.atl.cfs.nrcan.gc.ca>

CANADA'S MODEL FORESTS

International Model Forest Network
Secretariat
250 Albert Street
PO Box 8500
Ottawa, ON K1G 3H9
Phone: (613) 236-6163
Fax: (613) 234-7457
Web site: <http://www.idrc.ca/imfn/>
Executive Director: Peter Besseau

Bas-Saint-Laurent Model Forest
Université du Québec à Rimouski
300 allée des Ursulines, Room J-463
Rimouski, Québec G5L 3A1

Telephone: (418) 722-7211
 Fax: (418) 721-5630
 E-mail: foretmodele@fmodbsl.qc.ca
 Web site: <http://www.foret.fmodbsl.qc.ca>

Eastern Ontario Model Forest
 P.O. Bag 2111
 Kemptville, Ontario K0G 1J0
 Telephone: (613) 258-8241
 Fax: (613) 258-8363
 E-mail: modelforest@eomf.on.ca
 Web site: <http://www.eomf.on.ca>

Foothills Model Forest
 Box 6330
 Hinton, Alberta, Canada T7V 1X6
 Telephone: (780) 865-8330
 Fax: (780) 865-8331
 E-mail: don.podlubny@gov.ab.ca
 Web site: <http://www.fmf.ca>

Fundy Model Forest
 701 Main Street, Suite 2
 Sussex, New Brunswick E4E 7H7
 Tel: (506) 432-7575
 Fax: (506) 432-7562
 Toll Free: 1-800-546-4838
 E-mail: info@FundyModelForest.net
 Web site: <http://www.fundymodelforest.net/>

Lake Abitibi Model Forest
 P.O. Box 129
 Cochrane, Ontario P0L 1C0
 Telephone: (705) 272-7800
 Fax: (705) 272-2744
 E-mail: office@lamf.net
 Web site: <http://www.lamf.net>

Manitoba Model Forest
 P.O. Box 6500
 Pine Falls, Manitoba R0E 1M0
 Telephone: (204) 367-5232
 Fax: (204) 367-8897
 E-mail: dube@manitobamodelforest.net
 Web site: <http://www.manitobamodelforest.net>

McGregor Model Forest
 P.O. Box 2640
 Prince George, British Columbia V2N 4T5
 Telephone: (250) 612-5840
 Fax: (250) 612-5848
 E-mail: dan.adamson@mcgregor.bc.ca
 Web site: <http://www.mcgregor.bc.ca>

Nova Forest Alliance
 P.O. Box 208
 Stewiacke, Nova Scotia B0N 2J0
 Telephone: (902) 639-2921
 Fax: (902) 639-2981
 E-mail: info@novaforestalliance.com
 Web site: <http://www.novaforestalliance.com>

Prince Albert Model Forest
 P.O. Box 2406
 Prince Albert, Saskatchewan S6V 7G3
 Telephone: (306) 922-1944
 Fax: (306) 763-6456
 E-mail: pamf@sasktel.net
 Web site: <http://www.pamodelforest.sk.ca>

Waswanipi Cree Model Forest
 Waswanipi, Québec J0Y 3C0
 Telephone: (819) 753-2900
 Fax: (819) 753-2904
 E-mail: rhondaoblin@waswanipi.info
 Web site: <http://www.wcmf.ca>

Western Newfoundland Model Forest
 Forest Centre
 University Drive, P.O. Box 68
 Corner Brook, Newfoundland A2H 6C3
 Telephone: (709) 637-7300
 Fax: (709) 634-0255
 E-mail: wnmf@wnmf.com
 Web site: <http://www.wnmf.com>

NATIONAL FOREST STRATEGY

National Forest Strategy Coalition Secretariat
 580 Booth Street, 8th Floor
 Ottawa, ON K1A 0E4
 Telephone: (613) 947-9031
 Fax: (613) 947-9033
 E-mail: info@foreststrategy.ca
 Web site: http://nfsfc.forest.ca/index_e.htm
 Interim Chair of the NFSC: Mr. Mike Willick

PROVINCIAL/TERRITORIAL GOVERNMENTS – FOREST SERVICES

Alberta
 Sustainable Resource Development – including Forest
 Protection Division, Public Lands and Forests Division,
 Strategic Forestry Initiatives
 Information Centre
 Main Floor, 9920 108 Street
 Edmonton, Alberta T5K 2M4
 Phone: (780) 944-0313

Fax: (780) 427-4407
Web site: <http://www.srd.gov.ab.ca/>

Alberta Forest Service, Program Support Branch
9920-108 Street, 10th Floor Bramalea Building
Edmonton, AB T5K 2M4
Phone: (780) 422-6535
Division Research Coordinator: Ted Szabo

Alberta Land and Forest Service, Forest Protection
Division, Forest Health Branch
9920 - 108 Street, 10th Floor GWL Building,
Edmonton AB T5K 2M4
E-mail: sranasin@env.gov.a.ca
Manager, Forest Health: Hideji Ono
Alberta Research Council, Forest Products Business
Unit
250 Karl Clark Road, Edmonton, Alberta T6N 1E4
Phone: (780) 450-5419
E-mail: wellwood@arc.ab.ca
Web site: <http://www.arc.ab.ca>
Manager Forest Products: Robert Wellwood
Manager Pulp & Paper: Gordon Leary
Manager Forest Resources: Jack Nolan

British Columbia
Ministry of Forests and Range
PO Box 9529, Stn Prov Govt
Victoria, BC V8W 9C3
Phone: (250) 387-1040
Fax: (250) 387-6240
Web site: <http://www.gov.bc.ca/for/>
Hon. Rich Coleman
Minister of Forests and Range
British Columbia, Ministry of Forests, Research
Branch
31 Bastion Square
Victoria, BC V8W 3E7
Phone: (250) 387-6642
Director: Barrie Phillips

Manitoba
Manitoba Conservation Forestry Branch
200 Saulteaux Crescent
Winnipeg, MB R3J 3W3
Phone: (204) 945-7989
Web site: <http://www.gov.mb.ca/conservation/forestry/index.html>

New Brunswick
Natural Resources and Energy
Hugh John Flemming Forestry Centre
P. O. Box 6000
Fredericton, NB E3B 5H1

Phone: (506) 453-2516
Fax: (506) 453-6689
Web site: <http://www.gnb.ca/0079/index-e.asp>
Hon. Keith Ashfield
Minister of Natural Resources

Newfoundland and Labrador
Forest Resources
Fortis Building
P.O. Box 2006
Corner Brook, NL A2H 6J8
Phone: (709) 637-2349/2284
Fax: (709) 637-2403/634-4378
Web site: <http://www.nr.gov.nl.ca/forestry/>
Hon. Kathy Dunderdale
Minister of Natural Resources
Minister's Office & Administrative Services
Natural Resources Building
50 Elizabeth Ave.
P.O. Box 8700
St. John's, NL A1B 4J6
Phone: (709) 729-4715
Fax: (709) 729-2076

Northwest Territories
Forest Management Division
Department of Environment and Natural Resources
Government of the Northwest Territories
PO Box 7
Fort Smith, NT X0E 0P0
Phone: (867) 872-7700
Fax: (867) 872-2077
Web site: <http://forestmanagement.enr.gov.nt.ca/>
Susan Corey
Director, Forest Management Division

Nova Scotia
Natural Resources – Forestry Division
P.O. Box 698
Halifax, NS B3J 2T9
Canada
Phone: (902) 424-5935
Fax: (902) 424-7735
Web site: <http://www.gov.ns.ca/natr/>

Nunavut Territory
Department of the Environment
P.O. Box 1000 Station 1300
Iqaluit, NU X0A 0H0
Phone: (867) 975-7700 or toll free 1-866-222-9063
Fax: (867) 975-7742
Web site: <http://www.gov.nu.ca/Nunavut/environment/home/>
Honorable Olayuk Akesuk

Department of Environment

Ontario Forests Division
 Ministry of Natural Resources, Forests Division
 Roberta Bondar Place
 Suite 400
 70 Foster Drive
 Sault Ste Marie, ON P6A6V5
 Phone: (705) 945-6661
 Fax: (705) 945-6667
 Web site: <http://www.mnr.gov.on.ca/MNR/>
 Rich Greenwood, Director

Forest Management Branch
 Ontario Forest Research Institute
 Ontario Ministry of Natural Resources
 1235 Queen St. E.
 Sault Ste. Marie, ON P6A 2E5
 Phone: (705) 946-2981
 Fax: (705) 946-2030
 E-mail: information.ofri@mnr.gov.on.ca
 Wayne Fiset, Manager
 Phone: (705) 946-7482
 E-mail: wayne.fiset@mnr.gov.on.ca

Prince Edward Island
 Environment, Energy and Forestry
 Jones Building, 4th and 5th Floors
 11 Kent Street
 P.O. Box 2000
 Charlottetown, PE C1A 7N8
 Telephone: (902) 368-5000
 Fax: (902) 368-5830
 Web site: <http://www.gov.pe.ca/enveng/index.php3>
 Hon. Pat G. Binns
 Minister, Agriculture & Forestry
 Telephone: (902) 368-4880
 Fax: (902) 368-4857

Québec
 Ministry of Natural Resources of Quebec, Forest
 Research Branch
 Ministère des Ressources Naturelles, Forêt Québec,
 Direction de la Recherche Forestière
 2700, rue Einstein
 Sainte-Foy, Québec G1P 3W8
 Téléphone: (418) 627-8652
 Télécopieur: (418) 528-1278
 E-mail: foretquebec@mrnf.gouv.qc.ca
 Web site: <http://www.mrn.gouv.qc.ca/>
 Mr. Pierre Corbeil
 Minister of Natural Resources and Wildlife
 Directeur de la recherche forestière: Jacques Saint-Cyr
 Quebec Forest Research Council

Conseil de la Recherche Forestière du Québec
 1200 avenue Germain des Prés, Bureau 103,
 Sainte Foy, Quebec G1V 3M7
 E-mail: crfq@qbc.clic.net
 Web site: <http://www.qbc.clic.net/crfq>
 Head of Institution: Dr Gilles Frisque

Saskatchewan
 Saskatchewan Environment – Forest Service Branch
 Box 3003, 1061 Central Avenue
 Prince Albert, SK S6V 6G1
 Telephone: (306) 953-2437
 Fax: (306) 953-2360
 Web site: <http://www.se.gov.sk.ca/forests/>
 Al Willcocks
 Executive Director
 Saskatchewan Environment and Resource
 Management, Forest Ecosystem Branch, Forest Science
 Section
 Box 3003 (800 Central Ave.)
 Prince Alberta, SK S6V 6G1
 Email: johnston@derm.gov.sk.ca
 Web site: <http://www.gov.sk.ca>
 Manager, Forest Science Programmes: Dr Mark
 Johnston

Yukon Territory
 Energy, Mines and Resources – Forestry Branch
 Forest Management Branch
 Mile 918 Alaska Highway
 Box 2703 (K-918)
 Whitehorse, Yukon, Y1A 2C6
 Phone: (867) 456-3999 / 1-800-661-0408 ext. 3999
 Fax: (867) 667-3138
 E-mail: forestry@gov.yk.ca
 Web site: <http://www.emr.gov.yk.ca/forestry/index.html>

RESEARCH INSTITUTIONS

Acadia Research Forest (ARF)
 P.O. Box 4000
 Fredericton, New Brunswick E3B 5P7
 Phone: (506) 472-6928
 Fax: (506) 472-7916
 Web site: <http://www.atl.cfs.nrcan.gc.ca>

Alberta Research Council (ARC)
 250 Karl Clark Road
 Edmonton, Alberta T6N 1E4
 Telephone: (780) 450-5111
 Fax: (780) 450-5333
 Web site: <http://www.arc.ab.ca/>

Canadian Forest Service (CFS)
Headquarters
580 Booth Street
Ottawa, Ontario K1A 0E4
Phone: (613) 947-7341
Fax: (613) 947-7397
<http://www.nrcan-rncan.gc.ca>
<http://www.nrcan.gc.ca>

Canadian Institute of Forestry/Institut Forestier du
Canada (CIF-IFC)
504-151 Slater Street
Ottawa, Ontario K1P 5H3
Phone: (613) 234-2242
Fax: (613) 234-6181
E-mail: cif@cif-ifc.org
Web site: <http://www.cif-ifc.org/>

Canadian Interagency Forest Fire Centre (CIFFC)
210-301 Weston Street
Winnipeg, MB R3E 3H4
Telephone: (204) 784-2030
Fax: (204) 956-2398
Web site: <http://www.cifff.ca/>

FORAC Research Consortium
Pavillon Adrien-Pouliot
Université Laval
Quebec City, QC G1K 7P4
Tel: (418) 656-2131 ext: 12345
Fax: (418) 656-7415
info@forac.ulaval.ca
Web site: <http://www.forac.ulaval.ca/>

Forest Ecosystem Science Co-operative Inc.
977 Alloy Drive, Suite 18
Thunder Bay, Ontario P7B 5Z8
Telephone: 807-346-2860
Fax: 807-346-2299
Web site: <http://www.forestco-op.ca/>

Forest Engineering Research Institute of Canada
(FERIC)
Head Office
580 boul. St-Jean
Pointe-Claire, QC H9R 3J9
Telephone: (514) 694-1140
Fax: (514) 694-4351
Web site: <http://www.feric.ca>

Forestry Research Partnership
c/o The Canadian Ecology Centre
P.O. Box 430, Hwy 17 West
Mattawa, ON P0H 1V0

(705) 744-1715 ext. 585
E-mail: forest@canadianecology.ca?subject=FRP
Web site: <http://www.forestresearch.ca>

Forintek Canada Corp.
2665 East Mall
Vancouver, BC V6T 1W5
Telephone: (604) 224-3221
Fax: (604) 222-5690
Web site: <http://www.forintek.ca/>

International Development Research Centre (IDRC)
PO Box 8500
Ottawa, ON K1G 3H9
Phone: (613) 236-6163
Fax: (613) 238-7230
E-mail: info@idrc.ca
Web site: <http://www.idrc.ca>

International Model Forest Network (IMFN)
Secretariat
PO Box 8500
Ottawa, ON K1G 3H9
Phone: (613) 236-6163
Fax: (613) 234-7457
Web site: <http://www.idrc.ca/imfn/>

Lakehead University Northern Studies Centre
955 Oliver Rd.
Thunder Bay, ON, P7B 5E1
Telephone: (807) 343-8458
Fax: (807) 346-7775
E-mail: robbie.buffington@lakeheadu.ca
Web site: <http://northernstudies.lakeheadu.ca/>

Petawawa Research Forest
P.O. Box 2000
Chalk River, Ontario K0J 1J0
Telephone: (613) 589-3009
Fax: (613) 589-2275
Web site: <http://www.glfrc.cfs.nrcan.gc.ca>

Pulp and Paper Research Institute of Canada (Paprican)
Pointe-Claire
570 blvd St-Jean
Pointe-Claire, QC H9R 3J9
Telephone: (514) 630-4101
Fax: (514) 630-4134
Web site: <http://www.paprican.ca/>

Sustainable Forest Management Network (SFMN or
SFM Network)
Sustainable Forest Management Network/Réseau de
gestion durable des forêts

3-03, Civil Electrical Building
 University of Alberta
 Edmonton, Alberta T6G 2G7
 Phone: 780-492-6659
 Fax: 780-492-8160
 Web site: <http://www.sfmnetwork.ca>

UNIVERSITIES AND COLLEGES

British Columbia Institute of Technology (BCIT) -
 School of Construction and the Environment
 School of Construction and the Environment
 British Columbia Institute of Technology
 3700 Willingdon Avenue
 Burnaby, British Columbia V5G 3H2
 Tel: 604-432-8234
 Fax: 604-435-4219
 E-mail: construction@bcit.ca
 Web site: <http://www.bcit.ca/construction/>

Cégep de Sainte-Foy - Département des Technologies
 du Bois et de la Forêt
 2410, chemin Sainte-Foy
 Sainte-Foy, Québec G1V 1T3
 Telephone: (418) 659-6600 poste 3625
 Fax: (418) 659-4563
 Web site: <http://ici.cegep-ste-foy.qc.ca/departements/dtbf/>

Collège de Baie-Comeau - Département de
 Technologie Forestière
 537, boulevard Blanche
 Baie-Comeau, Québec G5C 2B2
 Telephone: (418) 589-5707
 Fax: (418) 589-9842
 Web site: <http://www.cegep-baie-comeau.qc.ca/departements/Foresterie/index.htm>

College of New Caledonia
 3330-22nd Avenue
 Prince George, British Columbia V2N 1P8
 Telephone: (250) 561-5867; 1-800-371-8111
 Web site: http://www.cnc.bc.ca/CNC_Programs/Program_websites/Forestry.htm

College of the North Atlantic (CNA)
 Corner Brook Campus
 141 O'Connell Drive
 Corner Brook, NL A2H 6H6
 Phone: (709) 637-8530
 Fax: (709) 634-2126
 Web site: <http://www.cna.nl.ca/programscourses>

Confederation College
 1450 Nakina Drive

P.O. Box 398
 Thunder Bay, ON P7C 4W1
 Telephone: (807) 475-6110
<http://www.confederationnc.on.ca/programs/forestryenviron.asp>

Hinton Training Centre
 1176 Switzer Drive
 Hinton, Alberta T7V 1V3
 Phone: (780) 865-8200
 Fax: (780) 865-8266
Hinton.Training@gov.ab.ca
 Web site: <http://www.srd.gov.ab.ca/forests/resedu/etc/index.html>

Lakehead University - Faculty of Forestry and the
 Forest Environment
 955 Oliver Road
 Thunder Bay, ON P7B 5E1
 Telephone: (807) 343-8507
 Fax: (807) 343-8116
 Web site: <http://www.lakeheadforestry.ca/>
 Dean: Dr. Reino Pulkki
 E-mail: reino.pulkki@lakeheadu.ca

Malaspina University-College
 900 Fifth Street
 Nanaimo, BC V9R 5S5
 Telephone: (250) 753-3245
 E-mail info@mala.bc.ca
 Web site: <http://www.mala.ca/calendar/Technology/forestresources.asp>

Maritime College of Forest Technology
 Hugh John Flemming Forestry Centre
 1350 Regent Street
 Fredericton, New Brunswick E3C 2G6
 Recruitment office: Toll Free 1-866-619-9900
 Telephone: (506) 458-0653
 Fax: (506) 458-0652
 E-mail: info@mcft.ca
 Web site: <http://www.mfrs.nb.ca>

McGill University - Faculty of Agricultural and
 Environmental Sciences
 Room MS2-032
 Macdonald-Stewart Building
 21111 Lakeshore Road
 Ste. Anne de Bellevue, Quebec H9X 3V9
 Web site: <http://www.mcgill.ca/macdonald/>

Nicola Valley Institute of Technology
 4155 Belshaw Street
 Merritt, BC V1K 1R1

Telephone: 1-250-378-3300
Fax: 1-250-378-3332
E-mail: info@nvit.bc.ca
Web site: <http://www.nvit.bc.ca>

The Northern Alberta Institute of Technology
11762 - 106 Street
Edmonton, Alberta T5G 2R1
Telephone: (780) 471-7400
Web site: <http://www.nait.ca/programs/FOT/>

Northern Lights College
11401 - 8th Street
Dawson Creek, BC V1G 4G2
Telephone: (250) 782-5251
Fax: (250) 782-5233
E-mail: appinfo@nlc.bc.ca
Web site: <http://nlc.bc.ca/public.program.php?>

Saskatchewan Institute of Applied Science and
Technology (SIAST)
SIAST Woodland Campus
1100 - 15th Street East
PO Box 3003
Prince Albert, SK S6V 6G1
Web site: [http://www.siastr.sk.ca/siastr/educationtraining/
oncampusprograms](http://www.siastr.sk.ca/siastr/educationtraining/oncampusprograms)

Selkirk College - School of Renewable Resources
Castlegar Campus
301 Frank Beinder Way
Castlegar, BC V1N 3J1
Telephone: (250) 365-7292
E-mail: info@selkirk.ca
Web site: [http://selkirk.ca/programs/rr/
academicprograms/forestry/](http://selkirk.ca/programs/rr/academicprograms/forestry/)

Simon Fraser University - School of Resource and
Environmental Management
8888 University Drive
Burnaby, BC V5A 1S6
Tel: (604) 291-4659
Fax: (604) 291-4968
Email: reminfo@sfu.ca
Web site: <http://www.rem.sfu.ca/>

Sir Sandford Fleming College – School of
Environmental and Natural Resource Sciences
P.O. Box 8000
Albert Street South
Lindsay, Ontario K9V 5E6
Telephone: (705) 324-9144
Fax : (705) 878-9312
Web site: <http://www.flemingc.on.ca/SENRS/>

University College of the Cariboo – Department of
Natural Resource Sciences
Department of Natural Resource Sciences
Thompson Rivers University
Main Campus
Box 3010, 900 McGill Road
Kamloops, BC V2C 5N3
Web site: <http://www.cariboo.bc.ca/schs/nrsc/index.htm>

University of Alberta - Faculty of Agriculture, Forestry
and Home Economics
2-14 Agriculture-Forestry Centre
University of Alberta
Edmonton, AB T6G 2P5
Phone: (780) 492-4931
Fax: (780) 492-0097
E-mail: questions@afhe.ualberta.ca

University of British Columbia - Faculty of Forestry
Forest Sciences Centre
2424 Main Mall
Vancouver, BC V6T 1Z4
Telephone: (604) 822-2727
Fax: (604) 822-8645
E-mail: forrecep@interchg.ubc.ca
Web site: <http://www.forestry.ubc.ca>
Dean: John N. Saddler

University of British Columbia - Centre for Applied
Conservation Research
Forest Sciences Centre
2424 Main Mall
Vancouver, BC V6T 1Z4
Peter Arcese, Co-Director
Phone: (604) 822-1886
E-mail: arcese@interchange.ubc.ca
<http://farpoint.forestry.ubc.ca/fp/?parcese>
Sarah Gergel, Co-Director
Phone: (604) 827-5163
E-mail: sgergel@interchange.ubc.ca
<http://farpoint.forestry.ubc.ca/fp?sgergel>

Université Laval - Département des sciences du bois et
de la forêt
Département des Sciences du bois et de la forêt
Pavillon Abitibi-Price, bureau 3137
Faculté de foresterie et de géomatique
Université Laval
Québec, Québec G1K 7P4
Tél: (418) 656-3025
Fax: (418) 656-5262
courriel:sbf@sbf.ulaval.ca
Web site: <http://ww2.sbf.ulaval.ca/>

Université de Moncton à Edmundston - Faculté de foresterie

165, boulevard Hébert
Edmundston, NB E3V 2S8

Tél. (506) 737-5068

Télééc. (506) 737-5373

E-mail: foresterie@umce.ca

Web site: <http://www.umce.ca/foresterie/>

Director: Richard Barry

E-mail: rbarry@cuslm.ca

University of New Brunswick - Faculty of Forestry and Environmental Management

P.O. Box 44555

Fredericton, New Brunswick E3B 6C2

Telephone: (506) 453-4501

Fax: (506) 453-3538

E-mail: forem@unb.ca

Web site: <http://www.unbf.ca/forestry/>

Dean: David McLean

E-mail: macleand@unb.ca

University of New Brunswick - Wood Science and Technology Centre

1350 Regent Street

Fredericton, NB E3C 2G6

E-mail: woodsci@unb.ca

Web site: <http://www.unb.ca/forestry/centrs/wstc.htm>

Director: Y.H. Chui

University of Northern British Columbia – Forestry Programme

3333 University Way

Prince George, BC V2N 4Z9

Telephone: (250) 960-6664

Fax: (250) 960-5539

Web site: <http://www.unbc.ca/forestry/>

University of Quebec in Abitibi-Témiscamingue - Forest Research and Development Unit (URDFAT)

445 Boulevard de l'Université

Rouyn-Noranda, QC J9X5E4

Web site : <http://www.uqat.quebec.ca>

Director: Brian Harvey

E-mail: brian.harvey@uqat.quebec.ca

Université du Québec à Montréal - Groupe de Recherche en Ecologie Forestière

C.P. 8888 Succ. A

Montréal QC H3C 398

Telephone: (514) 987-3000

Fax: (514) 987-4647

E-mail: R20724@ER.UQAM.CA

Director: Christian Messier

Université du Québec à Trois-Rivières - Centre de Recherche en Pâte et Papiers

3351 boul. des Forges,
Trois-Rivières, QC G9A 5H7

Director: H.C. Lavallée

E-mail: H-Claude-Lavallee@uqtr.quebec.ca

Université du Québec - Centre Multirégional de Recherche en Foresterie

531, Boulevard des Praires,
CP 100 Laval, QC H7N 4Z3

Téléphone: (819) 762-0971 poste 2397

Télécopieur: (819) 797-4727

Director: Jules Arsenaault

E-mail: Jules.Arsenaault@uqat.ca

University of Toronto - Faculty of Forestry
Earth Sciences Centre

33 Willcocks Street

Toronto, Ontario M5S 3B3

Telephone: (416) 978-5751

Fax: (416) 978-3834

Web site: <http://www.forestry.utoronto.ca>

Dean: Tat Smith

E-mail: tat.smith@utoronto.ca

4.5. Industry

Abitibi-Consolidated Inc

Head Office

1155 Metcalfe Street, Suite 800

Montréal, QC H3B 5H2

Telephone: 514 875-2160

E-mail: contact@abitibiconsolidated.com

Web site: <http://www.abitibiconsolidated.com>

John W. Weaver

President and Chief Executive Officer

Alberta-Pacific Forest Industries Inc.

Sales and Marketing Department

1680-200 Burrard Street

Vancouver, BC V6C 3L6

Tel: (604) 669-4111

Fax: (604) 682-7441

E-mail: alpac@apsi.ca

Web site: <http://www.alpac.ca/>

Bowater

Division Headquarters

5420 North Service Road

Burlington, ON L7L 6C7

Telephone: (905) 332-4616

Toll free: (800) 205-PULP (7857)

Fax: (905) 332-1866

E-mail: information@bowater.com

Web site: <http://www.bowater.com/en/>

Canadian Federation of Woodlot Owners
304-259 Brunswick Street
Fredericton, BC E3B 1G8
Telephone: (506) 459-2990
Fax: (506) 459-3515
E-mail: nbfwo@nbnet.nb.ca

Canfor Corporation
Head Office
100-1700 West 75th Ave
Vancouver, BC V6P 6G2
Telephone: (604) 661-5241
Fax: (604) 661-5235
E-mail: info@canfor.ca
Web site: <http://www.canfor.com/>
President and Chief Executive Officer: James A. Shepherd

Cascades Inc.
404 Marie-Victorin Street, P.O. Box 30
Kingsley Falls, QC J0A 1B0
Telephone: 819-363-5100
Fax: 819-363-5155
Web site: www.cascades.com
President and Chief Executive Officer: Alain Lemaire

Catalyst
16th Floor, 250 Howe Street
Vancouver, BC V6V 3R8
Telephone: (604) 654-4000
Fax: (paper) (604) 654-4331
Fax: (pulp and containerboard) (604) 654-4342
Web site: <http://www.catalystpaper.com/>
President and Chief Executive Officer: Russell J. Horner

Council of Forest Industries (COFI)
Suite 1501, 700 West Pender Street
Pender Place I Business Building
Vancouver, BC V6C 1G8
Telephone: (604) 684-0211
Fax: (604) 687-4930
E-mail: info@cofi.org
Web site: <http://www.cofi.org/>
President and Chief Executive Officer: John Allan
E-mail: allan@cofi.org
Telephone: (604) 891-1205

Domtar
395 de Maisonneuve Blvd. West
Montreal, QC H3A 1L6
Phone: (514) 848-5866

Fax: (514) 848-6850
E-mail: information@domtar.com
Web site: <http://www.domtar.com/en/>
Raymond Royer
President and Chief Executive Officer

Forest Engineering Research Institute of Canada (FERIC)
Head Office
580 Boulevard St-Jean
Pointe-Claire, QC H9R 3J9
Telephone: (514) 694-1140
Fax: (514) 694-4351
E-mail: admin@mtl.feric.ca
Web site: <http://www.feric.ca/>
President: Ian de la Roche
Western Division
2601 East Mall
Vancouver, BC V6T 1Z4
Telephone: (604) 228-1555
Fax: (604) 228-0999

Forest Products Association of Canada (FPAC)
Suite 410, 99 Bank Street
Ottawa, ON K1P 6B9
Telephone: (613) 563-1441
Fax: (613) 563-4720
E-mail: ottawa@fpac.ca
Web site: <http://www.fpac.ca/>
President and CEO: Avrim Lazar

Forintek Canada Corp.
2665 East Mall
Vancouver, BC V6T 1W5
Telephone: (604) 224-3221
Fax: (604) 222-5690
Web site: <http://www.forintek.ca/>
Ian de la Roche

Howe Sound Pulp and Paper Limited Partnership
Port Mellon, BC V0N 2S0
Telephone: (604) 884-5223
Fax: (604) 884-5363
Web site: <http://www.hspp.ca/>

Kruger Inc.
3285 Bedford Road
Montréal, QC H3S 1G5
Telephone: (514) 737-1131; (514) 343-3100
Fax: (514) 343-3125
Web site: <http://www.kruger.com/>
Chairman of the Board and CEO, Joseph Kruger II

Louisiana-Pacific Canada Ltd.
P.O. Box 900
Chetwynd, BC V0C 1J0
Telephone: (250) 788-7857
Fax: (250) 788-4533
Website: www.lpcorp.com
CEO: Rick Frost

Mill & Timber Products Ltd.
12770 - 116th Avenue
Surrey, BC V3V 7H9
Telephone: (604) 580-2781
Fax: (604) 580-3646
Web site: <http://www.millandtimber.com/>

Pulp and Paper Research Institute of Canada (Paprican)
3800 Westbrook Mall
Vancouver, BC V6S 2L9
Telephone: (604) 222-3201
Fax: (604) 222-3207
Web site: <http://www.paprican.ca>
President and CEO, Joseph D. Wright

Papier Masson Ltée
2 chemin Montréal Ouest
Masson-Angers, QC J8M 2E1
Telephone: (819) 986-4387
Fax: (819) 986-4379
Web site: www.papiermasson.com

SFK Pulp
Web site: <http://www.sfk.ca/>

Stora Enso Port Hawkesbury Mill
P.O. Box 9500
Port Hawkesbury, NS B9A 1A1
Telephone: (902) 625-6143
Fax: (902) 625-0376
Web site: <http://www.storaenso.com>
CEO: Jukka Sakari

Tembec Inc.
Forest Products Group
800, boul. René-Lévesque Ouest
Bureau 1050
Montréal, QC H3B 1X9
Telephone: (514) 871-0137
Fax: (514) 397-0896
Website: <http://www.tembec.com>
Chairman of the Board: Gordon S. Lackenbauer
President and Chief Executive Officer: James Lopez

Tolko Industries Ltd.
P.O. Box 1590

The Pas, MB R9A 1L4
Telephone: (204) 623-7411
Fax: (204) 623-5891
Web site: <http://www.tolko.com/>
President & CEO: Allan Thorlakson

UPM-Kymmene Miramichi, Inc.
332 Varry Street
St-Laurent, QC H4N 1A3
Telephone: (514) 336-9777
Fax: (514) 336-7977
Website: <http://www.upm-kymmene.com/>
President and Chief Executive Officer: Jussi Pesonen

West Fraser Timber Co. Ltd.
1000-1100 Melville Street
Vancouver, BC V6E 4A6
Telephone: (604) 895-2700
Fax: (604) 681-6061
Website: <http://www.westfrasertimber.ca/>
Chairman, President and Chief Executive Officer:
Henry H. Ketcham III

Weyerhaeuser Company Limited
925 West Georgia Street
Vancouver, BC V6E 3L9
Telephone: (604) 661-8000
Fax: (604) 691-2445
Website: <http://www.weyerhaeuser.com/>
Chairman, President and CEO: Steven R. Rogel

NON-GOVERNMENTAL ORGANIZATIONS (NGOS)

Boreal Forest Network
3rd Floor, 303 Portage Avenue
Winnipeg, Manitoba R3B 2B4
Telephone: (204) 947-3081
Fax: (204) 989-8476
E-mail: michelle@borealnet.org
Web site: <http://www.borealnet.org>

Canadian Forestry Association (CFA)
1027 Pembroke St E
Pembroke, ON K8A 3M4
Toll Free: 1-866-441-4006
Telephone: (613) 732-2917
Fax: (613) 732-3386
E-mail: cfa@canadianforestry.com
Web site: <http://www.canadianforestry.com>

Canadian Parks and Wilderness Society
National Office
250 City Centre Ave., Suite 506
Ottawa, ON K1R 6K7

Telephone: (613) 569-7226
Toll-free: 1-800-333-WILD (9453)
Fax: (613) 569-7098
Web site: <http://www.cpaws.org/index.php>

Canadian Boreal Initiative (CBI)
249 McLeod Street
Ottawa, ON K2P 1A1
Telephone: (613) 230-4739
Fax: (613) 230 9685
Web site: <http://www.borealcanada.ca>

Canadian Wildlife Federation
350 Michael Cowpland Drive
Kanata, ON K2M 2W1
Toll free: 1-800-563-WILD
Telephone: (613) 599 9594
Fax: (613) 599 4428
E-mail: info@cwf-fcf.org
Web sites: <http://www.cwf-fcf.org>; <http://www.wildeducation.org>; <http://www.spaceforspecies.ca>;
<http://www.wildaboutgardening.org>

Canadian Wood Council (CWC)
99 Bank Street, Suite 400
Ottawa, Ontario K1P 6B9
Telephone: (613) 747-5544
Fax: (613) 747-6264
Web site: <http://www.cwc.ca/>

Council of Haida Nations Forest Guardians
1563 Main St.
P.O. Box 589
Masset, Haida Gwaii V0T 1M0
Telephone: (250) 626-6058
Fax: (250) 626-6059
E-mail: fg3@island.net
Web site: <http://www.haidanation.ca/>

David Suzuki Foundation - Forests and Wild Lands
Program
Suite 219, 2211 West 4th Avenue
Vancouver, BC V6K 4S2
Phone: (604) 732-4228
Toll free: 1-800-453-1533
Fax: (604) 732-0752
E-mail: contact@davidsuzuki.org
Web site: <http://www.davidsuzuki.org/Forests/>

Ducks Unlimited Canada
P.O. Box 1160
Stonewall, Manitoba, Canada
R0C 2Z0
Toll-free: 1-800-665-DUCK (3825)

Fax: (204) 467-9028
E-mail: webfoot@ducks.ca
Web site: <http://www.ducks.ca>

The Ecoforestry Institute Society
Ecoforestry Institute Society
P.O. Box 5070 Station B
Victoria, BC V8R 6N3
Web site: <http://ecoforestry.ca/default.htm>

Ecotrust Canada
Suite 200, 1238 Homer Street
Vancouver, BC V6B 2Y5
Phone: (604) 682-4141
Fax: (604) 682-1944
E-mail: info@ecotrustcan.org
Web site: <http://www.ecotrustcan.org/index.shtml>

Federation of Canadian Municipalities (FCM)
24 Clarence Street
Ottawa, ON K1N 5P3
Telephone: (613) 241-5221
Fax: (613) 241-7440
Web site: <http://www.fcm.ca/>
Chief Executive Officer: James Knight
Telephone: (613) 241-5221 ext 223
E-mail: jknight@fcm.ca

Forest Action Network (FAN)
Great Bear Rainforest Office
Box 625
Bella Coola
Nuxalk Territory, BC V0T 1C0
Tel: (250) 799-5800
Fax: (604) 677-5871
E-mail: forest@fanweb.org
Web site: <http://www.fanweb.org/index.html>

ForestCare Corp.
885 Hwy 24
P.O. Box 150
St. Williams, ON NOE 1P0
Telephone: (519) 586-9116
Toll Free: 1-866-640-TREE (1-866-640-8733)
Fax: (519) 586-9118
E-mail: info@forestcare.com
Web site: <http://www.forestcare.com>

Forest Renewal Co-op
Lakehead University
Faculty of Forestry and the Forest Environment
955 Oliver Road
Thunder Bay, ON P7B 5E1
E-mail: frcoop@lakeheadu.ca

General Manager: William Murphy R.P.F
 Telephone: (807) 343-8313
 Fax: (807) 343-8116

Forest Stewardship Council - Canada
 400-70 The Esplanade
 Toronto, ON M5E 1R2
 Telephone: 416-778-5568; 1-877-571-1133
 Fax: 416-778-0044
 E-mail: info@fscscanada.org
 Web site: <http://www.fscscanada.org/>

FORREX Head Office
 Suite 702, 235 1st Avenue
 Kamloops, BC, V2C 3J4
 Telephone: (250) 371-3746
 Fax: (250) 371-3997
 E-mail: society@forrex.org
 Web site: <http://www.forrex.org>

Global Forest Watch Canada
 E-mail: gfwcanada@shaw.ca

International Institute for Sustainable Development
 (IISD)
 161 Portage Avenue East, 6th Floor
 Winnipeg, Manitoba
 Canada R3B 0Y4
 Tel: (204) 958-7700
 Fax: (204) 958-7710
 E-mail: info@iisd.ca
 Web site: <http://www.iisd.org>

National Aboriginal Forestry Association (NAFA)
 396 Cooper Street
 Suite 300
 Ottawa, Ontario
 Canada, K2P 2H7
 Telephone: (613) 233-5563
 Fax: (613) 233-4329
 Web site: <http://www.nafaforestry.org/>

National Round Table on the Environment and the
 Economy
 Canada Building, Suite 200
 344 Slater Street
 Ottawa, ON K1R 7Y3
 Telephone: (613) 992-7189
 Fax: (613) 992-7385
 E-mail: admin@nrtee-trnee.ca
 Web site: <http://www.nrtee-trnee.ca>

Nature Canada
 85 Albert St, Suite 900

Ottawa, Ontario K1P 6A4
 Phone: 1-800-267-4088 or 613-562-3447
 Fax: 613-562-3371
 Web site: <http://www.cnf.ca/>

Nature Conservancy of Canada
 110 Eglinton Avenue West, Suite 400
 Toronto, ON M4R 1A3
 Tel: (416) 932-3202
 Toll-free: 1-800-465-0029
 Fax: (416) 932-3208
 E-mail: nature@natureconservancy.ca
 Web site: <http://www.natureconservancy.ca>

Poplar Council of Canada (PCC)
 Office of the Secretariat
 c/o Canadian Forest Service
 5320 - 122nd Street
 Edmonton, AB T6H 3S5
 Telephone: (780) 435-7264
 Fax: (780) 435-7356
 E-mail: poplar@poplar.ca
 Web site: <http://www.poplar.ca>

Raincoast Conservation Society
 PO Box 8663
 Victoria, BC V8W 3S2
 Phone: (250) 655-1229
 Toll-free: 1-877-655-1229
 Fax: (250) 655-1339
 E-mail: greatbear@raincoast.org
 Web site: <http://www.raincoast.org>

Sierra Club of/du Canada
 412-1 Nicholas Street
 Ottawa, ON K1N 7B7
 Telephone: (613) 241-4611
 Fax: (613) 241-2292
 Toll free: 1-888-810-4204
 E-mail: info@sierraclub.ca
 Web site: www.sierraclub.ca

Sierra Legal Defense Fund
 214 - 131 Water Street
 Vancouver, BC V6B 4M3
 Toll Free: 1-800-926-7744
 Phone: (604) 685-5618
 Fax: (604) 685-7813
 E-mail: sldf@sierralegal.org
 Web site: <http://www.sierralegal.org/forests.html>

The Silva Forest Foundation
 P.O. Box 9
 Slocan Park, British Columbia V0G 2E0

Phone: (250) 226-7222
Fax: (250) 226-7446
E-mail: silvafor@netidea.com
Web site: <http://www.silvafor.org/>

Tree Canada Foundation
222 Somerset St. W., Suite 402,
Ottawa, ON K2P 2G3
Telephone: (613) 567-5545
Fax: (613) 567-5270
E-mail: tcf@treecanada.ca
Web site: <http://www.treecanada.ca>

Wildlife Habitat Canada (WHC)
1750 Courtwood Crescent, Suite 310
Ottawa, ON K2C 2B5
Telephone: (613) 722-2090
Toll-Free: (800) 669-7919
Fax: (613) 722-3318
Email: reception@whc.org
Web site: <http://www.whc.org>

CYPRUS

NATIONAL FOREST SERVICE

Department of Forests, within the Ministry of
Agriculture, Natural Resources and Environment.
26, Louki Akrita Avenue
1414 Nicosia
Cyprus
<http://www.moa.gov.cy/moa/Agriculture.nsf>

NATIONAL RESEARCH AND TRAINING INSTITUTION.

The Cyprus Forestry College
Contact: forcollege@cytanet.com.cy

DOMINICA

NATIONAL FOREST SERVICE

Forestry, Wildlife and Parks Division
Ministry of Agriculture and the Environment
Botanical Gardens
Roseau
Dominica
West Indies
00109-8000
Telephone : (767) 448 2733
E-mail: forestry@cwdom.dm

Web site: <http://www.avirtualdominica.com/forestry>

RESEARCH INSTITUTIONS

Archbold Tropical Research and Education Center
(ATREC)
Web site: <http://www.springfield-dominica.org/>
Nancy Osler, Managing Director
E-mail: nosler@clemsun.edu
Telephone: (767) 449-3026

NON-GOVERNMENTAL ORGANIZATIONS (NGOS)

Dominica Conservation Association (DCA)
P.O. Box 109
Roseau
Dominica
Telephone: (767) 448-4098
Fax: (767) 448-3855

FIJI

NATIONAL FOREST SERVICE

Department of Forestry, Ministry of Fisheries and
Forests
46 Knolly Street, Government Buildings
P.O. Box 2218
Suva
Fiji
http://www.fiji.gov.fj/publish/m_fish_forest.shtml

GAMBIA

NATIONAL FOREST SERVICE

Forestry Department of the Gambia, URL: www.crdfp.org/fd.htm, Forestry Department 5C, Marina Parade
Banjul, The Gambia Tel: 22 73 07 Fax: 22 47 65,
Email: forestry.dept@gamtel.gm

NATIONAL NGOS CONCERNED WITH FORESTRY

African Mangrove Network (AMN), www.mangroveafrica.net. The main aim of AMN is to
promote the sustainable management of mangrove
forests by rehabilitating damaged ecosystems,
protecting their species and developing management
plans

West African Bird Studies Association (WABSA),
www.wabsa.org.uk/

GHANA**NATIONAL FOREST SERVICE**

Ministry of Lands, Forestry and Mines, P.O Box M 212
Accra, Tel: (+233-21) 687314, Fax: (+233-21) 666801
URL: <http://www.ghana.gov.gh/governing/ministries/economy/mines.php>
The Forestry Commission of Ghana, www.fcghana.com/forestry_commission/

NATIONAL RESEARCH AND TRAINING INSTITUTE

Forestry Research Institute of Ghana, Director, Forestry Research Institute of Ghana University P.O. Box 63, Kumasi, Ghana
Tel: (051)- 60122,- 60123 60373, Fax: 051- 60121.
URL: www.forig.org/forig/history.html

UNIVERSITY FACULTIES/DEPARTMENTS OFFERING FORESTRY OR FOREST-RELATED TRAINING

Kwame Nkrumah University of Science and Technology, Private Mail Bag , Kumasi Ghana Phone:+233-51-60334m+233-51-60137 Fax:+233-51-60137 <http://www.knust.edu.gh/academics/colleges.htm>

NATIONAL NGOS CONCERNED WITH FORESTRY ISSUES

Biotechnology and Nuclear Agriculture Research Institute, P.O.Box. LG 80, Legon, Accra, Ghana,
Phone: (233) 21 400303, Fax : (233) 21 400807, Email : bnargaec@gh.com

Foundation For International Development & Environmental Studies, Contact by email: fihdcs_j@yahoo.co.uk

Agricultural and Rural Development Association of Ghana, P.O. Box 339 Darkuman Accra, Ghana
Tel:+233-21-306321 Email: araghana@web.de

GRENADA**NATIONAL FOREST SERVICE**

Forestry and National Parks Department
Ministry of Agriculture, Lands, Forestry and Fisheries, Energy, Public Utilities, Marketing and the National Importing Board
Botanical Gardens

Queen's Park
St. George's
Grenada
Telephone: (473) 440-2708/3078/3083
Fax: (473) 440-4191
E-mail: fnpd@caribsurf.com
Web site (Ministry): <http://agriculture.gov.gd/>

UNIVERSITIES AND COLLEGES

St. George's University (SGU)
University Centre
Grenada, West Indies
E-mail: sguinfo@sgu.edu
Web site: <http://www.sgu.edu/website/sguwebsite.nsf/index.html>

TA Marryshow Community College (TAMCC)
Tanteen
St. George's
Grenada, West Indies
Telephone: (473) 440-1389
Fax: (473) 440-3079
E-mail: tamcc@caribsurf.com
Web site: <http://www.tamcc.edu.gd/>

University of the West Indies Centre (UWI Centre)
University Centre
Marryshow House
P.O. Box 439
St. George's, Grenada
Telephone: (473) 440-2451
Fax: (473) 440-4985
E-mail: rtscsuwi@caribsurf.com
Web site: <http://www.uwi.edu>

NON-GOVERNMENTAL ORGANIZATIONS (NGOS)

Friends of the Earth-Grenada
PO Box 521
Lucas Street
Queen's Park
St. George's
Grenada, West Indies
Telephone: (473) 440 7192
Fax: (473) 440 7192
E-mail: foegda@caribsurf.com
Web site: <http://www.foei.org/groups/members/grenada.html>

National Science and Technology Council (NSTC)
Tanteen, St. George's
Telephone: (473) 440-3118/2867
Fax: (473) 440-9292

Dr. James S. de Vere Pitt
Director
E-mail: jpitt@caribsurf.com

St. Andrew's Development Organization (SADO)

GUYANA

NATIONAL FOREST SERVICE

Guyana Forestry Commission (GFC)
Ministry of Agriculture
P.O. Box 1029
1 Water Street Kingston
Georgetown
Guyana
Telephone: (592) 226-7271/4
Fax: (592) 226-8956
E-mail: forestry.cof@solutions2000.net
Web site: <http://www.forestry.gov.gy/>

RESEARCH INSTITUTIONS

Institute of Applied Science & Technology (IAST)
IAST Building
University Campus
Turkeyen
Greater Georgetown
Guyana
Telephone: (592) 222-42 14
Facsimile (592) 222-42 29
E-mail: iast@networksgy.com
Web site: <http://www.iastguyana.org>

Iwokrama International Centre for Rain Forest
Conservation and Development
PO Box 10630
77 High Street, Kingston
Georgetown, Guyana, South America
Telephone: (592) 225-1504
Fax: (592) 225-9199
E-mail: iwokrama-general@iwokrama.org
Web site: <http://www.iwokrama.org>

Tropenbos-Guyana programme (TGP)
Lot. 12E Garnett Street
Campbelville
Georgetown
Guyana
Telephone/Fax: (592) 226-2846
Web site: <http://www.bio.uu.nl/tropenbos/index.htm>

UNIVERSITIES, COLLEGES AND OTHER TRAINING CENTRES UNIVERSITIES AND COLLEGES

Formal training for the forestry sector is carried out at the University of Guyana and the Guyana School of Agriculture.

Guyana School of Agriculture
Mon Repos
East Coast Demerara
Guyana
Web site: <http://www.sdn.org.gy/minagri/gsa/index.htm>

University of Guyana
Turkeyen Campus
P.O. Box 10-1110
Greater Georgetown
Guyana
Telephone: (592) 222-5402
Fax: (592) 222-2490
E-mail: pro@uog.edu.gy
Web site: <http://www.uog.edu.gy/>

OTHER TRAINING CENTRES

Bina Hill Institute
Annai Amerindian District, North Rupununi
Region 9
Guyana
E-mail: binahill@yahoo.co.uk
Web site: <http://www.iwokrama.org/people/binahill.htm>

Forestry Training Centre (FTC)
Web site: <http://www.forestry.gov.gy/ftc.htm>

Iwokrama International Centre for Rain Forest
Conservation and Development
PO Box 10630
77 High Street, Kingston
Georgetown, Guyana, South America
Telephone: (592) 225-1504
Fax: (592) 225-9199
E-mail: iwokrama-general@iwokrama.org
Web site: <http://www.iwokrama.org>

NON-GOVERNMENTAL ORGANIZATIONS (NGOS)

Amerindian Peoples Association of Guyana (APA)
334B East Street
South Cummingsburg
Georgetown
Guyana
Telephone: (592) 227-0275; 223-5082

Fax: (592) 223-8150
 E-mail: apacoica@networksgy.com
 Web site: <http://www.apa.org.gy/>

DevNet
 c/o UNDP Building
 42 Brickdam and UN Place
 Georgetown
 Guyana
 Telephone: (592) 227-6198/5723/5989; 226-4040 (ext 263)
 E-mail: info@devnet.org.gy
 Web site: <http://www.devnet.org.gy/>

Friends Restoring Economic & Environmental
 Development (FREED)
 784, Determa Street
 Mckenzie, Linden
 Guyana

Guyana National Initiative on Forest Certification
 (GNIFC)
 Lot 17 Mud Flat, Access Road,
 Kingston, Georgetown
 Guyana
 Telephone: (592) 223-5138/624-0298
 Fax: (592) 223-5138
 E-mail: gnifc@telsnetgy.net
 Web-site: <http://www.forestry.gov.gy/>
 NGO Forum of Guyana
 E-mail: ngoforum@sdnp.org.gy
 Web site: <http://www.sdn.org.gy/ngo/>

North Rupununi District Development Board
 E-mail: binahill@yahoo.co.uk
 Web site: <http://www.iwokrama.org/people/nrddb.htm>

INDUSTRY

Barama Company Ltd
 Land of Canaan
 East Bank,
 Demerara
 Georgetown
 Guyana
 Telephone: (592) 225-4555
 Fax: (592) 225 4558
 E-mail: baramagis@yahoo.com
 Web site: <http://www.samling.com/>

Forest Products Association (FPA)
 157 Waterloo Street
 Cummingsburg Georgetown
 Guyana

Telephone: (592) 226-9848
 Fax: (592) 226-2821
 E-mail: fpasect@sdnp.org.gy; fpa@guyana.net.gy

Forestry Products Marketing Council of Guyana
 (FPMC)
 1 Water Street
 Kingston, Georgetown
 Guyana, South America
 Telephone: (592) 226-7271-4
 Fax: (592) 226-8956
 E-mail: info@fpmcguy.org
 Web site: <http://www.fpmcguy.org/>

Guyana Manufacturers' Association Ltd (GMA)
 157 Waterloo Street
 North Cummingsburg
 Georgetown
 Guyana
 Telephone: (592) 227-4295
 Fax: (592) 225-5615

Precision Woodworking Limited
 35 Industrial Estate, Ruimveldt
 Georgetown
 Guyana.
 Tel: (592) 225 2366
 Fax: (592) 225 6448
 E-mail: info@precisionguyana.com
 Web site: <http://precisionguyana.com/>

INDIA

NATIONAL AND STATE FOREST SERVICES

Director General of Forests
 Ministry of Environment and Forests
 Government of India
 CGO complex, Lodi Raod
 New Delhi 110003, India

Principal Chief Conservator of Forests
 Department of Forests
 Govt. of Andaman and Nicobar Islands
 Van Sadan, Haddo
 Port Blair – 744 101
 Telephone: 91 (3192) 233233
 Fax: 30113
 E-mail: pccf@and.nic.in

Principal Chief Conservator of Forests
 Department of Forests
 Govt. of Arunachal Pradesh

Zero point, Itanagar- 791111
Telephone: 0360 – 2212310
Fax: 2214020/ 2212243

Principal Chief Conservator of Forests
Department of Forests
Govt. of Bihar, Sachivalaya
Patna – 800 001
Telephone: 0612- 228672/ 202365
Fax: 0612 – 210920

Principal Chief Conservator of Forests
Department of Forests
Govt. of Andhra Pradesh
Aranya Bhawan, Tuljaguda Complex AHP Building
M.J. Market, Hyderabad – 500 001
Telephone: 040 – 235488
Fax: 24650028

Principal Chief Conservator of Forests
Department of Forests
Govt. of Assam, Rehabari
Rajgarh Road Guwahati - 781008
Telephone: 0361 – 2541319 (o)/ 2541319(R)
Fax: 2547386

Principal Chief Conservator of Forests
Department of Forests
Govt. of Chhattisgarh
Raipur - 402001
Telephone: 0771 – 2331121
Fax: 331110

Principal Chief Conservator of Forests
Department of Forests
Govt. of Gujarat
Dr. Jivraj Mehta Bhawan,
Block No. – 14, Ist Floor
Gandhi Nagar – 382 010
Telephone: 02712 – 300007/30009/30031
Fax: 21097/ 20166

Principal Chief Conservator of Forests
Department of Forests
Govt. of Haryana
C- 18 Van Bhawan, Sector-6
Panchkula – 134 109
Telephone: 0172 – 2563988
Fax: 564782

Principal Chief Conservator of Forests
Department of Forests
Govt. of Himachal Pradesh
Talland, Shimla - 171002

Telephone: 0177 – 2623155/ 2624192
Fax: 224192

Principal Chief Conservator of Forests
Department of Forests
Govt. of Jammu & Kashmir,
Seikhabagh, Srinagar – 190 001
Telephone: 0194 – 452221/ 455027
For winter
PCCF, Jammu & Kashmir
Van Bahwan Gumat, Jammu – 180 001
Telephone: 0191- 2547276/ 455753

Principal Chief Conservator of Forests
Department of Forests
Govt. of Jharkhand
P.O. Hinoo
Ranchi – 834 003
Telephone: 0651 – 2481909
Fax: 2580413

Principal Chief Conservator of Forests
Department of Forests
Govt. of Karnataka
Ananya Bhawan, 2nd Floor
18th Cross, Malleswaram
Bangalore - 560003
Telephone: 080 – 23343770
Fax: 233414484/ 2225893

Principal Chief Conservator of Forests
Department of Forests
Vashuthacaud
Thiruvanathapuram - 695014
Telephone: 0471 – 2321610/ 321798
Fax: 2320554/ 322217

Principal Chief Conservator of Forests
Department of Forests
Govt. of Madhya Pradesh
Satpura Bhawan
Bhopal - 462004
Telephone: 0755 – 2674200
Fax: 2674334

Principal Chief Conservator of Forests
Department of Forests
Govt. of Maharashtra
Ramgiri Road, Civil Lines Near Government Press
Nagpur – 440 001
Telephone: 0712 – 2556909/ 2550670
Fax: 2550675
E-mail: pccf@nagpur.dot.net.in

Principal Chief Conservator of Forests
 Department of Forests
 Govt. of Manipur
 Sanjinthong, Imphal – 795 001
 Telephone: 3852 – 2220414
 Fax: 2220934

Principal Chief Conservator of Forests
 Department of Forests
 Govt. of Meghalaya
 Shillong – 793 001
 Telephone: 0364 – 222014
 Fax: 222563

Principal Chief Conservator of Forests
 Department of Forests
 Govt. of Mizoram
 Aizawl - 796001
 Telephone: 0389 – 2325727
 Fax: 23227733/ 2323420

Principal Chief Conservator of Forests
 Department of Forests
 Govt. of Nagaland
 Kohima – 797 001
 Telephone: 0370 – 2231149/ 2227017
 Fax: 221472

Principal Chief Conservator of Forests
 Department of Forests
 Govt. of Orissa
 Janpath, Shaheed Nagar
 Bhubaneswar - 751007
 Telephone: 0674 – 2300853
 Fax: 300049

Principal Chief Conservator of Forests
 Department of Forests
 Govt. of Punjab
 17, Bays Building, Sector - 17,
 Chandigarh – 160 017
 Telephone: 0172 – 2701325
 Fax: 2702919

Principal Chief Conservator of Forests
 Department of Forests
 Govt. of Rajasthan
 Van Bhawan, Vaniki Path, Bhagwan Das Road
 Jaipur – 302 005
 Telephone: 0141 – 2227391
 Fax: 2227836

Principal Chief Conservator of Forests

Department of Forests, Environment & Wildlife
 Management,
 Forest Secretariat Building, Deoralli
 Govt. of Sikkim
 Gangtok – 737 102
 Telephone: 3592 – 281385
 Fax: 281778

Principal Chief Conservator of Forests
 Department of Forests
 Govt. of Tamil Nadu
 No. 1, Jeenis Road, Panagal, Maligai, Saidapet,
 Chennai – 600 015
 Telephone: 044 – 4348059/ 25671511
 Fax: 24337307

Principal Chief Conservator of Forests
 Department of Forests
 Govt. of Tripura
 P.O. Kunjvan
 Agartala – 799 001
 Telephone: 0381 – 2323779
 Fax: 2225253

Principal Chief Conservator of Forests
 Department of Forests
 Govt. of Uttar Pradesh
 Ranapratap Marg
 Lucknow – 226 001
 Telephone: 0522– 2206168
 Fax: 2206053

Principal Chief Conservator of Forests
 Department of Forests
 Govt. of Uttarakhand
 85, Rajpur Road, Dehradun - 248001
 Telephone: 0135 – 2746934
 Fax: 746934

Principal Chief Conservator of Forests
 Department of Forests
 Govt. of West Bengal, Aranya Bhawan, 4th Floor
 Salt Lake City
 Sector – 3, Block- La-10a
 Kolkata – 700 098
 Telephone: 033 – 23358580
 Fax: 23358756

Conservator of forests
 Bhubaneswar
 Shri Richard D'Souza
 Managing Director
 Goa Forest Development Corporation
 GOA

RESEARCH INSTITUTIONS

Indian Council of Forest Research and Education (ICFRE)
The Director, Forest Research Institute
P.O. New Forest, Dehradun (Uttaranchal) - INDIA
PIN – 248 006
Telephone: 0135 – 2755277
E-mail: negiss@icfre.org
Fax: 0135 – 2756865
Website: <http://www.icfre.org>

JAMAICA

NATIONAL FOREST SERVICE

Forestry Department
Ministry of Agriculture
173 Constant Spring Road
Kingston 8
Jamaica
Fax: (876) 924-2626
E-mail: forestrydepartment@forestry.gov.jm
Web site: <http://www.forestry.gov.jm>

National Environment and Planning Agency (NEPA)
John McIntosh Building
10 Caledonia Avenue, Kingston 5
Jamaica, West Indies
Telephone: (876) 754-7540
Fax: (876) 754-7595-6
E-mail: pubed@nepa.gov.jm
Web site: <http://www.nrca.org/>

RESEARCH INSTITUTIONS

Environmental Management Unit (EMU)
Department of Geography and Geology
University of the West Indies
E-mail: emu@uwimona.edu.jm
Web site: <http://www.mona.uwi.edu/geoggeol/emu/index.htm>
The Institute Of Jamaica
10-16 East Street
Kingston
Jamaica
Telephone: (876) 922- 0620-6
Fax: (876) 922-1147
E-mail: ioj.jam@mail.infochan.com
Web site: <http://www.instituteofjamaica.org.jm/>

Unit for Disaster Studies (UDS)
Department of Geography and Geology

University of the West Indies
Web site: <http://www.mona.uwi.edu/uds/index.html>

UNIVERSITIES, COLLEGES AND OTHER TRAINING CENTRES

College of Agriculture, Science and Education (CASE)
Passley Gardens, P.O. Box 170
Port Antonio, Portland
Jamaica, W.I
Telephone: (876) 993-5436-8
Fax: (876) 993-5546
Web site: <http://www.case.edu.jm/>

Knox Community College
Spalding Post Office, Box 52
Jamaica, W.I.
Telephone: (876) 987-8056/8049
Fax: (876) 987-8048
E-mail: knoxcollege@cwjamaica.com
Web site: <http://www.knoxcommunitycollege.edu.jm/index.html>

Northern Caribbean College
Mandeville, Manchester
Jamaica, WI
Telephone: (876) 962-2204
E-mail: info@ncu.edu.jm
Web site: <http://www.ncu.edu.jm/>
College of Natural & Applied Sciences
Northern Caribbean College
Telephone: (876) 523-2063
E-mail: cnas@ncu.edu.jm
Website: <http://cnas.ncu.edu.jm>

University of Technology
237 Old Hope Road
Kingston 6
Jamaica
Telephone: (876) 927-1680
Fax: (876) 977-4388
Web site: <http://www.utech.edu.jm/index.htm>
School of Building and Land Management (SBLM)
Telephone: (876) 927-1613 ext: 2333
E-mail: athomas@utech.edu.jm
Web site: <http://www.utech.edu.jm/Faculties/Built/SBLM/index.htm>

The University of the West Indies (UWI)
Mona Campus
Kingston 7
Jamaica, West Indies
Telephone: (876) 927-1660-9
Fax: (876) 927-0997

Web site: <http://www.mona.uwi.edu/>

NON-GOVERNMENTAL ORGANIZATIONS (NGOS)

Bluefields People Community Association
Bluefields P.O. Box 22
Belmont Square
Belmont, Westmoreland
Jamaica, West Indies
Phone: (876) 955-8793
Fax: (876) 955-8791
E-mail: keithr44@yahoo.com
Web site: <http://www.bluefieldsjamaica.org.jm>

Caribbean Coastal Area Management (CCAM)
Foundation
P.O. Box 33
Lionel Town, Clarendon
Jamaica, West Indies
Telephone: (876) 986-3344
Fax: (876) 986-3956
Web site: <http://www.ccam.org.jm/>

Environmental Foundation of Jamaica
1B Norwood Avenue
Kingston 5
Jamaica
Tel: (876) 960-6744
Toll Free: 1 888 991-2953
Fax: (876) 920-8999
E-mail: efj.ja@cwjamaica.com
Web site: <http://www.efj.org.jm/>

Environment Watch Organization (EWO)
P.O.Box 815
Montego Bay
St. James
Jamaica
Telephone: (876) 940-2149
Fax: (876) 940-2149
E-mail: edob@toj.com

ICT4D Jamaica
6b Oxford Road
Kingston 10
Jamaica WI
Telephone: (876) 946-2998/9
Fax: (876) 978-3579
E-mail: info@ict4djamaica.org
Web site: <http://www.ict4djamaica.org>

International School of Jamaica
Oracabessa P.O. 36, Saint Mary
Jamaica, West Indies

Phone: (876) 725-0185 / 725-0060 Fax:(876) 725-0933
E-mail: isja1@yahoo.com
Web site: <http://www.isja.org.jm/index.html>

Jack's Hill Community Council (JHCC)
9th Mile Marker
Jacks Hill Postal Authority
St. Andrew
Jamaica
Telephone: (876) 702-0130

Jamaica Conservation and Development Trust (JCDDT)
P.O. Box 1225
Kingston 8
Jamaica
Telephone: (876) 960-2848/9
Fax : (876) 960-2850
E-mail: jcdt@kasnet.com
Web site: <http://www.greenjamaica.com>

Jamaica Environment Trust (JET)
Earth House
11 Waterloo Road
Kingston 10
Jamaica W.I.
Telephone: (876) 960-3693/9783/9385
Fax (876) 926-0212
E-mail: jamentrust@cwjamaica.com
Web site: <http://www.jamentrust.org/>

Jamaica Sustainable Development Network Ltd
891/2 Half Way Tree Road
Kingston 10
Jamaica
Telephone: (876) 968-0323
Fax: (876) 968-1125
Web site: <http://www.jsdnp.org.jm>

National Environmental Communications Campaign
(NECC)
NEEC Secretariat
Natural Resources Conservation Authority
10 Caledonia Avenue, Kingston 5
Jamaica W.I.
Telephone: (876) 754-7578/7546-52
Fax: (876) 754-7597
E-mail: neec@nrca.org
Web site: <http://www.nrca.org/neecwebsite>

National Environmental Societies Trust (NEST)
P.O. Box 3040
Kingston 8
Jamaica
Telephone: (876) 969-6502

E-mail: nest@infochan.com
Web site: <http://www.jsdnp.org.jm/nestjamaica/nesthome.htm>

Natural History Society of Jamaica (NHSJ)
c/o Department of Life Sciences
UWI, Mona
Kingston 7
Jamaica WI
Tel: (876) 9776938
Fax: (876) 9771075
E-mail: naturalhistory@hotmail.com

Portland Environment Protection Association (PEPA)
6 Allan Avenue
Port Antonio, Portland
Jamaica
Telephone: (876) 993-9632
Fax: (876) 715-3705
E-mail: pepa@cwjamaica.com
Web site: <http://www.pepa-jamaica.org/index.shtml>

INDUSTRY

Jamaica Exporters Association
39 Hope Road
PSOJ Building
Kingston 10
Jamaica, West Indies
Telephone: (876) 927-6238/927-6786
Fax: (876) 927-5137
E-mail: infojea@exportja.org
Web site: <http://www.exportjamaica.org/>

Jamaica Manufacturers' Association
85a Duke Street
Kingston
Jamaica, W.I.
Telephone: (876) 922-8869/8880-3
Fax: 922-9205
Web site: <http://www.jma.com.jm/>

Jamaica Promotions Corporation (JAMPRO)
Head Office
18 Trafalgar Road
Kingston 10
Jamaica W.I.
Telephone: (876) 978-7755/3337
Fax: (876) 946-0090
E-mail: jampro@investjamaica.com
Web site: <http://www.investjamaica.com/index.php>

KENYA

NATIONAL FOREST SERVICE

Forest Department
Government
P.O Box 30513, Nairobi.
Website: www.environment.go.ke/

RESEARCH INSTITUTIONS

Kenya Agricultural Research Institute (KARI)
Government
Agro forestry
P.O Box 57811, 00200, Nairobi, Kenya.
Website: www.kari.org
E-mail: resource.centre@kari.org

Kenya Forestry Research Institute (KEFRI)
Government
Forest Products and Resource Center
P.O Box 30241, 00200, Nairobi, Kenya.
Website: <http://www.kefri.org/natural.htm>

Kenya Medical Research Institute (KEMRI),
Government
Centre for Traditional Medicine and Drug Research
P.O Box 54840, Nairobi
Website: www.kemri.org
Email: kemrilib@ken.healthnet.org

ACADEMIC/ TRAINING

Kenyatta University, (KU)
School of Environmental and human sciences
P.O Box 43844, 00100, Nairobi
Website: www.ku.ac.ke/academic

Egerton University
Faculty of Environmental Studies and Natural Resources
P.O Box 536, Njoro
Website: www.egerton.ac.ke/academic/ferd/
Email: ferd@egerton.ac.ke

Jomo Kenyatta University of Agriculture and Technology (JKUAT)
Department of Botany
P.O Box 62000, 00200, Nairobi.
Website: www.jkuat.ac.ke/f_science_botany.php

Maseno University
Department of Botany
P.O Box 333

Maseno
Email: baps@maseno.ac.ke

Moi University
Department of Forestry & wood science
P.O Box 1125,30100, Eldoret, Kenya.
www.mu.ac.ke/academic/school/nrm/
Londiani Forestry College
P.O Box 8, Londiani, Kenya.
Baraka Agricultural College
P.O Box 52, Molo- 20106
Web: baraka@africaonline.co.ke

NON-GOVERNMENTAL ORGANISATIONS AND NETWORKS WITH OPERATIONS IN KENYA.

Forest Action Network (FAN)
Website: www.fanweb.org
Email: forest@fanweb.org

Kenya Association of Forest Users (KAFU)
PO Box 44597 00100. Nairobi, Kenya.
Email: info@kafuworld.org

Kenya Forestry Working Group (KFWG)
P.O. Box 20110-00200,
Nairobi, Kenya
Website: www.kenyaforests.org
Email: kfwg@wananchi.com or info@kenyaforests.org

Nature Kenya
P.O Box 44486, 00100, Nairobi, Kenya.
Website: www.naturekenya.org
Email: info@naturekenya.org

African Wildlife Foundation
Website: www.awf.org
Network for Natural Gums and Resins in Africa
(NGARA)
Website: www.ngara.org
E-mail: info@ngara.org

African Conservation Centre
P O Box 15289-00509
Nairobi, KENYA
<http://www.conservationafrica.org>
info@conservationafrica.org

Green Belt Movement
Website: <http://www.greenbeltmovement.org>
E-mail: fdegasparis@greenbeltmovement.org.

KIRIBATI

NATIONAL FOREST SERVICE

Agroforestry Section of the Ministry of Natural Resource Development and the Ministry of Environment and Social Development. Both government bodies are responsible for the reforestation, conservation and education programmes for trees and forests. The Ministry of Environment and Social Development focuses mainly on conservation and management activities.

LESOTHO

NATIONAL FOREST SERVICE

Director of Forestry
Ministry of Forestry and Land Reclamation
(Government of Lesotho)
forestrydepartment@leo.co.ls
<http://www.lesotho.gov.ls/mnforestry.htm>
forestrydepartment@leo.co.ls
+266 22 312826/323600
P.O. Box 92
Thaba - Bosiu, Industrial Area
Maseru – 100

MALAWI

NATIONAL FOREST SERVICE

The Ministry of Mines, Natural Resources and Environment:
Environmental Affairs Department
P.O. Box
Lilongwe, Malawi

NATIONAL RESEARCH AND TRAINING INSTITUTION

National Herbarium and Botanical Gardens of Malawi (NHBGM)
P.O. Box 528, Zomba, Malawi
Tel: +265 1 527783, +265 1 524108
E-mail: nhbgm@sdnp.org.mw

UNIVERSITY FACULTIES/DEPARTMENTS OFFERING FORESTRY OR FOREST-RELATED TRAINING

The University of Malawi Bunda College of Agriculture

The College Registrar
Bunda College of Agriculture
P.O. Box 219
LILONGWE

MALAYSIA

NATIONAL FOREST SERVICE

Forestry Department of Peninsular Malaysia, Ministry
of Agriculture
Jalan Sultan Salahuddin
50660 Kuala Lumpur
Malaysia
<http://www.forestry.gov.my/e>

RESEARCH INSTITUTION

Forest Research Institute Malaysia (FRIM) Kepong,
Kepong Selangor 52109
Malaysia
Tel: 60 3 62797218
Fax: 60 3 62731041
Web Site: www.frim.gov.my

MALDIVES

NATIONAL FOREST SERVICE

Deputy Minister
Ministry of Agriculture Fisheries and Marine
Resources
Agriculture and Forestry Division,
Ministry of Fisheries, Agriculture and Marine
Resources,
Gaazee Building, Ameer Ahmed Magu,
Malé
Maldives
Tel (PABX): (960) 322625, 321239
Fax: (960) 321168, 326558
E-mail: it@fishagri.gov.mv
Website: <http://www.fishagri.gov.mv>

MALTA

NATIONAL FOREST SERVICE

Malta does not have a forest service as such. Instead
the Ministry for Rural Affairs and the Environment is
responsible for afforestation (and horticulture).

Ministry for Rural Affairs and the Environment,
Barriera Wharf,
Valletta - CMR 02.
E-mail: info.mrae@gov.mt
Website: <http://www.mrae.gov.mt>

MAURITIUS

NATIONAL FOREST SERVICE

Ministry of Agriculture and Natural Resources
E-mail: npcs.agr@intnet.mu

NON GOVERNMENTAL ORGANISATION (NGO)

Mauritius Wildlife Foundation
E-mail: executive@mwf.intnet.mu

MOZAMBIQUE

NATIONAL FOREST SERVICE

National Directorate of Lands and Forests (DNFF)
P.O. Box 288
Maputo
Mozambique

At the provincial level there are Provincial Agricultural
Directorates which represent the central Ministry
of Agriculture. The DNFFB is represented by the
Provincial Forest and Wildlife Services at provincial
level (FAO,2005b;Cuco & Kumagwelo,1994). In
provincial districts Agriculture (and Forestry and
Wildlife) is represented by District Agricultural
Directorates. Most of the planning, management and
control functions have been delegated to the provincial
Forest and Wildlife Services (Cuco,1994).

The national research and training institution is
part of the above national Ministry of Agriculture,
concentrating on the rapidly developing needs of its
own staff, and of the communities of the country. Some
of these research and training aspects are:
Contribute to the resettlement process and establish
proper land use practices;
Support sustainable agriculture productivity and food
security;
Promote community participation in the conservation
and management of natural resources;
Provide sector-based employment opportunities;
Conserve and manage parks, reserves and protected
areas (Cuco & Kumagwelo,1994).

The more than 40 year old University of Maputo now called the Eduardo Mondlane University has 22 faculties , one of which is the one for Agronomy with a staff of about 650 and student numbers of 6800. The number of graduates is still very low .In 1997 there were 230 candidates in the Agronomy faculty. With the help of Finnish foreign aid a forestry training facility is being sponsored at the Chimoio Agricultural Institute. Together these two institutions contribute towards Forestry and Wildlife management and research by educating students towards knowledgeable graduates who can contribute to the country's wellbeing. It is known that Mozambique students also come and study at South African universities. The website addresses are www.uem.mz and www.atnesa.org/mozambique.htm.

No outstanding single forestry NGO has been identified. However, a number of active local NGO's and community organisations are known to exist and are regularly being consulted by the DNFFB at various management and planning levels. No specific professional forestry association exists. However, some Mozambiquans become members of the Southern African Institute of Forestry, publish in their journal and network internationally through the International Society of Tropical Forestry, and its regular ISTF News.

Mozambique is part of the Southern African Development Community and has signed the SADC Forestry Protocol , a regional co-operative agreement described in the Chapter on South Africa.

NAMIBIA

NATIONAL FOREST SERVICE

Ministry of Environment and Tourism (MET)
Director of Forestry
P.O. Box
Windhoek, Namibia

NATIONAL RESEARCH AND TRAINING INSTITUTE

National Botanical Research Institute
P.O. Box
Windhoek, Namibia

UNIVERSITY FACULTIES/DEPARTMENTS OFFERING FORESTRY OR FOREST-RELATED TRAINING, WITH PHYSICAL

The University of Namibia
Faculty of Forestry
P.O. Box
Windhoek, Namibia

NAURU

NATIONAL FOREST SERVICE

Governmental responsibility for natural resources on Nauru lies with the Department of Island Development and Industry, thus responsibility for forestry is nominally under its purview. The Department's wide-ranging responsibilities encompass Culture and Tourism, Lands and Survey, and Environment. The Environment Division is responsible for the protection of Nauru's natural environment. Little attention is paid to forest management issues, but in the future, reforestation activities carried out under the direction of the Nauru Rehabilitation Corporation are likely to be of significance. A proposal for the establishment of a Ministry of Natural Resources, within the Department of Agriculture, includes the establishment of a small Forestry/Agroforestry Division.

NEW ZEALAND

NATIONAL FOREST SERVICE

The Ministry of Agriculture and Forestry (MAF)
Pastoral House
25 The Terrace
PO Box 2526, Wellington

Within MAF are the following services:

Crown Forestry Group
Kate Dalton
Executive Officer
Crown Forestry
Ministry of Agriculture and Forestry
PO Box 2526
Wellington

Indigenous Forestry Unit
Ministry of Agriculture and Forestry
PO Box 25022
138 Victoria Street
Christchurch
NEW ZEALAND

East Coast Forestry Project
Ministry of Agriculture and Forestry
Cnr Grey St & Childers Rd
1st Floor ZGFM Building
PO Box 2122
Gisborne

National research and training institution(s):
University faculties/departments offering forestry or
forest-related training:

Regional/provincial forest services and other
institutions:

National NGOs concerned with forestry issues

NIGERIA

NATIONAL FOREST SERVICE

The Federal Department of Forestry (FDF), Block 10,
Oran Street, Wuse, Zone 1, Abuja

NATIONAL RESEARCH AND TRAINING INSTITUTIONS

Forestry Research Institute of Nigeria (FRIN), Private
Mail Bag 5054, Jericho, Ibadan, Oyo State. Telephone:
+234 (22) 414-441, 414-073, 414-022 Telex: 31207.

UNIVERSITY FACULTIES/DEPARTMENTS OFFERING FORESTRY OR FOREST-RELATED TRAINING:

University of Ibadan. <http://ui.edu.ng>
The Federal University of Technology, Akure. www.futa-forestry.org, www.futakure.net. P.M.B 704,
Akure, Ondo state.

Uthman Fodio University, Sokoto.

Federal University of Agriculture, Abeokuta. www.unaab.edu.ng

Federal University of Agriculture, Umudike. <http://michaelokparaunivesi.tripod.com>

The University of Benin. www.uniben.edu

TECHNICAL INSTITUTIONS

Federal College of Forestry, PMB 5054, Ibadan,
Nigeria

Federal College of Forestry P.M.B. 2019, Jos, Nigeria.

National NGOs concerned with forestry issues (Source:
h):

Environmental Foundation for Africa www.efasl.org.uk.

Nigerian Conservation Foundation, Km, 19, Lagos-Epe
Expressway, Lekki, Lagos, Nigeria P.O. Box 74638,
Victoria Island, Lagos, Nigeria. <http://www.ncf-nigeria.org>,
info@ncf-nigeria.org

Environmental Rights Action, #214, Uselu-Lagos Road
Ugbowo

P.O. Box 10577, Benin City Nigeria. Tel/Fax: +234-52-
600 165, E-mail:eraction@infoweb.abs.net <http://www.essentialaction.org/shell/era/era.html>

Pronatura, 37, Onne, GRA Phase II , P.O Box 7790,
Port Harcourt , Nigeria, Tel / Fax (234) 8423 2748.
Email: 114260.3561@compuserve.com <http://www.pronatura.org.br/en/info/>
Rainforest Resource & Development Centre, <http://www.rainforestcentre.org>

Nigerian Field Society, <http://www.nigerianfield.org>

NGO Coalition for the Environment (NGOCE), www.ngoce.nigeria.org

Save Earth Nigeria, <http://www.senigus.interconexion.org>

PAKISTAN

NATIONAL FOREST SERVICES

Inspector General of Forests / NPD SLMP
Ministry of Environment,
Government of Pakistan
CDA Block-4, Old Navel Head Quarters,
Islamabad
Telephone: 0092-51-9219051

Director General
Pakistan Forest Institute
Rahatabad, Palosi Road
Peshawar.
Telephone: 0092-91-9218145, 9218148
Fax: 0092-91-9216203

Secretary Environment
Department of Environment,

Govt. of North West Frontier Province,
Block A, Civil Secretariat, Peshawar
Telephone: 0092-91-9210333

Chief Conservator of Forests
North West Frontier Province Forest Department
Shami Road, Peshawar
Telephone: 0092-91-9212177
Mob: 0092-300-9117371
Website: ccfnwfp@gmail.com

UNIVERSITIES AND COLLEGES

University of Agriculture, Faisalabad
Department Of Forestry, Range And Wildlife
Management.
380 University Ave.
Faisalabad 38040
Pakistan
Telephone: +92 (41) 920 0161
Fax: No. 092-411-647846
Website: <http://www.uaf.edu.pk/>

University of Arid Agriculture, Rawalpindi
Department of Range Management and Forestry
University of Arid Agriculture
Shamsabad ,Muree Road Rawalpindi.
Pakistan
Phone: (+92 51) 9290151-52
Fax:(+92 51) 9290160
Website: <http://www.uar.edu.pk>

PAPUA NEW GUINEA

NATIONAL FOREST SERVICE

Papua New Guinea Forest Authority
P.O. Box 5055
Boroko
Papua New Guinea

The government's principal forestry agency is the Papua New Guinea Forest Authority, a statutory body established by an Act of Parliament in 1991. It is comprised of a Forestry Board, advisory committees, and a National Forest Service. The Forest Authority is responsible for preparing and reviewing the National Forest Plan, control and regulation of forest exports, advice on forest policy and legislation, resource acquisition, resource allocation, as well as administration, monitoring and enforcement of the Forestry Act and forest management standards. The National Forest Service is the operational arm

of the Forestry Authority and has four operational divisions focusing respectively on: Forest Planning, Resource Development, Forest Management and Forest Research. Development of forest policy is the responsibility of a separate Ministry for Forests. Other government agencies with involvement in the national forest estate include: the Department of Environment and Conservation, responsible for environmental planning, assessment and protection, as well as nature conservation; the Bureau of Water Resources; and the Department of Lands and Physical Planning. Papua New Guinea's 19 provincial governments are all involved in resource and land development and management activities. Provincial Forest Management Committees form an important link between forest resource owners and the Forest Authority.

RESEARCH INSTITUTION

Papua New Guinea Forest Research Institute
P.O. Box 314,
LAE,
Morobe Province,
Papua New Guinea
Tel: 675 472 4188
Fax: 675 4726572
Website: http://www.nri.org.pg/pages/research_in_PNG.htm

SAMOA

NATIONAL FOREST SERVICE

Forestry Division, Ministry of Natural Resources,
Environment and Meteorology
Private Bag
Apia
Samoa

SEYCHELLES

INSTITUTIONS

Ministry of Environment and Transport
Department of Forestry
E-mail: forestry@seychelles.net

The Forestry Section of the Division of Environment under the Ministry of Environment and transport is responsible for the controlling and management of the forest resources of the country. Within the Ministry of Transport and Environment is the Division of Environment among others, and is headed by a

Director General of Environment. The Division is split into five Sections, namely; (i) Forestry Section, (ii) Conservation Section, (iii) Botanical Gardens, (iv) Environmental Assessment and Pollution Control and (v) Education and Information Section. The Forestry Section is the responsible forest authority in Seychelles and has previously concentrated on production forestry and plantation establishment (FAO, 2001b). Today, the Forestry Section has changed trend and moved to forest management of conservation areas.

At a higher education level, the country has Seychelles Polytechnique but has no department on forestry although it has departments for agriculture and fisheries (ASTI, 2005).

SIERRA LEONE

NATIONAL FOREST SERVICE

Ministry of Agriculture Forestry and Environment (MAFE): Private Mail Bag 540 Tower Hill Freetown, url:<http://www.statehouse-sl.org/ministryagriculture.htm>

NATIONAL RESEARCH AND TRAINING INSTITUTE

Institute of Agricultural Research (IAR), Njala Headquarters, Ministry of Agriculture, Forestry and the Environment / Sierra Leone ,Town/City, Njala Tel:(+232) 22-223380 Fax:(+232) 22-223473 Email: iarsl@sierratel.sl

UNIVERSITY FACULTIES/DEPARTMENTS OFFERING FORESTRY OR FOREST-RELATED TRAINING

Njala University, University of Sierra Leone; Private Mail Bag, Freetown, Sierra Leone; Tel: 00232 -22 - 228788, 00232-22-226851; URL: <http://www.nu-online.com/> Email: nuc@sierratel.sl, nuclib@sierratel.sl

NATIONAL NGOS CONCERNED WITH FORESTRY ISSUES

Environmental Foundation for Africa (EFA); EFA Headquarters 1 Beach Road, Lakka, Freetown Peninsula Sierra Leone. PMB 34. Tel: +232 76 611 410; <http://www.efasl.org.uk/>
Organisation for Research and Extension of Intermediate Technology (OREINT), 48 Wellington Street, Freetown; TEL: 232 22 224948/227873
Email: oreint48@usa.net.
Conservation society of Sierra Leone (CSSL)

Environmental foundation of Sierra Leone (ENFOSAL) Commonwealth Human Ecology Council of Sierra Leone (CHEC – SIL), Y.W.C.A. Headquarters, Bismarck Johnson Street, Brookfields, Freetown; Tel: 076-628345, 240379, 240383; E-Mail: checsil@yahoo.com, (<http://www.sierra-leone.org/assns.html>)
Friends of the Earth, Sierra Leone Chapter
Sierra Leone Adult Education Association- Ecological Promotion (SLADEA –Ecological Promotion)

SINGAPORE

NATIONAL FOREST SERVICE

Responsibility for Singapore's forests and trees is largely under the auspices of the National Parks Board and the Parks and Recreation Department. Both are arms of the Ministry of National Development. The National Parks Board has responsibility for management of the country's two national parks and two nature reserves and for general nature conservation. The Parks and Recreation Department is in charge of other green areas, parks and landscaping. The mission of the National Parks Board in conservation management is to consistently embark on plans that improve recreational facilities and, at the same time, preserve the ecological balance of the natural heritage in nature parks. The Board's vision is to create a clean and green metropolis out of Singapore's dense urban landscape. Overall responsibility for management of the environment lies with the Ministry of Environment. The Concept Plans are developed by the Urban Redevelopment Authority, Singapore's national planning authority, under the guidance of the Ministry of National Development. All forest land is owned by the state.

SOLOMON ISLANDS

NATIONAL FOREST SERVICE

Government forestry activities in the Solomon Islands are administered through the Forestry Division of the Ministry of Forests, Environment and Conservation. The Forestry Division's responsibilities are divided between 4 Sections: Operations (log monitoring), Economics & Marketing, Research & Development, and Policy and Planning. The Operations sector has the greatest direct involvement in forest management, with responsibilities to monitor harvesting operations and check harvesting plans, as well as to monitor log exports, sawmills, and to collect government levies

and royalties. Among the duties of the Research & Development sector is extension responsibility for promoting reforestation on customary lands. This sector is also charged with overseeing reforestation of old garden sites and tribal lands that have been logged over in the past. Other duties of the Research & Development sector include improving genetic material of priority species and managing the Herbarium and Botanical Gardens.

SOUTH AFRICA

INSTITUTIONS

Natural Resources and Environment

PO Box 395

PRETORIA

0001

www.csir.co.za

Department of Environmental Affairs and Tourism

Private bag X447

PRETORIA

0001

www.deat.gov.za

Department of Water Affairs and Forestry

Private bag x313

PRETORIA

0001

www.dwaf.gov.za

Forestry and Agriculture Biotechnology Institute

University of Pretoria, Pretoria, 0002

www.fabinet.up.ac.za

Forest Industries Education and Training Authority

www.fieta.org.za

Forestry South Africa

PO Box 1553

RIVONIA

2128

www.forestry.co.za

Institute for Commercial Forestry Research

PO Box 100281

SCOTTSVILLE

3209

www.icfr.unp.ac.za

Natal Timber Co-operative

PO Box 1445

PIETERMARITSBURG

3200

www.nctforest.com

Nelson Mandela Metropolitan University, Saasveld
Campus

Private bag X6531

GEORGE

6530

www.nmmu.ac.za

Paper Manufacturers Association of South Africa

PO Box 1553

RIVONIA

2128

www.pamsa.co.za

South African Forestry Contractors Association

PO Box 26394

EAST RAND

1462

Southern African Institute of Forestry

Post Suite 329

Private bag X4

MENLOPARK

0102

www.foresters.co.za

South African National Biodiversity Institute

Private bag X101

PRETORIA

0001

www.sanbi.org

SOUTH African Wattle Growers Union

PO Box 633

PIETERMARITSBURG

3200

South African Wood Preservers Association

Private bag X 686

ISANDO

1600

www.sawpa.aug.za

Forestry Programme University of Kwazulu-Natal

PrivatebagX1

SCOTTSVILLE

3209

www.ukzn.ac.za

Department of Forest Science, Faculty Agricultural and
Forestry Sciences, University of Stellenbosch

Private bag X1

MATIELAND

7602

www.sun.ac.za/forestry

NON GOVERNMENTAL ORGANISATION (NGO)

Food and trees for Africa
PO Box 2035
Gallo Manor
2052
www.trees.co.za

SRI LANKA

NATIONAL FOREST SERVICE

Conservator General of Forests
Forest Department
Ministry of Environment and Natural Resources
(Government of Sri Lanka)
82, Rajamalwatta Road
Colombo
Battaramulla
Sri Lanka
E-mail: forlib@sltnet.lk

UNIVERSITIES AND COLLEGES

Head, Faculty of Applied Sciences
University of Sri Jayewardenepura
Nugegoda, Sri Lanka.
Telephone: +0094-11-2802914
Fax: +0094-11-2802914
E-mail: deanfas@sjp.ac.lk
Website: <http://www.sjp.ac.lk>

ST. KITTS AND NEVIS

NATIONAL FOREST SERVICE

Ministry of Housing, Agriculture and Fisheries
Government of Saint Kitts and Nevis
La Guerite
P. O. Box 39
Basseterre
St. Kitts
Telephone: (869) 465-2335
Fax: (869) 465-2928
E-mail: doastk@caribsurf.com
Web site: <http://www.gov.kn/>
Head of Service:
Ms. Ilis Watts
Fruit Tree and Forestry Officer
E-mail: ilisp@hotmail.com

RESEARCH INSTITUTIONS

Nevis Field Study Centre (NFSC)
Nevis Historical and Conservation Society
PO Box 563
Charlestown
Nevis
Telephone: (869) 469-5786
Fax: (869) 469-0274
Web site: <http://www.nevis-nhcs.org/>

UNIVERSITIES, COLLEGES AND OTHER TRAINING CENTRES

Clarence Fitzroy Bryant College
Burdon Street Campus
PO Box 268
Basseterre
St. Kitts
Telephone: (869) 465-2856/8791/8990
Fax: (869) 465-8279
E-mail: info@cfbc.edu.kn
Web site: <http://www.cfbc.edu.kn/>

NON-GOVERNMENTAL ORGANIZATIONS (NGOS)

Nevis Historical and Conservation Society
PO Box 563
Charlestown
Nevis
Telephone: (869) 469-5786
Fax: (869) 469-0274
Web site: <http://www.nevis-nhcs.org/>
St. Christopher Heritage Society
P.O. Box 888
Bay Road
Basseterre
St. Kitts
Telephone/Fax: (869) 465-5584
E-mail: schs@caribsurf.com
Web site: <http://www.stkittsheritage.org>

ST. LUCIA

NATIONAL FOREST SERVICE

Department of Forestry
Ministry of Agriculture, Fisheries and Forestry
5th Floor, Sir Stanislaus Building
Waterfront, Castries
St. Lucia
Telephone: (758) 450-2078/2231
Fax: (758) 450-2287

E-mail: deptforest@slumaffe.org
 Web site: http://www.slumaffe.org/Forestry_Department/forestry_department.html

RESEARCH INSTITUTIONS

Department of Forestry – Research Unit
 Ministry of Agriculture, Fisheries and Forestry
 5th Floor, Sir Stanislaus Building
 Waterfront, Castries
 St. Lucia
 Telephone: (758) 450-2078/2231
 Fax: (758) 450-2287
 E-mail: deptforest@slumaffe.org
 Web site: http://www.slumaffe.org/Forestry_Department/forestry_department.html

UNIVERSITIES, COLLEGES AND OTHER TRAINING CENTRES

Sir Arthur Lewis Community College (SALCC)
 Morne Fortune, Castries
 St. Lucia
 Telephone: (758) 452-5507
 Fax: (758) 452-7901
 Web site: <http://www.salcc.edu.lc/>

NON-GOVERNMENTAL ORGANIZATIONS (NGOS)

National Community Foundation
 1st Floor Francis Compton Building
 Waterfront, Castries
 P.O. Box CP 5390
 St. Lucia
 Telephone: (758) 453-6661
 Fax: (758) 451-9882
 Web site: <http://www.stluciancf.org/>

National Research & Development Foundation (NRDF)
 P.O. Box 3067
 La Clery
 Castries
 St. Lucia, W.I.
 Telephone: (758) 452-4253/7083
 Fax: (758) 453-6389
 E-mail: info@nrdf.org.lc
 Web site: <http://www.nrdf.org.lc>

Saint Lucia National Trust
 Pigeon Island
 Saint Lucia, West Indies
 Telephone: (758) 452-5005
 Web site: <http://www.slunatrust.org>

ST. VINCENT AND THE GRENADINES

NATIONAL FOREST SERVICE

Forestry Department
 Ministry of Agriculture, Forestry and Fisheries
 Campden Park
 Kingstown
 Saint Vincent and the Grenadines
 Telephone: (784) 457-8594
 Fax: (784) 457-8502
 E-mail: forestrysvg@vincysurf.com; forestrysvg93@yahoo.com
 Web site: <http://www.gov.vc/Govt/Government/Executive/Ministries/Agriculture&Fisheries/forestry/forestry.asp?z=0>

UNIVERSITIES, COLLEGES AND OTHER TRAINING CENTRES

University of the West Indies (UWI)
 University Centre
 Murray Road
 P.O. Box 610
 Kingstown, St. Vincent
 Telephone: (784) 456-1183
 Fax: (784) 456-1251
 E-mail: uwisvg@gmail.com; scs@caribsurf.com
 Web site: <http://www.cavehill.uwi.edu/bnccde/svg/index.html>

SWAZILAND

NATIONAL FOREST SERVICE

Forestry Section, Department of Agriculture and Extension, Ministry of Agriculture and Co-operatives
 P.O. Box 162
 Mbabane
 Swaziland
<http://www.gov.sz/home.asp>

Research in the plantations is carried out by both Mondi and Sappi from their research centres in South Africa.

Limited research on indigenous forest and woodland species is carried out by staff of the University of Swaziland in Mbabane. Emphasis is on subsistence and communal use of such species and forests. Fuelwood use, wood for carving, medicinal use of woodland and forest species, use of fruit and leaves are other aspects of such research.

There is no specific forestry technical and scientific training in Swaziland. Students attend such courses in neighbouring countries, such as South Africa. Swaziland is part of the Southern African Development Community (SADC) and has signed the Forestry Protocol, a regional co-operative agreement described in the Chapter on South Africa.

TANZANIA

NATIONAL FOREST SERVICE

National Forest Programme (NFP)
P.O. BOX 11979
Dar Es Salaam
Tanzania
Tel: 255 741 325706
Fax: 255 22 2130091
Website: <http://www.nfp.co.tz>

National Environment Management Council (NEMC)
P.O. Box 63154,
Dar es Salaam.
TANZANIA
E-mail: nemc@simbanet.net, nemc@nenactz.org
Tel: +255(022) 2134603, 0741-608930/2323210
Fax: +255 (022) 2134603
Website: www.newctz.org

National Tree Seed Program (TaNSP)
P.O. Box 373, Morogoro, Tanzania
Tel: 255-023-2563192
Fax: 255-023-2563275

RESEARCH

Tanzania Forestry Research Institute (TAFORI)
P.O. Box 1854, Morogoro.
Tel. 255-023-2263725

National Housing and Building Research Agency (NHBRA)
P.O Box 40465, Dar es Salaam

ACADEMIC/ TRAINING

Sokoine University of Agriculture
Phone: 255-023-263511
E-mail: Forestry@hhetan.gn.apc.org
Forestry@costach.gn.apc.org

University of Dar es Salaam Institute of Resource Assessment (IRA) (degree)

PO Box 35097, Dar es Salaam
Website: Email: fiti@africaonline.com
<http://www.udsm.ac.tz/ucb/institofresources.html>

University of Dar es Salaam
P.O. Box 65001, Dar es Salaam,
Telephone: 2140331, 2150302 Ext. 209
E-mail: principal@muchs.ac.tz

University of Dar es Salaam
P.O. Box 35064, Dar es Salaam
Tel: 255-22-2410462; 255-741-237774

Forestry Training Institute Olmontonyi
P.O Box 943, Arusha, Tanzania
Tel: 255-027-50441

Forestry Industries Training Institute (FITI) Moshi
PO Box 1425, Moshi, Tanzania. Tel: +255 27-2755016. Fax: +255 27-2753835.

Name and contact address of non-governmental organisations with operations in Tanzania

UNDP–
GEF East African Cross border Biodiversity Project
P.O. Box 1041, Arusha
Tel: +255 27 508398
E-mail: biodiversity@cybsnet.co.tz

Wildlife Conservation Society of Tanzania (WCST)
P.O. Box 70919, Dar es Salaam
Tel: +255-22-2124572

Arusha Non-Governmental Organisation Network (ANGONET)

Joint Environment and Development Management Action (JEMA)
Website: <http://www.africanconservation.org/jema/index.html>.
E-mail: terry@africanconservation.org

Tanzania Forest Conservation Group (TFCG)
Plot 312, Old Bagamoyo Road
Mikocheni B
P.O. Box 23410
Dar es Salaam, Tanzania
Tel: +255-22-2780737
Email: tfcg@tfcg.or.tz Website: <http://www.tfcg.org/index.htm>

TONGA**NATIONAL FOREST SERVICE**

National forest management is the responsibility of the Forest and Conservation Division of the Ministry of Agriculture and Forestry. Its responsibilities include policy and planning, forestry research, plantation forestry, agroforestry and conservation. A separate committee exists within the MAF to coordinate all agroforestry activities. The Ministry of Land, Survey and Natural Resources administers the Environment Act, and an Environmental Unit within the Ministry is responsible for environment and conservation matters. Under the provisions of the 1976 Parks and Reserves Act, a Parks and Reserves Authority was established in 1989 within the Ministry of Lands, Survey and Natural Resources to protect, manage and develop natural areas in Tonga.

TRINIDAD AND TOBAGO**NATIONAL FOREST SERVICE**

Forestry Division
Ministry of Public Utilities and the Environment
P.O. Bag 30
St. James
Port of Spain
Trinidad and Tobago
Fax: (868) 628-5503
E-mail: forestry@tstt.net.tt

RESEARCH INSTITUTIONS

Centre for Caribbean Land and Environmental
Appraisal Research (CLEAR)
The Office of Research
The University of the West Indies
St. Augustine, Trinidad and Tobago
Telephone: (868) 662-2002 ext. 2108/3314
Fax: (868) 662-4414
Web site: <http://sta.uwi.edu/clear/index.asp>

National Herbarium of Trinidad and Tobago
The University of the West Indies
St. Augustine
Trinidad and Tobago
Telephone: (868) 645-3509/662-2002 ext 3326
Fax: (868) 645-3509/663-9686
E-mail: trinherb@hotmail.com
Web site: <http://sta.uwi.edu/herbarium/>

**UNIVERSITIES, COLLEGES AND OTHER
TRAINING CENTRES**

College Of Science, Technology and Applied Arts of
Trinidad and Tobago (COSTAATT)
9-11 Melville Lane
Port of Spain
Trinidad
Telephone: (868) 625-5030/627-5946
E-mail: info@costaatt.edu.tt

COSTAATT comprises the following institutions:
Eastern Caribbean Institute of Agriculture and Forestry
(ECIAF)

John S. Donaldson Technical Institute (JSDTI)
Joint Services Staff College (JSSC)
Metal Industries Company (MIC)
Government Vocation Centre (GVC)
San Fernando Technical Institute (SFTI)
The NIHERST Colleges:
College of Health Sciences
College of Nursing
Information Technology and Business Management
College
School of Languages
General Education Division

Eastern Caribbean Institute of Agriculture and Forestry
(ECIAF)
Centeno via Arima PO
Trinidad, West Indies
Telephone: (868) 646-2650
Fax: (868) 646-3964
E-mail: eciaf@tstt.net.tt
Web site: <http://www.angelfire.com/zine/eciaf/>

University of the Southern Caribbean
P.O.Box 175
Port of Spain,
Trinidad, West Indies
Telephone: (868) 662-2241/2242/2206
Fax: (868) 662-1197
E-mail: admissions@usc.edu.tt
Web site: <http://usc.edu.tt>

University of the West Indies
St. Augustine Campus
St. Augustine
Trinidad, W.I.
Telephone: (868) 662-2002
Fax: (868) 663-9684
Web site: <http://sta.uwi.edu/>

NON-GOVERNMENTAL ORGANIZATIONS (NGOS)

Asa Wright Nature Centre (AWNC)
Asa Wright Nature Centre
7 3/4 Mile-Marker Arima-Blanchisseuse Road
P.O. Box 4710
Arima, Trinidad
W.I.
Telephone: (868) 667-4655
E-mail: asawright@tstt.net.tt
Web site: <http://www.asawright.org>

Caribbean Forest Conservation Association (CFCA)
77B Saddle Road
Maraval, Port-of-Spain
Trinidad and Tobago, West Indies
Telephone: (868) 622-2322
Fax: (868) 628-0273
E-mail: cfca@trinidad.net
Web: <http://www.cfcatt.org>

Caribbean Network for Integrated Rural Development (CNIRD)
40 Eastern Main Road
St. Augustine, Trinidad and Tobago
Telephone: (868) 662-6472
Fax: (868) 662-2612
Web site: <http://www.cnird.org/>

Council of Presidents of the Environment (COPE)
E-mail: info@cope.org.tt
Web site: <http://www.cope.org.tt>

Environment TOBAGO (ET)
PO Box 503
Scarborough
Tobago
Trinidad & Tobago, West Indies
Telephone: (868) 660 7462
Fax: (868) 660 7467
E-mail: envirtob@tstt.net.tt
Web site: <http://www.scsoft.de/et>

Friends of Botanic Gardens of Trinidad and Tobago
c/o Horticultural Services Unit, Botanic Gardens,
Cotton Hill,
Maraval
Trinidad and Tobago, West Indies.
E-mail: fobgott@yahoo.com
Web-site: <http://www.trinidad.net/fobgott>

Trinidad and Tobago Field Naturalists' Club
P.O. Box 642

Port-of-Spain
Trinidad and Tobago, West Indies
Telephone: (868) 687-0514
E-mail: ttfnc@wow.net
Web site: <http://www.wow.net/ttfnc>

TUVALU

NATIONAL FOREST SERVICE

Primary governmental responsibility for forestry in Tuvalu rests with the Forestry Division of the Department of Agriculture, itself a part of the Ministry of Natural Resources and Environment (MNRE). Also within the MNRE is an Environment Unit, which focuses on the environment in general. MNRE carries out environmental impact assessments in relation to development projects, however, these are not done in relation to overseas funded projects. The Ministry of Home Affairs and Rural Development deals with all issues related to village development and village by-laws that regulate resource use. All land on Tuvalu is under traditional ownership and regulated mainly by customary law. The government does not own any land, but can lease land for any 'public purpose' including for conservation projects.

UGANDA

NATIONAL FOREST SERVICE

National Forest Authority (Forest Department)
Plot 01, Spring Road-Nakawa P O Box 1752, Kampala,
Uganda.
Email: nbsfd@imul.com.

Uganda Wildlife Authority
PO Box 3530 - Kampala. Tel: +256 41 346287
Email: uwa@uwa.or.ug
Website: www.uwa.or.ug

National Environment Management Authority
Tel: 256 41 251064/5/8
Fax: 256 41 257521
Kampala - Uganda
email: info@nemaug.org
Website: <http://www.nemaug.org/>

RESEARCH

Uganda Forestry Resources and Institutions Center

P.O.Box7062
Kampala,Uganda
Tel:256-41-543204/543238
FAX: 256-41-533574
Email:ufric@starcom.co.ug

Forestry Resources Research Institute (FORRI)
PO Box 1752, Kampala, Uganda.
Email: foridir@infocom.co.ug

ACADEMIC

Makerere University
PO Box 7062 Kampala, Uganda
www.makerere.ac.ug/forestry/

Institute of Environment and Natural Resources
P.O Box, 7062, Kampala Uganda.
Email: muienr@infocom.co.ug
<http://www.makerere.ac.ug/makict/people/contacts.htm>

Institute of Environment and Natural Resources
Nyabyeya Forestry College
Tel. 256 - 465 - 20370;
Fax: 256 - 465 - 20370
E-mail: nfc@infocom.co.ug

NON-GOVERNMENTAL ORGANISATIONS WORKING IN FORESTRY

Nature Uganda

The East Africa Natural History Society
P.O.Box 27034, Kampala, Uganda
Tel: +256-41-540719;Fax: +256-41-533528
Email: nature@natureuganda.org

Wood Farmers Associations

Uganda Biodiversity Network (UBN)
E-mail: ugbiodnet@hotmail.com (No website yet).

Uganda Tree Farmers Association
National Association of Professional Environmentalists
(NAPE)
E-mail: napesbc@afsat.com
Website: <http://www.nape.or.ug/>

Uganda Women's Tree Planting Movement
(Established in 1985) (WOUGNET, 2006).
P.O. Box 10351, Kampala, Uganda
E-mail: uwtpm@yahoo.com

Uganda Forestry Working Group

Uganda Wood Farmers' Association

UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND

NATIONAL FOREST SERVICE

Forestry Commission GB and Scotland
Silvan House
231 Corstorphine Road
Edinburgh
Scotland
EH12 7AT
Telephone: (44) 0131 334 0303
E-mail: enquiries@forestry.gsi.gov.uk
Website: <http://www.forestry.gov.uk/forestry/>

NATIONAL RESEARCH AND TRAINING
INSTITUTIONS

Forest Research
Alice Holt Lodge
Farnham
Surrey GU10 4LH
00 44 (0)1420 22255
00 44 (0)1420 23653
research.info@forestry.gsi.gov.uk
<http://www.forestry.gov.uk/>

Forest Research
Northern Research Station
Roslin
Midlothian EH25 9SY
00 44 (0)131 445 2176
00 44 (0)131 445 5124
nrs@forestry.gsi.gov.uk
<http://www.forestry.gov.uk/>

UNIVERSITY FACULTIES/DEPARTMENTS
OFFERING FORESTRY OR FOREST-RELATED
TRAINING

University of Aberdeen
School of Biological Sciences,
Department of Agriculture and Forestry
Zoology Building,
Tillydrone Avenue University of Aberdeen Aberdeen
AB24 2TZ
(0)1224-272861
(0)1224-272396
bioscience@abdn.ac.uk

University of Edinburgh
College of Science & Engineering,
School of Biological Sciences,
www.biology.ed.ac.uk
Michael Swann Building
The King's Buildings
Mayfield Road
Edinburgh
EH9 3JR
(0)131 650 5525
(0)131 650 6556
biology@ed.ac.uk

University of Wales, Bangor
School of the Environment & Natural Resources
<http://www.senr.bangor.ac.uk>
Bangor
Gwynedd
LL57 2UW
Tel (0)1248 382281
Fax (0)1248 354997
e-m_senr@bangor.ac.uk

Inverness College
Scottish School of Forestry
www.school-of-forestry.org
Viewhill, Inverness. IV2 5EA
01463 273600
01463 792497
ssf@inverness.uhi.ac.uk

University of Central Lancashire
School of Natural Resources,
National School of Forestry
www.uclan.ac.uk/facs/science/forestry
Preston
PR1 2HE
(0)1772 201201
Or (0)1768 863791
01768 867249

NGOS CONCERNED WITH FORESTRY ISSUES.

There is a vast number of NGOs concerned with environmental issues, including forestry, but in order to restrict the numbers only those have been listed which support major forestry activities. A good source of NGOs concerned with the all UK (and European) environmental issues is the FERN database of NGOs www.fern.org/ngo_database. The UK list includes NGOs which are British-based but operate internationally.

International

Forest Peoples Programme
1C Fosseyway Business Centre, Stratford Road,
Moreton-in-Marsh GL56 9NQ, UK
website: www.forestpeoples.org
email: info@forestpeoples.org

Global Witness
PO Box 6042, London N19 5WP
website: www.globalwitness.org
email: jbuckrell@globalwitness.org

Rainforest Foundation UK
City Cloisters, 196 Old Street, London EC1V 9FR
website: www.rainforestfoundationuk.org
email: rainforestuk@rainforestuk.com

The Corner House
Station Road, Sturminster Newton, Dorset DT10 1YJ,
UK
website: www.thecornerhouse.org.uk
email: cornerhouse@gn.apc.org

WWF UK
Panda House, Weyside Park, Godalming, Surrey GU7
1XR, UK
website: panda.org and wwf.org.uk
email: brichards@wwf.org.uk

Practical Action (former Intermediate Technology
Group)
Bourton Hall, Bourton on Dunsmore, Rugby, Warwicks
CV23 9QZ, UK
www.practicalaction.org
enquiries@practicalaction.org.uk

Tree Aid
Bristol BS2 8ZZ
<http://www.treecouncil.org.uk/>

UK

Small Woods Association
The Old Bakery, Pontesbury, Shropshire SY5 0RR
www.smallwoods.org.uk

Tree Council
71 Newcomen Street, London SE1 1YT
www.treecouncil.org.uk

Woodland Heritage
PO Box 168, Haslemere GU26 1XQ

www.woodlandheritage.org.uk

Woodland Trust

Autumn Park, Dysart Road, Grantham, Lincs. NG31 6LL

www.woodland-trust.org.uk

VANUATU

NATIONAL FOREST SERVICE

The Department of Forestry was established in 1980 and recently restructured (1999) with the addition of a Forest Research Division and an Extension Forestry Division. It is responsible for the implementation of the national forest policy and the forestry legislation, as well as for issuing Timber Licenses and monitoring timber-harvesting operations according to the Code of Logging Practice. It is also in charge of collecting information about forest resources, conduct forest research and facilitate the development of commercial plantations and agroforestry systems. It provides advice on forest conservation, protected areas and National Parks.

ZAMBIA

NATIONAL FOREST SERVICE

Ministry of Tourism, Environment and Natural Resources (MTENR)
Office of the Permanent Secretary, Mr. Raphael Mulele
P.O. Box 34011, Lusaka, Zambia

Department of Forests, Ministry of Tourism, Environment and Natural Resources (MTENR)
Kwacha House, Cairo Road, Lusaka Zambia
Director: Mrs. Anna M. Chileshe Masinja
E-mail: forestry@zambia.zm; Annachileshe_masinja@yahoo.co.uk
Phone: 00-260-1-234375
00-260-1-226131
P.O. Box 50042
Lusaka, Zambia

Zambia Forestry College
Mwekera
Kitwe

Department of Environment and Natural Resources
Ministry of Environment and Natural Resources (MTENR)

P.O. Box 34011, Lusaka, Zambia
Kwacha House Annex, Cairo Road

The Environmental Council of Zambia (ECZ)
P.O. Box 35131
Plot No. 6971 Suez Road, Ridgeway, Lusaka
Lusaka, Zambia

NATIONAL RESEARCH INSTITUTIONS

Forestry Research Director (ZFRC)
P.O. Box 22099, Kitwe, Zambia
Obote Avenue
Main areas of research: Seed, plant growth, and plantation

Zambia Agricultural Research Centre (ZAREC)
P/Bag Chilanga,
Mount Makulu Research Station,
Kafue Road, Chilanga
Lusaka
Golden Valley Agricultural Research Trust
Lusaka, Zambia
Kabwe Road, Chisamba Area
Lusaka,

Natural Resources Development College (NRDC)
Lusaka
Great East Road, Chelstone area

The Copperbelt University
School of Natural Resources (SNR)
P.O. 31692, Kitwe, Zambia
Jambo Avenue
Riverside, Kitwe

The University of Zambia
Great East Road Campus
School of Natural Resources
P.O. Box 32379, Lusaka, Zambia

REGIONAL/PROVINCIAL FOREST SERVICES

Provincial Forest Extension Officer
Lusaka Province
Department of Forestry
Ministry of Tourism, Environment and Natural Resources
Lusaka, Zambia

Provincial Forest Extension Officer
Eastern Province
Department of Forestry

Ministry of Tourism, Environment and Natural Resources
Chipata, Zambia

Provincial Forest Extension Officer
Western Province
Department of Forestry
Ministry of Tourism, Environment and Natural Resources
Mongu, Zambia

Provincial Forest Extension Officer
North-Western Province
Department of Forestry
Ministry of Tourism, Environment and Natural Resources
Solwezi, Zambia

Provincial Forest Extension Officer
Southern Province
Department of Forestry
Ministry of Tourism, Environment and Natural Resources
Choma, Zambia

Provincial Forest Extension Officer
Northern Province
Department of Forestry
Ministry of Tourism, Environment and Natural Resources
Kasama, Zambia

Provincial Forest Extension Officer
Luapula Province
Department of Forestry
Ministry of Tourism, Environment and Natural Resources
Mansa, Zambia

Provincial Forest Extension Officer
Central Province
Department of Forestry
Ministry of Tourism, Environment and Natural Resources
Kabwe, Zambia

Provincial Forest Extension Officer
Copperbelt Province
Department of Forestry
Ministry of Tourism, Environment and Natural Resources
Ndola, Zambia

NATIONAL NGOS CONCERNED WITH FORESTRY ISSUES

The Commonwealth Forestry Association
Zambian Branch Coordination Office
Private Bag RW 359X
Ridgeway
15102 Lusaka
Zambia
E-mail: kawangavik@yahoo.co.uk
Website: cfa-international.org/zambia/index.htm
Phone: 00-26-096-439091

The Green Living Movement
Muyuni House, Kamwala area
Lusaka
Zambia

Wildlife and Environmental Conservation Association of Zambia
(WECAZ)
Plot No. 8471, Haile Sellasie Rd, Longacres
P.O. Box 30255
Lusaka
Phone: 254887/256564
Email: weslusak@coppernet.zm

Environment and Conservation Association of Zambia
(ECAZ)
Lusaka
ZNFU Building
Showgrounds
Lusaka
Timber Producers Association of Zambia (TPAZ)
Lumumba Road
Lusaka

Beekeepers Association of Zambia
Solwezi
Zambia
Handcrafts Producer Association of Zambia
(HAPAZA)
P.O. Box Lusaka
Astonia House
Kabelenga Road
Phone: 00-26-096-767854

Miapen Zambia Crafts
Vizimbili Community Centre
Kabwe Road
P.O. Box 34843
Lusaka, Zambia
Phone: 00-26-96767854
E-mail: miapencraft2000@yahoo.co.uk

Lusaka National Museum Nature Reserve
Education Department
Government Complex, Kamwala
Lusaka
Zambia
Phone: 00-260-1-228887

North Luangwa Wildlife Conservation and Community
Development Programme (NLWCCDP)
P.O. box 450210, Mpika, Zambia
TeleFax: 00-260-4-370623
E-mail: nlwccdp@zamnet.zm

