



# Commonwealth Forests 2010

An overview of the forests and forestry sectors  
of the countries of the Commonwealth



Commonwealth Forestry Association

# The African Development Bank

The African Development Bank (AfDB) has, since the late 1970s, supported forestry interventions in its Regional Member Countries (RMCs). A policy, guiding lending to the sector, has been in place since 1994 and focus has been on arresting deforestation and ecological degradation; promoting sustainable production of timber and non-timber forest products to meet local, national and international requirements; and, more recently, addressing the global issue of climate change.

The AfDB seeks to promote sustainable economic growth and reduce poverty on the continent, and the forestry sector is an important contributor in achieving these goals. Through its efforts to prioritise projects and programmes that promote national and regional cooperation, there are new initiatives encouraging countries to work together where trans-boundary forest resources require joint management action. The Congo Basin Forest Fund (CBFF) is one such initiative. Ten Central African countries are collaborating to address critical conservation and sustainable forest management in the Congo Basin.

Forestry is closely linked to agriculture, food security and sustainable water resources management. These are critical issues in many of the Bank's regional member countries. To date, the Bank has made significant investments in these sectors and remains committed to providing further support to its RMCs.

Increasingly, climate change is becoming a major threat to sustainable economic growth and poverty reduction. This could, ultimately, threaten political stability in some regions as competition over available natural resources increases. Africa is still highly dependent on fuelwood and charcoal as sources of energy and there are no obvious alternatives in the short term. This dependency will continue to exert enormous pressure on forest resources. Addressing this challenge requires both supply-side and demand-side interventions. While more plantations for fuelwood supply will be required, it is clear that more efficient technologies for using biomass will also be required. In addition, adoption of various renewable energy options is imperative in order to meet increasing energy demand.



**Dr Donald Kaberuka, President of the African Development Bank.**

# ...at work

In most AfDB regional member countries, the forestry sector has been adversely affected by increasing population growth, weak forestry institutions; and significant social, economic and political demands on forest resources. Conflicts and wars have, in some regions, created favourable conditions for illegal exploitation and destruction of ecosystems, exacerbated by the influx of refugees. Private sector operators continue to plunder forest resources without regard to environmental conservation and resource sustainability. Concessions and license holders need to be regulated and encouraged to adopt efficient extraction and utilisation technologies as well as sustainable forest management principles. Furthermore, they should be encouraged to be responsive to the social needs of affected communities as part of their corporate social responsibilities.

Many governments lack financial resources and the technical knowhow needed to implement cutting-edge forestry operations and projects. For countries that are well endowed with forest resources, high indebtedness tends to encourage some of them to overexploit their resource base in order to expand their current income streams. In others, poverty has led to encroachment on the forests for food production. It is imperative that the institution's regional member countries and their development partners work together to ensure that poverty reduction interventions meet environmental sustainability criteria. Financing and technical capacities for the sector should also be enhanced. Other sectoral interventions such as agriculture, infrastructure and irrigation should complement forestry sector investments to ensure sustainability.

Lastly, the Bank has noted emerging positive trends in the sector in some of its regional member countries. Such countries have reorganised their forestry institutions and reformed their forestry policies and laws to make them more responsive to current challenges. Many of them are delegating greater roles and responsibilities to local communities and the private sector in the management of their forestry resources. A greater appreciation of the global values of forests is also observable.

Against this background, the AfDB is optimistic about the sector's future. The Bank is committed to working with other development partners to ensure the sustainable management of Africa's forests.



# The African Development Bank

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# Commonwealth Forests 2010

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forestry sectors of the countries  
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The Crib

Dinchope

Craven Arms

Shropshire SY7 9JJ

England

E-mail: [cfa@cfa-international.org](mailto:cfa@cfa-international.org)

Telephone: +44 (0)1588 672868

Facsimile: +44 (0)870 0116645

Website: [www.cfa-international.org](http://www.cfa-international.org)

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## CLARENCE HOUSE

It was not so long ago that forests were seen as a source of raw materials; a way to meet our growing demand for timber and pulp. Today, there is a much greater understanding of the value of forests, both as a potential source of renewable natural resources and as an essential life support system.

Indeed, the more we learn about the cycles of Nature, the more we realize that the world's forests are vital to our long-term welfare. Forests store vast amounts of carbon – billions of tonnes – within their living matter and soils, locking it away and out of the atmosphere. Every year, more carbon is absorbed by forests, helping to reduce the effects of fossil fuel combustion. Forests also generate rain which helps to sustain farming and agriculture.

Equally important is the support that forests provide for most of the world's terrestrial biodiversity – that vast array of animals, plants and other life forms that share this small and fragile planet with us. We benefit too; a huge proportion of human cultural diversity is found in the world's dwindling forests. From the moist forests of Papua New Guinea and the dry eucalyptus groves of Australia to the cool temperate rainforests of Western Canada, many of the world's peoples who still live close to Nature rely fundamentally on forests to meet all of their needs, both physical and, of course, spiritual.

The people of the Commonwealth have a long history of forest exploration, documentation and use, all of which has been synthesized in this volume to enable the reader to gain a thorough understanding of our shared forest resource.

Forests form a major element of our common wealth; it is imperative that we continue to work together to find ways to protect, preserve and value them.

A handwritten signature in black ink, appearing to read 'Charles', followed by a long, horizontal, wavy line that extends to the right.





HRH The Prince of Wales



## Foreword

In the first edition of this excellent volume produced by the Commonwealth Forestry Association just three years ago, we learnt that the Commonwealth's forests are disappearing about 70% faster than the rest of the world's. In this re-evaluation the figures remain broadly the same. Are we doing enough? Clearly not!

It is high time for all Commonwealth countries to listen to forestry professionals and civil society groups, and take action to conserve standing forests, restore damaged forests and plant new ones. It is time to demonstrate the innovation, leadership and forest management know-how of which the Commonwealth is capable. We may never see a better opportunity.

At the November 2009 meeting of the Commonwealth Heads of Government in Trinidad & Tobago, important progress was made in building consensual positions on climate change. Although this did not convert into an agreement on emissions targets at the Copenhagen meeting of the UN Framework Convention on Climate Change (UNFCCC), the Copenhagen Accord did give special mention to forests and recognised their "crucial role of reducing emissions from deforestation and degradation".

The Accord called for the immediate establishment of a mechanism to reduce emissions from deforestation and forest degradation (REDD+) thereby storing and capturing more carbon and mitigating climate change. Such payments for ecosystem services could halve deforestation by 2030, cut emissions of carbon by 1.5 to 2.7 Gt per year, and provide long-term livelihoods for forest people. The Accord committed developed countries to provide substantial finance for this purpose, including US\$30 billion during 2010-12, and five countries committed US\$3.5 billion in interim financing to begin the process of building capacity for REDD+ immediately. With long-term benefits of trillions of dollars, this is a worthwhile investment!

Already the Commonwealth has shown its commitment to sustainable forestry in the Iwokrama International Centre, Guyana, where 370,000 ha of forest are under



management for combined low-level logging, ecotourism, research and community engagement under innovative financing schemes. Iwokrama is also pioneering measurement and valuation of forest ecosystem services. Ideas like this need to be multiplied across the Commonwealth.

As I write this Foreword the final preparations are being made for the 18th Commonwealth Forestry Conference in Edinburgh, Scotland. The Conference theme *Restoring the Commonwealth's Forests: Tackling Climate Change* catches the moment precisely and provides an unequalled opportunity for the Commonwealth to act. This book is being offered to participants as an introduction to some of the key issues to be discussed.

The time is right. We have the evidence base; we have international support for action; we have proven models that work, and we have the Commonwealth conference at which partnerships and plans can be laid. Let us all work together and put forests back where they belong, at the heart of a strategy for humankind's future.

Dr Mark Collins, Director, Commonwealth Foundation



**C**ommonwealth Forests 2010 is published by the Commonwealth Forestry Association (CFA) to coincide with the 18th Commonwealth Forestry Conference, 2010, held in Edinburgh. The theme of the Conference is *Restoring the Commonwealth's Forests: Tackling Climate Change* and thus the emphasis of *Commonwealth Forests 2010* is related to this, as a contribution to informing the debates of the Conference

The aim of this publication is also to quantify and describe the present state of forestry in the countries of the Commonwealth and, from this, to identify common challenges facing Commonwealth foresters and the opportunities arising from them. It also provides a great many links, not only on technical and policy-related issues but also to the forest services and research and training institutions of Commonwealth countries. This edition, like its predecessor will be put on the CFA website.

The Commonwealth is a voluntary association of 54 independent countries, Rwanda having joined in 2009. The Commonwealth's population has now grown to over 2 billion people, or 31% of the world's population. The countries of the Commonwealth, spread across all the continents, include some of the world's largest both in terms of area and 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 pioneers of scientific and sustainable forestry.

The first edition of *Commonwealth Forests* was published in 2007, based largely on 2005 data. This second edition incorporates figures updated from the FAO Global Forest Resources Assessment (FRA) 2010. There are two points to note concerning the new data which affect comparisons with figures from the first edition of *Commonwealth Forests*:

- Countries are the primary source of information; they may revise figures from previous assessments. For example, the figures quoted for a country in a previous FRA may have been extrapolated from an inventory made some years before; when a new inventory is made in or after 2005 the figures for that year will be revised – but will not be available until FRA2010.
- Definitions may change. FAO agrees definitions with countries at regular consultations; the main change that occurred which affects this report was the move from “plantations” to the more comprehensive “planted forest” (see *Chapter 1*).

The Commonwealth Forestry Association, which was founded in 1921, is the world's longest established international forestry organisation. It unites foresters, scientists, students, NGOs, planners and policymakers throughout the Commonwealth and beyond in a unique international network that provides professional support to its members and forms a key element in civil society debates. This new publication of the CFA provides facts and figures and useful contacts and references together with an analysis of the forestry sector and identification of the many challenges facing foresters of the Commonwealth. It is organised in three parts: the text, in eight chapters; the data in Annexes; and country information.

*Commonwealth Forests 2010* is a collaborative effort of foresters of many nations, who are recognised in the Acknowledgements. It does not pretend to cover all aspects of forestry, nor every Commonwealth country, and not all readers will agree with the aspects of the forestry sector that have been covered. Inevitably some of the information will be out of date by the time it is published, but we hope that readers will provide feedback to improve the balance and to update the information.



## INDIA'S FORESTS AT A GLANCE

### INTRODUCTION:

India is one of the 17 mega diverse countries of the world. Despite a high population (17% of world's population) and biotic pressure (18% of world's cattle) and the pressure of economic development, India is one of the few developing countries where the forest and tree cover continues to increase.



### STATE OF FORESTS

- The Forest Survey of India, Dehradun has published 11 biennial State of Forest Reports since 1987 based on satellite data supported by ground truthing.
- Scale of interpretation 1:50,000 (SFR, 2009).
- All forest and tree canopy patches down to one hectare are mapped.

### INDIA: VITAL STATISTICS:

Area	328.7 million ha
Population	1145 million
Livestock population	485 million
Plant species	45,500
Animal species	91,200

### FORESTS as per SFR, 2009

Forest Class	Area in million ha.	% of Total Geographical Area
Very Dense Forest (more than 70% canopy density)	8.35	2.54
Moderately Dense Forest (40% - 70%)	31.90	9.71
Open Forest (10%-40%)	28.84	8.77
<b>Total Forest Cover</b>	<b>69.09</b>	<b>21.02</b>
Tree Cover	<b>9.28</b>	<b>2.82</b>
<b>Total Forest &amp; Tree Cover</b>	<b>78.37</b>	<b>23.84</b>
Scrub	4.15	1.26
Non Forest	<b>255.49</b>	<b>77.72</b>
<b>Total Area</b>	<b>328.73</b>	<b>100.0</b>

### FOREST TYPES OF INDIA

The panorama of Indian forests ranges from evergreen tropical rain forests in the

Andaman and Nicobar Islands, the Western Ghats, and the north-eastern states, to dry alpine scrub high in the Himalaya in the north. Between these two extremes, the country has semi-evergreen forests, deciduous monsoon forests, thorn forests, subtropical pine forests in the lower montane zone and temperate montane forests.



Forest types	% of total forest area
Tropical /Dry Deciduous	38
Tropical Moist Deciduous	30
Tropical Thorn Forests	6
Tropical Wet Evergreen Forests	5.8
Others	20.2
<b>Total</b>	<b>100</b>

### FOREST MANAGEMENT

The earliest records of indigenous forest management in India date back to the *Atharvaveda* (12th Century B.C.). The foundation of present day forest management, based on the concept of "sustained yield", was laid in 1864 with the appointment of Dr Dietrich Brandis as Inspector General of Forests in India. The working plans are generally prepared for a period of ten to twenty years, and are generally restricted to selection cum improvement fellings. Clear felling has been given up in most forests except in existing plantations.



### CARBON SEQUESTRATION POTENTIAL

India's forests are a significant net sink of CO<sub>2</sub>. From 1995 to 2005, the carbon stocks stored in our forests and tree cover have increased from 6,245 million tonnes to 6,662 million tonnes, corresponding to the increase in forest cover thereby registering an annual increment of 38 million tonnes of carbon or 138 million tonnes of CO<sub>2</sub> equivalent worth US\$ 120 billion or Rs. 6,000 billion amounting to 11% of the total emissions of the country (Govt. of India brochure, August, 2009,



"India's Forest and Tree Cover – Contribution as a Carbon Sink").

### INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION

ICFRE, an autonomous body of the Ministry of Environment & Forests, Government of India is the premiere forestry research organization of the country. It is mandated to formulate, organize, direct and manage forestry research; transfer developed technologies to States and other agencies; and impart forestry education. ICFRE has its headquarter in Dehradun and has eight institutes and four regional centres to cater to the research needs of the different agro-climatic zones of the country.



### FOREST CONSERVATION POLICY

In order to arrest indiscriminate diversion of forest lands for non forest use, the Central Government enacted the Forest (Conservation) Act, 1980, inter-alia requiring prior approval of the Central Government for diversion of any forest land for non-forestry purposes. While approving proposals for non-forest uses of forest land, the schemes like compensatory afforestation, maintenance of safety zone, etc. are mandatory to mitigate the adverse impact of such diversions. The project proponent has to also pay the Net Present Value of lost environmental services, at a rate fixed periodically by the Supreme Court, into a Fund which will be used for improving the forest. Annual deforestation rate was .13 million ha during the 1970's and came down to 0.02-0.03 million ha per year after the Forest Conservation Act was imposed.



### NTFP MANAGEMENT

India has more than 3,000 species of Non Timber Forest Products (NTFPs), worth about Rs 42,000 million annually which are of great significance to rural livelihoods. More than half of the revenue of the Forest Department comes from NTFP extractions, and about 70% of the forest export incomes come from NTFP exports.





## FLAGSHIP SCHEMES OF GOVERNMENT OF INDIA

### • INTENSIFICATION OF FOREST MANAGEMENT

This scheme supports strengthening of forestry administration in the country by way of infrastructure development and technology induction. It also supports area-specific management interventions. The State Forest Departments have used this scheme for developing facilities like camp offices, forest barracks, maintenance and creation of patrolling paths and interior forest roads, better communication through mobile phones, PDAs, wireless, and field vehicles. The outlay for the 11th Five Year Plan (2007-2012) is Rs. 6000 million. The achievements over the last three years include:-



- (i) Creation and maintenance of fire-lines – 252,679 km
- (ii) Fire Watchtowers – 368 (Nos)
- (iii) Construction of Forest Roads – 3019 km.
- (iv) Erection of boundary pillars – 269058 (Nos)
- (v) Field operational vehicles – 656 (Nos)

### • JOINT FOREST MANAGEMENT (JFM)

Drawing from the National Forest Policy of 1988, the country launched an initiative for involving local communities specially women in jointly protecting, regenerating sustainably harvesting and managing the forests. This initiative of JFM has completed 20 years of implementation since the first notification by the Central Government in 1990. The village level committees are entitled to a substantial share of all incremental growth of timber, fuelwood, non-timber products etc. and also get incomes through wages for planting, weeding, cleaning and other operations.



- No. of JFM Committees : 106,000
- No. of people involved : 24 million
- Forest area under JFM : 22 million ha

This initiative has resulted in improving the health of the forest besides improving water conservation, and enhanced livelihoods of millions of people living inside forest and in fringes areas.

### • NATIONAL AFFORESTATION PROGRAMME (NAP)

Formulated by the National Afforestation & Eco-development Board (NAEB), this programme operates through a two tier structure of Forest Development Agencies (FDAs) at the district level and Joint Forest Management Committees (JFMCs) at the village level. Another tier has been added from 2010-11 by creating State FDA. Main objectives of the NAP are-

- Increase and/ or Improvement in Forest and Tree Cover (FTC)
- Rehabilitation of degraded forests and adjoining areas through participatory forest management
- Supplementing livelihoods by creating community assets, value addition to forest produce
- Capacity building of the communities for self sustenance of the program
- Various models of regeneration such as added natural regeneration, artificial regeneration silvi pastoral/pasture development etc.

During the first three years (2007-10) of the 11th five year plan, 0.55 million ha. have been proposed to be taken up for plantation. The annual plantation area ranges from 0.7 million ha. to 1.25 million ha. in recent years, totaling to around 30 million ha., of which around 10 million ha. is ascribed to private land.



### FOREST CERTIFICATION

Forest Certification has emerged as a voluntary market-driven mechanism in support of Sustainable Forest Management. A National Forest Certification Committee has been constituted to frame the policy guidelines for forest certification for timber and non timber forest products, and also to develop a mechanism to establish an independent National Forest Certification Council.



### Timber Trade

Total Industrial demand for wood in roundwood equivalent (RWE) is predicted to increase from 58 million cubic metre in 2000 to 153 million cubic metre in 2020, with over 50% supply coming from non forest sources. The import of timber and timber products has increased substantially from 2.45 million cubic metre in 2001, to 16.7 million cubic

metre in 2008, valued at Rupees 759 billion. Out of total production of 68 million cubic metre of wood, the production from state forests amount to only 12 million cubic metre, and 31 million cubic metre wood comes from outside the forest including imports. The contribution of forestry sector to GDP has been enhanced from 0.67% in 2007-08 to 1.70% in 2008-09, by adding the contribution of trees outside forest, estimated around Rupees 430 billion stock value.



### WILDLIFE CONSERVATION

India has 2.5% of the world's land area but supports around half of the world population of tiger, Asiatic elephant, one horned rhino, Indian gaur and snow leopard and the only population of Asiatic lion. There is a healthy network of 661 Protected Areas (PAs) encompassing about 4.8% of the geographical area of the country, forming the nucleus of the biodiversity conservation strategy of the country. Two major flagship programmes, namely Project Tiger (1973) and Project Elephant (1991) are being implemented to conserve these species along with their habitats and corridors, and to address man - animal conflict. As per the recent estimation, tiger population is 1411± 246, as against the total world's population of 3200 wild tigers. There is a healthy population of about 27,694 wild elephants.



National Parks	100	
WL Sanctuaries	514	
Conservation Reserves	43	
Community Reserves	4	
<b>Total</b>	<b>661</b>	
Project Tiger Reserves	39	Over-lapping with existing PA network
Elephant Reserves	27	
Biosphere Reserves	14	

### Wildlife Crime Control Bureau (WCCB)

The WCCB was set up in 2006 to combat wildlife related crimes, and its mandate includes collation and dissemination of intelligence along with setting up centralized wildlife crime data bank etc.





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*Finance Director:* Yvonne O'Donnell

*Finance Assistants:* Maria Picardo, Anita d'Souza

*Senior Consultants:* Derek Armandias, Jeffrey Fearnside, Michael Gaskell, Karin Hawksley, William Innes, David Penn





### Forest

The definition is that used in FAO's Global Forest Resources Assessment 2010<sup>1</sup>:

*Land spanning more than 0.5 hectares with trees higher than 5 metres and a canopy cover of more than 10%, 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 metres in situ. Areas under reforestation that have not yet reached but are expected to reach a canopy cover of 10% and a tree height of 5 metres 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 hectares and width of more than 20 metres.

**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.

### Primary Forest

*Forest of native species, in which there are no clearly visible indications of human activity, and ecological processes are not significantly disturbed.* (FAO, 2010)

<sup>1</sup> FAO 2010 Global Forest Resources Assessment 2010 (in press), FAO, Rome, Italy.

### Other Wooded Land

*Land not classified as forest, spanning more than 0.5 hectares; with trees higher than 5 metres and a canopy cover of 5-10%, or trees able to reach these thresholds in situ; or with a combined cover of shrubs, bushes and trees above 10%. 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 include areas of native species characterised 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.

### Outgrowers and Outgrower Schemes

Outgrower schemes are partnerships between small landowners (the outgrowers) and industrial companies, according to which the outgrowers raise trees on their own land to sell to the companies, usually at an agreed price and sometimes with support from the company.

### Acronyms and Abbreviations

**AFCS** Australian Forest Certification Scheme  
**AOSIS** Alliance of Small Island States  
**C&I** Criteria and Indicators

**CBD** Convention on Biological Diversity

**CBFM** Community-based Forest Management

**CDM** Clean Development Mechanism

**CFA** Commonwealth Forestry Association

**CGIAR** Consultative Group on International Agricultural Research

**CHOGM** Commonwealth Heads of Government Meeting

**CIF** Canadian Institute of Forestry

**CIFOR** Centre for International Forestry Research

**CITES** Convention on International Trade in Endangered Species of Wild Fauna and Flora

**COP** Conference of the Parties (of CBD, UNFCCC etc.)

**CPF** Collaborative Partnership on Forests

**CSA** Canadian Standards Association

**CMW** Commonwealth

**COFO** (FAO) Committee on Forestry

**EU** European Union

**FAO** Food and Agriculture Organisation (of the United Nations)

**FLR** Forest Landscape Restoration

**FMU** Forest Management Unit

**FSC** Forest Stewardship Council

**FRA** (FAO) Global Forest Resources Assessment

**GHG** Greenhouse gases

**Gt** Gigatonne (10<sup>9</sup>)

**Ha** Hectare

**ICF** Institute of Chartered Foresters (UK)

**ICRAF** World Agroforestry Centre

**IFA** Institute of Foresters of Australia

**IFF** Intergovernmental Forum on Forests

**IMFN** International Model Forest Network

**IPF** Intergovernmental Panel on Forests

**IPCC** Intergovernmental Panel on Climate Change

**ITTO/ITTA** International Tropical Timber Organisation/Agreement

**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 (India)

**JI** Joint Implementation

**KP** Kyoto Protocol (of the UNFCCC)

**LFCC** Low Forest Cover Countries

**M** Million

**MCPFE** Ministerial Conference on the Protection of Forests in Europe

**MDG** Millennium Development Goals

**MTCS** Malaysian Timber Certification Scheme

**NGO** Non Governmental Organisation

**NLBI** Non-legally Binding Instrument on All Types of Forests

**NWFP** Non-wood Forest Product

**NZIF** New Zealand Institute of Foresters

**OWL** Other Wooded Land (see definition above)

**PEFC** Pan-European Forest Process

**PFE** Permanent Forest Estate

**PFM** Participatory Forest Management

**REDD** Reduced emissions from deforestation and forest degradation in developing countries

**REDD+** As REDD, but with conservation, sustainable management of forests, and stock enhancement in addition

**REDD++** As REDD+, but with all terrestrial carbon in addition

**RIL** Reduced Impact Logging

**SCCF** Standing Committee on Commonwealth Forestry

**SIDS** Small Island Developing States

**SFI** Sustainable Forestry Initiative (North America)

**SFM** Sustainable forest management

**UKWAS** UK Woodland Assurance Standard

**UNCCD** United Nations Convention to Combat Desertification

**UNCED** United Nations Conference on Environment and Development (1992)

**UNDP** United Nations Development Programme

**UNEP** United Nations Environment Programme

**UNFCCC** United Nations Framework Convention on Climate Change

**UNFF** United Nations Forum on Forests

**WUI** Wildland Urban Interface

**WWF** World Wide Fund for Nature

**WSSD** World Summit on Sustainable Development (2002)

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# About Kenya Forest Service

Kenya Forest Service [www.kenyaforestservice.org](http://www.kenyaforestservice.org) is a State Corporation established in February 2007 under the Forest Act 2005 to provide for the establishment, development and sustainable management, including conservation and rational utilization, of forest resources for the socio-economic development of the country.

The Service has a workforce of 5,358 staff.

The Service's management structure comprises 10 conservancies that are ecologically demarcated, 76 Zonal forest offices, and 150 forest stations; 250 divisional forest extension offices are located countrywide.

The new law allows for joint management and concession arrangements through which the private sector and communities can engage.

## Importance of forests in Kenya

Kenya has 3.456 million hectares of forest cover which is equivalent to 5.9% of its land area. Out of these, 1.406 million hectares or 2.4% of total land area comprises of indigenous closed canopy forests, mangroves and plantations in both public and private lands. These forests play an important role in the country's water resource conservation, provide essential environmental services, habitat for diverse flora and fauna, offer cultural, spiritual and recreational opportunities, and provide a variety of food, medicines and wood.

In addition, forests make significant contribution to the economy buttressing

the agriculture, tourism, energy and manufacturing sectors.

## Kenya's forest products and industries

*Timber and wood products:* Forests especially those managed for commercial utilization meet the national timber needs. Key species grown for this purpose include *Cupressus lusitanica*, *Pinus patula*, *Eucalyptus grandis*, *Eucalyptus saligna*, and a variety of Eucalyptus clones. Kenya is currently witnessing the emergence of a vibrant private sector driven by the commercial forestry subsector.

*Non-wood forest products:* These are of critical importance to the livelihoods of rural communities and in some cases account for a significant share of household incomes. Some include gums and resins, honey, essential oils, frankincense, myrrh, fibres, medicinal and aromatic plants, dyeing and tanning materials. In addition, some indigenous trees like *Prunus Africana* and *Aloe* have the potential to earn Kenya a high income from international markets.

*Forest industries:* These manufacture products such as construction timber, paper, plywood, block boards, particle boards among others. They provide employment in the manufacturing, construction, transportation, and processing sectors thus contributing to improved livelihoods and incomes.

*Forestry and wealth creation:* Tree growing improves soil and water conservation, and soil fertility, which contributes to increased agricultural production. Wealth creation and employment opportunities are realized through farm production, development of forest-based industries and promotion of eco-tourism. Intensified farm forestry, commercial production of non-wood products and promotion of out-growers tree schemes supports forest industries and enhance industrialization and employment creation.

*Trade in forest products:* Trade is limited to the national level, while opportunities for export of forest products exist. Products include timber, paper products, carvings, gums and resins, charcoal and medicines. To facilitate entry into the international markets, KFS is promoting forest products certification and labelling for the wider market acceptability. In addition, the Service is promoting value addition for forest products and developing infrastructure for non-extractive forest uses.

*For more information, please contact:*

## Kenya Forest Service

P. O. Box 30513

00100 Nairobi

Kenya

Tel: +254 20 3754904/5/6 / +254 20 2396440 / +254 20 2502508

Fax: +254 20 2395512 / 2385374

Email: [info@kenyaforestservice.org](mailto:info@kenyaforestservice.org)

Website: [www.kenyaforestservice.org](http://www.kenyaforestservice.org)

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# Trees for Better Lives

Conserving, developing and  
protecting forest resources  
in Kenya for humanity



# The Forest Resource

By 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 national data). This figure, which refers to forests with a canopy cover of more than 10% and an area of more than 0.5 ha<sup>1</sup>, includes all types of forest from primary, undisturbed forest, through natural and semi-natural forests which have been modified by human activity, to planted forests. It also includes the area of forests in Rwanda (435,000 ha), which was elected to the Commonwealth in 2009.

The total area of forest in the countries of the Commonwealth appears to have increased slightly since 2005 when 808 M ha was reported in the first edition of *Commonwealth Forests*. The African regional total has increased most, largely because of an increase in the figure for Mozambique – possibly through the transfer of what was previously reported as Other Wooded Land (OWL) – but also because of the inclusion of Rwanda. The proportion of forest in Commonwealth

### BELOW

Canada has the largest extent of national forest estate in the Commonwealth and ranks three in the world.

<sup>1</sup> The full definition is in the glossary.

## Forests in Dependent Territories

BOX  
1.1

Australia, New Zealand and the UK have a number of Dependent Territories, whose forest areas have been excluded from *Table 1.1* and *Annex 2.1*. They are listed in *Annex 2.1*. Some of them, however, have forest or OWL; Niue (NZ), for example, has 19,000 ha of forest (FAO, 2010) and several others have significant areas of forest which may contain endemic species of animals or plants which are often threatened. An example is the Norfolk Island Pine (*Araucaria heterophylla*) which is endemic to the island of the same name, an External Territory of Australia, but whose conservation status according to the International Union for the Conservation of Nature and Natural Resources (IUCN) is vulnerable.

countries has remained the same as in 2005 (27%), as has the area of forest per head (0.4 ha).

Three Commonwealth countries: Canada (310 M ha), Australia (149 M ha) and India (68 M ha) are among the world's 10 countries with the largest extent of national forest estate. Other Commonwealth countries with more than 20 M ha of forest include Mozambique (39 M ha), Tanzania (33 M ha), Zambia (49 M ha) in Africa, and Malaysia (20 M ha) and Papua New Guinea (29 M ha) in South-east Asia. Forests also exist in what are not independent Commonwealth countries – see *Box 1.1*.

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: the Seychelles has 88% of its land area under forest, the Solomon Islands 79%, Guyana and St Lucia have 77% each, followed by Brunei Darrusalam (72%), St Vincent & the Grenadines (68%) and Zambia (67%). 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 20.6 ha of forest/head of population, Canada has 9.5 ha/head, Australia





7.3 ha/head, Botswana 6.1 ha/head, Belize 5.0 ha/head and Papua New Guinea 4.6 ha/head.

But measuring the adequacy of the forest estate to its people's needs has less to do with those 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 (LFCC), Small Island Developing States (SIDS) and on mountains are described in *Box 1.2*.

### Forests in LFCC, SIDS and on Mountains

BOX  
1.2

Forests in these three special situations have several features in common: first, the local people are highly reliant on them for products and environmental benefits; second, other people who live beyond the immediate environs of the forests benefit from them; third, the forests themselves are subject to the hazards of extreme climatic conditions; and last, they often represent genetic resources or natural ecosystems that are not found elsewhere.

LFCC have been defined by FAO as those countries with less than 10% of their land under forest. According to this definition there are 55 LFCC countries reported in FRA2005, of which nine are Commonwealth countries (listed 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. Indeed, some are not small, others are not islands and a few are not developing economies. SIDS were, however, given an international political identity with the establishment in 1991 of the Alliance of Small

Island States (AOSIS); and 27 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 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 Commonwealth countries in Africa (Kenya, Tanzania, Uganda, Cameroon), the Americas (only Canada), South Asia (India, Pakistan, Sri Lanka), South-east 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 non-wood forest products, and outsiders appreciate the scenic beauty and recreational facilities. Mountain forests are often culturally important where they enshrine sacred groves or trees.

**Sources:**

LFCC – FAO, 2000 and 2003;

SIDS – *International Forestry Review*, Vol. 4 (4), December 2002;

Mountain forests – website of the Mountain Partnership [www.mountainpartnership.org](http://www.mountainpartnership.org).



Forest Area in the Commonwealth, 2010

TABLE 1.1

Region	Forest			Other Wooded Land (OWL)**
	Area (000 ha)	% land area*	ha forest/head*	Area (000 ha)
Africa	197,713	26	0.5	149,624
Americas				
– Caribbean	1,243	43	0.2	328
– Central & North America	326,732	35	9.7	95,644
Total Americas	327,975	35	8.4	95,972
South Asia	73,424	19	0.1	5,011
South-east Asia & Pacific	210,993	24	3.3	143,153
Europe	3,058	12	<0.1	234
Total Commonwealth	813,163	27	0.4	393,994
Total World	4,033,060	31	0.6	1,144,687

Source: FAO, 2010.

Notes: \* land area and population 2006, from Annex 1.1;

\*\* Defined as land not classified as forest, covering more than 0.5 ha, with trees more than 5 metres high and a canopy cover of 5-10% (FAO, 2006a).

Trees are also found outside the areas defined as forests. Pandey (2008), for example, points out that in India trees have been planted outside forests for hundreds of years, but the resource was boosted after the initiation of social forestry programmes from 1980. Up to 40% of the targets were met through the distribution of seedlings to individuals and organisations, but a great deal was also planted by governments. Private wood-based enterprises also became involved, and encouraged farmers to grow timber through outgrower schemes (see below). It was estimated that tree plantations outside forests recently made up more than 70% of the total plantation area. Mango (*Mangifera indica*) comprises 11% of the growing stock, followed by coconut (*Cocos nucifera*) 5%, *Syzygium cumini* and *Azadirachta indica* (both 4%), suggesting that the main reason for planting trees was not for timber but fruit, shade or firewood.

Pandey (2008) discusses the ways in which Indian estimates of trees outside forests are obtained, but

states that methods are still based on tree numbers and there is no standardisation of methodology or ground checking. The resource is highly difficult to classify and inventory because it is so heterogeneous, and hence it is often difficult to develop policies for promoting tree planting or conserving what exists.

Due to the absence of a standardised methodology the estimates of trees on OWL are not as complete or reliable as on forests, but it is likely that OWL covers nearly 400 M ha in Commonwealth countries (Table 1.1). Such woodland may be unmanaged relicts of cleared forest, or may be systematically managed stands in agroforestry systems, among other forms. All may serve a number of environmental and economic functions, which may be similar to forests in principle if not in extent. But the regional totals, especially that of Africa, show the potential contribution of this resource to forest goods and services, which is often especially important to rural people, and to the poor in particular, who may rely on a wide range of non-timber forest products for their domestic energy and livelihoods.

#### ■ Forest characteristics and forest types

Most forests in Commonwealth countries have been more or less modified by human activities but some primary<sup>2</sup> forest remains – see Annex 2.2.

It may seem encouraging that 28% of the Commonwealth's total forest area in 2010 is primary forest, but most of that lies in Canada (over 165 M ha). Figures from those Commonwealth countries which reported on primary forests show that in Africa most of the primary forest was in South Africa, Malawi, Kenya and Ghana, while in South Asia India reported over 15 M ha and in South-east Asia and the Pacific significant areas were reported by Papua New Guinea (26 M ha),

2 Defined as forest of native species, in which there are no clearly visible indications of human activity, and ecological processes are not significantly disturbed (FAO, 2010).



Australia (5 M ha), Malaysia (3.8 M ha) and New Zealand (2 M ha). But large areas have been lost even since 2005 in Malawi, Sri Lanka, Australia and Papua New Guinea, as *Annex 2.2* shows, while it appears that Nigeria lost its final 300,000 ha between 2005 and 2010.

Commonwealth forests cover a wide range of natural forest types, from montane to mangrove and from boreal to tropical moist forest. *Annex 2.3* 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 country. 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 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, which accords with popular perception. *Box 1.3* 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 13 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 their conservation, research and the development of management practices for them lag behind.

Despite the 2002 International Year of Mountains, the importance of montane forests is also less well

appreciated. The goods and services they provide to the people who live near them, and essential services in maintaining water supplies to the people living downstream, are described in *Box 1.2*. 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 1.3*).

#### ■ Change in the extent of forest – and forest degradation

Change in the extent of forest, often called, 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.

Forest loss in the countries of the Commonwealth appears to have increased in the period 2005-10, having been more or less stable since 1990. The absolute area cleared in that period was nearly 3 M ha/year, or 0.36%, concentrated in Africa and South-east Asia and the Pacific. The figures may, however, be revised in subsequent assessments, since the current numbers have been affected by the figures from Australia, where remote sensing imagery has not distinguished between tree deaths and trees defoliated in large areas affected by the prolonged drought. If the figures for Australia are omitted the annual area lost from 2005 to 2010 falls to 2.015 M ha/year, at a rate of 0.3% – still an increase over 2000-05, but much less so.

There are, however, some more encouraging signs. The area lost in Africa seems to have continued to fall



## Two Climatic Extremes – Mangroves and Boreal Forest

BOX  
1.3

### Mangroves

The figures from the recent Global Forest Resources Assessment (FAO, 2010) showed that there are over 14 M ha of mangroves worldwide, of which Commonwealth countries account for nearly 6 M ha, or 40% of the world's total.

The boreal tundra woodland is influenced by cold arctic air and is 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.

Region	Area (000 ha)				Main countries (>100,000 ha)
	1990	2000	2005	2010	
Africa	2,091	1,987	1,963	1,948	Nigeria, Mozambique, Cameroon, Tanzania, Kenya, Sierra Leone
Americas	406	399	396	393	Bahamas, Belize
South Asia	1,102	1,093	1,090	1,129	India, Bangladesh (Sunderbans), Pakistan
South-east Asia & Pacific	1,302*	2,309	2,021	2,277	Australia, Papua New Guinea, Malaysia, Fiji
Total Commonwealth	4,901	5,788	5,470	5,747	

Source: FAO, 2010.  
Note: \* no figures given for Australia in FRA1990, whereas in 2000 it reported over 1 M ha.

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. An important service provided by mangrove forests is coastal protection against tidal surges and tsunamis. Unfortunately, many mangrove forests have been converted to salt pans, aquaculture ponds or agriculture, although several Commonwealth countries, including Bangladesh, India and Malaysia have shown increases in the area of mangrove forests in recent years.

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

### Canada's Boreal Forest

Canada's boreal forest covers 310 M 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*.

Sources:  
Mangroves – FAO, 2003, 2006(a) and 2010;  
Boreal – FAO, 2002 and Canadian Forest Service, 2003.

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 kilometres, 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; global warming is contributing to the outbreak of Mountain Pine Beetle in British Columbia, Canada (see Chapter 2).

Boreal forest is very important as a reservoir of carbon, which is stored not only above ground but also in the roots and especially the soil. The consequence of global warming will be reduction in area, or even loss, of some of the boreal forest and the release of greenhouse gases, including both carbon dioxide and methane – the latter is a greenhouse gas with a global warming potential more than 20 times greater than carbon dioxide. The boreal forests as a sink and potential source of greenhouse gases is, however, often overlooked; it has been called *The Carbon the World Forgot*, the title of an article by Carlson *et al.* (2009) which also describes the Canadian Boreal Forest Conservation Network under which, since 2001, nearly 50 M ha of boreal forest have been protected as parks and wildlife refuges.



**LEFT**  
Deforestation and land use change have important implications for climate change and the loss of diversity.

slightly while the figures for the South Asia region continue to increase. Country details are in *Annex 2.3*. There has too been evidence of a commitment to tackle illegal encroachment, including Uganda where the eviction of encroachers has been ordered by Presidential directive, and Kenya where the long-running dispute over illegal logging, charcoal burning and agriculture in the Mau Forest will be resolved through the relocation of about 30,000 families (*CFA Newsletter*, No. 47 of December 2009).

In addition, 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 US\$2,670 in 2002, and Malaysia US\$9,120, but Malaysia’s rate of forest loss increased, not decreased. On the other hand, *Chapter 2* shows that Malaysia scored well in many of the attributes of sustainable forest management.

*Annex 2.2* and *Table 1.2* show the change in the area of primary forest from 1990-2010 and 2005-10 respectively, i.e. forest of native species, in which there are no clearly visible indications of human activity and ecological processes are not significantly disturbed.

**Area and Change in Extent of Primary Forest, 2005-2010**

TABLE 1.2

Region	Area (000 ha)		% regional forest area 2010	% change, 2005-10
	2005	2010		
Africa	3,607	3,053	1.5	-15
Americas	172,928	172,928	52.7	0
South Asia	16,304	16,304	22.2	0
South-east Asia & Pacific	40,266	37,927	18.0	-5
Europe	13	13	0.4	0
Total	233,118	230,225	28	-1.2

Source: FAO, 2010.



Canada, with over 165 M ha (53% of its total forest area), has the most primary forest and this total has remained unchanged since 1990. The greatest absolute loss of primary forest has occurred in Papua New Guinea, where over 274,000 ha were deforested yearly between 1990 and 2000, a further 250,000 ha yearly between 2000 and 2005, and over 400,000 ha yearly between 2005 and 2010. Nigeria lost all of its remaining 300,000 ha between 2005 and 2010. Losses of primary forest appear to be continuing in Africa, but the evidence suggests that the rate of loss elsewhere has slowed (except for Papua New Guinea) or even stopped.

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% of all greenhouse gases released into the atmosphere each year – 1.6 billion tonnes – is from 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 whose negative impact on forests (and the climate) has been increasingly appreciated in recent years; for example, degradation causes the loss of biological diversity and a decline in biomass as well as soil erosion, it leads to economic losses of valuable timber species, it reduces recreational and cultural values, and is a major source of CO<sub>2</sub> and other greenhouse gases. Estimates vary of the extent of forest degradation: the International Tropical Timber Organisation (ITTO, 2002) considered that the total area of degraded forests and forest land in 77 tropical countries was 800 M ha, of which degraded primary

and secondary forest covered 500 M ha, while Lambin *et al.* (2003) estimated that the rate of forest degradation for Africa could be almost 50% of the annual rate of the continent's deforestation.

Degradation is the second "D" in REDD – reducing emissions from deforestation and degradation – and could thus be of great significance both for climate change mitigation and as a new source of forest funding for developing tropical countries. But if REDD is to be implemented under the revised Kyoto Protocol then degradation will have to be monitored; its definition, however, is proving difficult since different users have different objectives and perceptions which also complicate its measurement. The challenge was most recently addressed in a meeting of interested parties in 2009 which compared and analysed the various definitions from ITTO, the Convention on Biological Diversity (CBD), the UNFCCC and IPCC, the International Union of Forestry Research Organisations (IUFRO), as well as FAO (the hosts) and its Global Forest Resources Assessment (FAO, 2009). A generic definition, "the reduction of the capacity of a forest to provide goods and services", provides for the meantime a common framework for all of the definitions of international stakeholders and is also compatible with the ecosystem approach but clearly there remains more work to be done to harmonise the definitions.

It should be remembered that degradation can usually be reversed, since forests are a renewable resource, and thus there are links between forest degradation and the process of forest landscape restoration (discussed in *Chapter 2*).

#### ■ Planted forests

The concept of planted forests combines forest areas formerly called plantations and planted semi-natural forest respectively, which were considered separately before 2005 (FAO, 2006c). Both plantations and planted





semi-natural forest establish similar species (often using improved seed or clonal material), both use intensive establishment and management methods which often include thinning and pruning and, where the objective is wood production, both aim to grow material of uniform size and technical specifications.

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, and also for the provision of protective functions. Evans (2009) sounds a note of warning, however: "Planted forests, in all their variety, offer major opportunities but are no panacea to the ills that beset the world's forests at large...Tree planting and planted forests have a role to play and are part of the solution to these ills".

The total reported area of planted forests in the Commonwealth in 2010 was 32 M ha (see *Table 1.4* and country details in *Annex 2.6*). The Commonwealth total for plantations alone in 2005 was 14.2 M ha, so the increase of over 15 M ha due to the inclusion of planted semi-natural forest is considerable; it is largely explained by the new figures from Canada.

Planted forests make up 3.9% of the 2010 Commonwealth forest estate, compared with a global average of 6.5%, but the rate of increase in the Commonwealth planted forest area appears to be growing slightly in recent years. Most Commonwealth planted forests lie in South Asia (34% of the total), followed by the Americas (28%), nearly all of which lies in Canada (slightly less than 9 M ha). There is 18% of the total in South-east Asia and the Pacific, 12% in Africa and 7% in Europe.

Planted forest data should be treated with some caution since not all countries reported their plantation

**Change in Extent of Forest in the Commonwealth, 1990-2010** TABLE 1.3

Region	1990-2000		2000-2005		2005-2010	
	000 ha/yr	%	000 ha/yr	%	000 ha/yr	%
Africa	-1,889	-0.83	-1,868	-0.88	-1,854	-0.91
Caribbean	-1	-0.08	-1	-0.10	-1	-0.11
North & Central America	-10	n.s.	-10	n.s.	-10	n.s.
South Asia	75	0.11	389	0.54	85	0.12
South-east Asia & Pacific	-121	-0.06	-474	-0.22	-1,165	-0.54
Europe	19	0.67	11	0.36	7	0.24
Total Commonwealth	-1,927	-0.23	-1,953	-0.23	-2,939	-0.36

Source: FAO, 2010.  
n.s. = not significant.

area – the anomalous and low figures for Canada in 1990 being an example. Note too that rubber (*Hevea brasiliensis*) is included in planted forest areas above; the use of rubber wood for saw timber has been pioneered in Malaysia.

Commonwealth countries with the most planted forest are India (10.2 M ha), Canada (8.9 M ha), the United Kingdom (2.2 M ha), Australia (1.9 M ha), New Zealand and Malaysia (1.8 M ha) and South Africa (1.7 M ha).

**Area of Planted Forests in the Commonwealth, 1990-2010** TABLE 1.4

Region	Area of planted forests (000 ha)				% change/year 2005-10
	1990	2000	2005	2010	
Africa	3,021	3,308	3,684	3,941	1
Americas:					
Caribbean	25	25	26	26	0
Central & North America	1,359	5,822	8,050	8,965	1
Total Americas	1,384	5,847	8,076	8,991	1
South Asia	6,431	7,955	10,277	10,973	1
South-east Asia & Pacific	4,441	4,918	5,362	5,848	1
Europe	1,989	2,173	2,218	2,250	0
Total Commonwealth	17,266	24,201	29,617	32,003	1
Total World				264,001	

Source: FAO, 2010.



**ABOVE**  
Forest plantations such as Kielder in the UK were originally established to provide industrial timber.

Globally, planted forests constitute about 7% of the world's forest area, but may contribute up to 70% of the world's industrial wood and fibre (Evans, 2009). Within the Commonwealth there are several countries where planted forests are highly important in the provision of goods and services. In Africa they include Rwanda (86% of the forest estate), Mauritius (43%), Swaziland (25%), Lesotho (23%) and South Africa (19%). In Swaziland the planted forests are of great importance for the provision of timber, but in neighbouring South Africa they have a protective role on watersheds, as well as a productive function.

In Bangladesh planted forests make up 16% of the forest estate, where they are important for protection as well as the production of firewood, but in India,

despite the large area and high demand for all sorts of wood products, they only make up 15% of the forest estate. Some 99% of New Zealand's industrial wood came from plantations in 1997 (FRA2000) which made up 22% of the forest area, and industrial wood products are the third largest export, after dairy products and manufacturing. It 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 planted forests in Commonwealth countries. *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 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 being debated 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. abies*). 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 – discussed further in *Chapter 2*.

Evans (2009) discusses some of the other issues related to planted forests. They include:

- Sustainability questions, including their impact on the site and long-term productivity in later rotations. Good management, it is concluded, should reduce the threat of the former while there is no evidence, so far, of loss of productivity in subsequent rotations – again, with the proviso of sound management practices.
- Risks to planted forests from pest and diseases and fire (discussed in *Chapter 2*), from droughts and extreme weather events, and from climate change (which may lead to increases in all of the previous risks). Again, good management and not putting all of one's eggs in the same basket are essential for reducing the chances of suffering devastating loss.

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 cooperation 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, 2006b):

- India, Bhadrachalam Paperboards, eucalyptus pulp, 3,210 ha and 1,375 growers;
- Solomon Islands, Kolombangara Forest Products, sawlogs, 200 ha, 100 growers;
- Vanuatu, Melcoffee Sawmill, sawlogs, 100 ha, 50 growers;
- South Africa, Mondi Ltd, pulpwood, 5,900 ha, 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 increase in outgrower schemes reflects also the recent increase in ownership of planted forests by small holders, a trend noted in a FAO publication (FAO, 2006c).

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* (2001) is devoted to this topic.

#### ■ 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.

**ABOVE**

Street trees in Singapore – with half of the world's people now living in cities the need for urban tree planting is growing.

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). All of the population of Singapore and Nauru live in urban areas, 95% of the people of Malta do, 90% of the UK population, 88% of Australia's and 86% of New Zealand's (see *Annex 1.2*).

Many developing economies have at present low proportions of their people living in urban areas, but a rapid rate of urban growth: Uganda has an urban population of only 13% but a rate of urbanisation of 4.2%/year, while Malawi has 17% of its people living in towns and cities but a rate of urbanisation of 4.8%/year (*Annex 1.2*). 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 three temporal phases of urban tree planting in Malaysia are described in *Box 1.4*.

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 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. *Annex 2.6* shows that the countries with significant proportions of private forest in 2005 were:

- 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%) and New Zealand (37%);
- Europe – United Kingdom (64%) and Cyprus (39%).

In Fiji, Papua New Guinea and Vanuatu most of the forest is owned by customary landowner groups.

The ownership of OWL follows a similar pattern.

Many Commonwealth countries have been privatising planted forests 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 internationalisation followed privatisation – 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). Mozambique is actively promoting large-scale commercial afforestation tax and other incentives and has set aside 6 M ha of degraded savanna for this purpose. The target is South African forest industries which are running out of suitable sites in their own country (ICF, 2009).

#### ■ Summary

The forests of Commonwealth countries account for more than one-fifth of the world's forest area or over 800 M ha; the Commonwealth has the resource base to play a major role in the international dialogue on forests and forest-related issues.

### Urban Tree Planting in Malaysia

BOX  
1.4

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 nationwide 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.

From Sreetheran *et al.*, 2006.



For example, three Commonwealth countries (Canada, Australia and India) are among the world's 10 most forested countries while five more have forests covering more than 20 M ha each. Some 28% of the Commonwealth's forests are classified as primary forest, mainly in Canada but with significant areas in Africa and South-east 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 appreciated by policymakers. Other wooded land is another resource that is often omitted from national planning; it covers nearly 400 M ha in Commonwealth countries. It makes a significant contri-

bution to the livelihoods of many rural people but more studies are required to quantify it and the benefits it provides, especially to the poorest.

Loss is continuing in Commonwealth forests, apparently at a faster rate than in the period 2000-05 – whereas the world's deforestation has probably slowed slightly since then. Most of this loss has occurred in certain African and South-east Asian countries. The loss of primary forest continues too, in South-east Asia but to a lesser extent in certain African countries.

The outlook is, however, not entirely pessimistic. There has been a net gain of forest in some Asian countries, a transition from net deforestation to net reforestation. Commonwealth countries have a long history of planting trees and planted forests in now cover 32 M ha, or 3.9% of the Commonwealth forest estate compared with the global proportion of 6.5%. 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

#### RIGHT

The mangrove forests of many SIDS such as the Maldives are under threat from the effects of global warming.





livelihoods or rural people, but there implications for policymakers, 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 Dlomo, M. (2003), "Forests, economics and the development agenda", Paper, 12th World Forestry Congress, Québec City, 21-28 September 2003.
- Canadian Forest Service (2006), *The State of Canada's Forests 2004-2005*, Canadian Forest Service, Natural Resources, Canada.
- Carlson, M., Wells, J. and Roberts, D. (2009), *The carbon the world forgot: conserving the capacity of Canada's boreal forest region to mitigate and adapt to climate change*, [www.borealbirds.org/resources/carbon/report-full](http://www.borealbirds.org/resources/carbon/report-full).
- Evans, J. (ed.) (2009), *Planted forests: uses, impacts and sustainability*, CABI International and FAO.
- 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, [www.fao.org/DOCREP/004/AC131E](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.
- FAO (2009), *Towards defining forest degradation: comparative analysis of existing definitions*, FAO, Rome.
- FAO (2010), *Global Forest Resources Assessment 2010* (in press), FAO, Rome.
- ICF (2009), Newsletter of the Institute of Chartered Foresters (UK), Spring 2009.
- International Forestry Review* (2002) Vol. 4 (4) – special issue on Small Island Developing States.
- ITTO (2002), ITTO Guidelines for the Restoration, Management and Rehabilitation of Degraded and Secondary Tropical Forests, ITTO Policy Development Series #13, Yokohama.
- Lambin, E.F., Geist, H.J. and Lepers, E. (2003), "Dynamics of land-use and land-cover change in tropical regions", *Annual Review of Environmental Resources*, 28.
- Mather, A.S. (2007), "Recent Asian forest transitions in relation to forest-transition theory", *International Forestry Review*, Vol. 9 (1).
- 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.
- Pandey, D. (2008), "Trees outside the forest (TOF) resources in India", *International Forestry Review*, Vol. 10 (2).
- Sreetheran, M., Philip, E., Adnan, M. and Siti Zakiah, M. (2006), "A historical perspective of urban tree planting in Malaysia", *Unasyilva*, No. 223 Vol. 57, pp. 28-33.
- Unasyilva* (2001), issue on rehabilitation of degraded sites, No. 207 Vol. 52.

# Volvo Forestry Solutions

Demonstrating its commitment to forestry customers around the world, the Volvo forestry equipment range now includes four tracked carriers – FC2121C, FC2421C, FC2924C and FC3329C – and, introduced in September, 2008, initially into the North American market, three feller bunchers – FB3800C, the short tail swing FB2800C and the zero swing FBR2800C.

Developed from Volvo standard excavators, the tracked forestry carriers are designed as versatile, all-purpose machines. The great advantage of this design is that, depending on seasonality and weather conditions, these machines can tackle a variety of forest applications when not being used for harvesting; from forest road building, shovel logging, log loading, processing, stump harvesting for bio-energy to reforestation, and so the process starts all over again.

Designed for the tough demands of forestry work, Volvo heavy-duty tracked forestry carriers include protection for both the upper and lower structure, a purpose-built, “high-walker” undercarriage to manage difficult terrain and protection for all major components. The FC2421C can also be supplied with an optional “gull wing” panel opening system, providing unimpeded, easy access to the engine and components, for easy service and maintenance, ensuring maximum machine availability.

The more powerful and purpose-designed feller buncher carriers feature a well-matched, forestry hydraulic system with a dedicated pump to power the hot saw. Whilst these machines normally carry a heavy-duty felling head, they can also be equipped with a harvester head for cut to length operations. In addition to felling and processing applications, they can also serve as shovel loggers when working with large trees.

With operator safety never underestimated, all Volvo dedicated forestry machines feature a Volvo Forestry Care Cab, approved to OSHA, WCB, SAE and ISO standards. On the feller bunchers, the larger cab also provides sufficient space for the occasional trainer or trainee to be in the cab alongside the operator.

Alongside quality and safety, as Volvo core values, environmental care is never off the agenda, and perhaps never more appropriate than to the environment that is the forest. Volvo adapts a multi-pronged approach to fuel efficiency through the development of alternative fuels, engine development to continue to meet the ever more challenging emissions regulations, eco-operating programmes for machine operators, the development of systems that deliver fuel savings and, of course, hybrids.

As just one example of Volvo’s quest for ever more environmentally friendly solutions, Volvo’s Technology Transfer

division has been the major investor in the Swedish company El-forest AB, in the development of the world’s first hybrid forwarder, which was demonstrated on the Volvo stand at the last Elmia Wood dedicated forestry exhibition in Sweden.

Volvo’s strength in the forestry segment is derived not only from the provision of specialist forestry equipment, but also from the extensive range of products offered in the Volvo Construction Equipment product portfolio – wheeled and tracked excavators, wheel loaders, with an extensive range of wood handling attachments, haulers, graders, compact equipment and, of course, superior Volvo, Renault and Mack trucks – all of which have an important role to play in some part of the forestry process, from building forest access roads and harvesting, right through loading, transportation to mills and the handling of finished products for onward transportation.

For forestry customers around the world, this “total solutions” capability gives Volvo the opportunity to offer everything needed in mobile equipment and related services, both in terms of financial support from Volvo Financial Services to customer after-sales support. The focus of the “total solutions” concept is the best overall result on the customer’s bottom line, year after year.



Perfect partners – a Volvo tracked harvester and (background), one of the latest feller bunchers, which can also be equipped with a harvester head, for added versatility.



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# Sustainable Forest Management

By Jim Ball, Chair, Commonwealth Forestry Association

**S**ustainable Forest Management (SFM) has been defined 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” (ITTO, 2006).

The concept of SFM, which arose from the UN Conference on Environment and Development (UNCED) in 1992, thus includes social and environmental dimensions besides the economic aspects. This chapter therefore covers all aspects of SFM including not only conventional management for sustainable outputs but also the involvement of communities in management as well as the conservation of forest biological diversity and forest protection.

## ■ Forest management

### *The development of SFM*

The importance of forests for the sustainable supply of goods (not only timber, but also firewood) and services, especially watershed protection, had been recognised by the end of the 19th century. Forest reservation by national governments, 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 (Dawkins and Philip, 1998), while plantation techniques were developed for many other countries. But silvicultural systems for the management of other tropical moist forest types, such as the Malayan Uniform System, the Timber Stand Improvement of Uganda (also a uniform system) and the Tropical Shelterwood System of Ghana were not developed until the 1950s and 1960s. 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 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. An

**Management of the Production Tropical Permanent Forest Estate in some ITTO Member Countries, 2005 (% of area)** TABLE 2.1

Country	Natural forest		Plantation	
	Licensed concessions	With management plan	Sustainably managed	With management plan
<b>Africa</b>				
Cameroon	56	20	6	n.a.
Ghana	90	100	23	100
Nigeria	39	24	n.a.	47
<b>Asia &amp; Pacific</b>				
Fiji	n.a.	n.a.	n.a.	80
India	100	72	36	25
Malaysia	61	100	43	100
Papua New Guinea	64	57	17	n.d.
Vanuatu	n.d.	0	0	100
<b>Americas</b>				
Guyana	70	68	10	0
Honduras	67	42	12	58
Trinidad & Tobago	59	59	12	100

Derived from ITTO, 2005; n.a. = not available; n.d. = no data.



**LEFT**  
The concept of sustainable forest management arose from UNCED.

ITTO report showed that a very small area was, even in theory, under sustainable management (Poore *et al.*, 1989). But ITTO has subsequently issued a new report (ITTO, 2005) that gives a more encouraging picture. There has evidently been progress since 1989, when the authors had trouble finding even 1 M ha of sustainably managed natural forests. Instead at least 25 M ha were identified, and India and Malaysia alone accounted for 40% of that.

The criteria for SFM used in the ITTO study were the proportion of the forest area with valid licensed concessions, a current management plan or being sustainably managed according to the ITTO assessors. The study found that many more forests had management plans, but only 7% of the 352 M ha of the natural forests in tropical countries which were stated to be managed to produce timber, were in fact 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. *Table 2.1* and *Annexes 3.1* and *3.2* show

the situation of the management of the Permanent Forest Estate<sup>1</sup> (PFE) in the 11 Commonwealth countries that are ITTO members.

Management of the PFE with production functions in the 11 Commonwealth ITTO countries shows that there are high proportions of licensed concession and of forests with management plans, both in natural forest and plantation, although the area of natural forest believed to be sustainably managed is low.

Information on the presence of management plans in other Commonwealth countries is summarised in *Table 2.2*.

There are some unexplained discrepancies between the 2005 data in *Table 2.1* and that of 2010 in *Table 2.2*, notably for Fiji, Ghana, Malaysia, Nigeria and India. Whatever the reason for these differences, it does appear that most Commonwealth countries have a high proportion of their forests under working plan.

<sup>1</sup> Areas declared by governments to be permanently devoted to the practice of forestry – although they may not always have forest cover.


**Forest with Management Plan in Commonwealth Countries, 2010**

 TABLE  
2.2

Country	Management plan (% of forest area)	Country	Management plan (% of forest area)
<b>Africa</b>		Honduras	15*
Cameroon	39	Jamaica	13*
Gambia	16	<b>South Asia</b>	
Ghana	20	Bangladesh	60
Kenya	24	India	45
Lesotho	7	Sri Lanka	100*
Mauritius	23	<b>South-east Asia &amp; Pacific</b>	
Mozambique	2	Australia	21
Namibia	8	Fiji	1
Nigeria	41	Kiribati	2
Sierra Leone	3	Malaysia	45
South Africa	23	New Zealand	84
Swaziland	19	Papua New Guinea	17*
Tanzania	85	Singapore	100
Uganda	35*	Tonga	22
Zambia	23	<b>Europe</b>	
<b>Americas</b>		Cyprus	62
Belize	74*	Malta	100
Canada	70*	UK	65
Guyana	36		

Source: FRA2010 and \*2000 where data not reported in 2010.

### Criteria and indicators

Criteria and indicators (C&I) 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 SFM, 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 of good practice (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, [www.fsc.org](http://www.fsc.org)), but there are four national schemes: the Australian Forest Certification Scheme (AFCS, [www.forestrystandard.org.au](http://www.forestrystandard.org.au)), the Canadian Standards Association (CSA, [www.shopcsa.ca](http://www.shopcsa.ca)), the Malaysian Timber Certification Scheme (MTCS, [www.mtcc.com.my](http://www.mtcc.com.my)) and the UK Woodland Assurance Standard (UKWAS, [www.ukwas.org.uk](http://www.ukwas.org.uk)), which is not a certification scheme but provides a single common standard for use within those forest certification programmes that operate in the UK – largely the FSC and the Pan-European Forest Process (PEFC). There is also a North American scheme, the Sustainable Forestry Initiative (SFI, [www.aboutsfi.org](http://www.aboutsfi.org)), which is used by Canada. New Zealand has established its own National Standard, which is subject to independent verification.

An approximate estimate of the area of forest presently certified in Commonwealth countries, derived from Table 2.3, is 170 M ha in 2009, or nearly 21% of the Commonwealth's total forest area. It is mainly natural forest but also planted forests – see Chapter 1.

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 a public opinion survey carried out by the UK 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, 2005).

### Participatory 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 responsibilities<sup>2</sup>. 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 decentralisation such conflicts were vertical – between social classes – afterwards they were horizontal – within social classes (Madingou, 2003).

Such conflicts relate to the problems that have been experienced in ensuring that all members of a community have a voice and a share of the benefits. “Is community forestry really benefiting those who are most in need and those who continue to

**Forest Areas Certified for Some Commonwealth Countries, 2000-2009**

TABLE 2.3

Country	Area certified (000 ha)		
	2000	2005	2009
Australia	0	6,280	10,455
Belize	0	96	105
Cameroon	0	0	879
Canada	4,360	119,800	146,000
Guyana	0	0	372
India	0	0	644
Kenya	0	0	2
Malaysia	55	966	4,144
Mozambique	0	0	71
Namibia	0	0	328
New Zealand	363	620	1,047
Papua New Guinea	0	0	41
Solomon Islands	0	0	39
South Africa	828	1,169	1,638
Sri Lanka	0	13	23
Swaziland	0	101	117
Tanzania	0	0	36
Uganda	0	0	204
UK	958	1,500	1,576

Sources: FSC, AFCS, Canadian Forest Service, MTCC and UKWAS websites.

<sup>2</sup> Decentralisation refers to the shift of power to a lower level, often within the same organisation. 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.



struggle with marginalisation and exclusion?” asked Campbell (2009).

But participatory forestry is not only about wood supplies, forest conservation or social equity as described in *Box 2.1*. Akumsi (2003) has described a project in Cameroon (supported by the UK) in the development of community participation in wildlife management, including the lucrative bushmeat trade, 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 20 years ago, and now three different forest strategies have developed. In

England “community forestry” refers to the management of new and existing woodland in areas of urban regeneration for public benefit. In Scotland social activism and policy changes have led to a twofold model of urban regeneration, and community ownership and enterprise in rural areas. In Wales it has been led by rural communities with project funding (Lawrence *et al.*, 2009).

#### *Some recent Commonwealth initiatives in SFM*

There are two important global initiatives led by Commonwealth countries 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 (IIC) 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 IIC, which is dedicated “to develop, demonstrate, and make available to Guyana and the international community systems, methods and techniques for the sustainable management and utilisation of the multiple resources of the tropical forest and the conservation of biological diversity”, is an autonomous non-profit institution. It manages the Iwokrama Forest of nearly 371,000 ha 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. In its vision the IIC states that: “By 2010,

#### **The Impacts of Two Types of Participatory Forest Management**

BOX  
2.1

Participatory Forest Management (PFM) has been promoted throughout Tanzania as a means of achieving conservation and improving livelihoods. A study of nine villages in the Eastern Arc Mountains investigated the impacts of two institutional forms of PFM – Joint Forest Management (JFM) and Community-Based Forest Management (CBFM) – on the livelihoods of different well-being groups within communities. PFM was found to provide a new, though small, source of community-level income that was used to improve community physical capital. Household incomes from PFM forests generally increased slightly for most groups. However, technical and administrative obstacles prevented the poorest from taking full advantage of the benefits of forests under CBFM, while benefits from JFM-related income-generating activities were captured by village élites. Overall, the results suggested that PFM implementation has improved forest conservation but has not realised its potential to contribute to poverty reduction or social exclusion and, in the case of CBFM, may even be increasing the gap between rich and poor.

Source: Vyamana, 2009.

**BELOW**

The Iwokrama International Centre for Rain Forest Conservation and Development in Guyana is supported by the Commonwealth.

IIC intends to become the leading international authority on development of models for commercially sustainable, practical and community-inclusive conservation businesses based on tropical forests and their natural assets". The IIC mission is "to promote conservation and the sustainable and equitable use of tropical rainforests in a manner that will lead 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 programmes on: Climate Change; Sustainable Forest Management; and Eco-tourism – and cross-cutting support programmes on: 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.

The first phase of Iwokrama's research focused on the collection of baseline information to support management planning. Now Iwokrama is engaged in three large projects which build on the baseline information to provide a more holistic approach to cover all the ecosystem services that the forest provides. They are: the Forest Research Network; the Guiana Shield Initiative; and a programme focused on capacity building to support national initiatives in reducing deforestation and degradation in Guyana.



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# The International Model Forest Network: A Global Learning Network for Working-level Solutions to Sustainable Forest Management

By Peter Besseau, Christa Mooney and Nicolas Duval-Mace  
International Model Forest Network Secretariat

The question of how to involve different interest groups as active partners in finding working solutions to the many challenges of sustainable forest and landscape management inspired the creation of Canada's Model Forest Program in the early 1990's. In Canada, this was a period when the paradigms that had until then largely guided forest planning and management – generally via a partnership of government and industry - were being challenged by new voices and a more diverse set of forest values seeking to be part of the process of determining the future of forests. This transition continues in different degrees around the world today.

A Model Forest is a place, a partnership and a process. The place is a landscape or ecosystem-scale area; the partnership is voluntary and inclusive, from national policy makers to local farmers; and the process is a journey of dialogue, experimentation, and innovation designed to understand what “sustainability” means within a given landscape and then to use the partnership to work toward it. While the process must involve sound technical and scientific inputs, a considerable part of it involves understanding one another, the demands that we place on an ecosystem, and the tradeoffs involved in the choices we make. On that basis it is possible to make more informed choices, to draw fully from the intellectual capital represented by a rich and varied partnership, and, ultimately to make better choices.

## Model Forest Principles

Interest in the Model Forest concept outside of Canada led to Canada's announcement of the International Model Forest Network at UNCED, in

1992, which was followed by establishment of its Secretariat in Ottawa, in 1994. From an initial 10 sites in Canada and three sites abroad, the IMFN today has grown to include nearly 30 participating countries and close to 50 Model Forests around the world. While Model Forests represent extremely varied landscapes, forest types, political jurisdictions, and cultures, they all share a common, agreed-upon set of principles:

- Broad based, inclusive, voluntary partnerships
- A land base large enough to incorporate a broad range of forest uses and values, including social, economic and environmental concerns
- A commitment by all partners to work collaboratively in support of the conservation and sustainable management of natural resources and the forested landscape
- A governance structure that is representative, transparent and accountable to its members
- A program of work reflective of its partners' needs and values
- A commitment to knowledge sharing, capacity building and networking by sharing know-how and expertise with others

The sixth principle underpins the justification for a network of sites. Membership in the IMFN is designed to allow for the efficient movement of knowledge and know-how to accelerate innovation between Model Forests, and support and encourage opportunities for learning. Overseeing development of the Network is the IMFN Secretariat based at and supported by Natural Resources Canada's Canadian Forest Service in Ottawa. Funding for the Secretariat and some program support is also provided by the

International Development Research Centre (IDRC). Within the countries in which they are hosted Model Forests are the responsibility of the lead forest agency at a national or sub-national level: they provide the enabling environment, the financial support, and the political opportunity for such partnerships to convene and actively contribute to share ideas, perspectives, and opportunities for action around the sustainability challenge. Together with our partners around the world, one of the Secretariat's key objectives is ultimately to realize a dynamic global learning network that demonstrates concretely how landscapes and ecosystems can be managed on a sustainable basis through inclusive partnership arrangements.

## What do Model Forests Do?

At the local level, Model Forests bring diverse forest stakeholders together — particularly those who have traditionally been left out of the decision-making process — to openly discuss, plan, test and implement sustainable solutions to pressing economic, social and environmental issues. Frequently, the Model Forest partnership represents the only forum in a given region that draws together such varied stakeholders. It is also often the only forum through which the high-level policy objectives of SFM are translated into ideas and tasks that are accessible and do-able at the landscape level.

The program of activities found in Model Forests varies considerably across the Network because each stakeholder group defines what sustainability means in their particular context, and sets its own priorities. However, there are many common threads across the IMFN, including: education, forest science,



research, biodiversity conservation, sustainable economic development and participatory governance, among others.

### Local Implementation, Global Reach

While each Model Forest operates at the local level it simultaneously engages at the national, regional and global levels through membership in the IMFN and its various Regional Networks. In this capacity, key international forest issues, such as climate change, forest degradation or loss of biodiversity can be examined at a range of scales through coordinated research agendas or joint projects.

For example, the IMFN is currently exploring joint work in the area of in climate change vulnerability and adaptation research in sites across the boreal north linked through Model Forest communities and others. Elsewhere, an analogue forestry project involving five Model Forests in Latin America is examining biodiversity restoration and enhanced rural livelihoods. In addition,

Model Forests in the Mediterranean have expressed an interest in exploring issues such as forest fires and natural disturbances as common elements in their collaboration, while ongoing development of an African Model Forest Network is expected to result in decreased forest degradation and increased economic opportunities.

The theme of the 18th Commonwealth Forestry Conference, forest restoration, is also an area in which Model Forests are active. In Russia, the Kovdozersky Model Forest is looking at approaches, methods and technologies for forest restoration. In Argentina, the Formoseño Model Forest is working to protect and enrich forest cover with native species of high cultural value that also produce livestock forage. And in Brazil, Pandeiros Model Forest is establishing tree nurseries and reforesting degraded lands for soil conservation and regeneration of endemic vegetation.

Globally, the IMFN Secretariat leads Network-wide initiatives focused on

climate change, ecological goods and services, community sustainability and the development of an Internet-based market for sustainably produced goods in Model Forests as a way to support resource-based communities over the long-term.

Whether involved in local, regional or trans-boundary natural resource planning, Model Forests have demonstrated that both local stakeholders and decision makers at all levels must be an active part of the process of defining and delivering solutions on the ground. Ultimately, the range of issues that Model Forests address are not just developed or developing country issues; they are familiar in all our landscapes. Therefore both the range of issues considered and the options for addressing them are substantially enriched through broad-based local partnerships and their interaction with the broader IMFN global community of practice.

For more information on the International Model Forest Network, please visit [www.imfn.net](http://www.imfn.net).



International  
Model Forest  
Network

Landscapes

Partnerships

Sustainability

**The International Model Forest Network (IMFN) is a global Community of Practice whose members work towards a common goal: the sustainable management of forest-based landscapes.** The IMFN is made up of more than 50 Model Forests and 30 member countries across five continents.



Model Forests are based on a flexible approach that combines the social, cultural and economic needs of local communities with the long-term sustainability of large landscapes in which forests are an important feature.

By design they are voluntary, broad-based initiatives, linking forestry, research, agriculture, mining, recreation, and other interests within a given landscape. While each Model Forest sets its own priorities, common themes found across the IMFN include biodiversity, conservation, forest restoration, sustainable economic development, education and good governance. These common themes form the basis for networking, learning, and innovating from local to global levels.

*To learn more about the IMFN visit [www.imfn.net](http://www.imfn.net)*



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du Canada

Canada



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 has begun.
- 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](http://www.iwokrama.org) and detailed information on some of its programmes was included in *CFA Newsletter*, No. 34 of September 2006. Support from the countries of the Commonwealth for Iwokrama was specifically mentioned in the Commonwealth Climate Change Action Plan, issued by the CHOGM in 2007<sup>3</sup> and investment as Payment for Environmental Services (PES) in Iwokrama was described in *CFA Newsletter*, No. 41 of June 2008.

The second initiative in forest management of global significance is Canada's Model Forest Program, which

<sup>3</sup> See [www.thecommonwealth.org/document/34293/35144/173014/climateactionplan.htm](http://www.thecommonwealth.org/document/34293/35144/173014/climateactionplan.htm).

was launched in 1992. It emphasises the importance of engaging people with a direct interest in the forest in all aspects of forest management. According to the website, "A Model Forest is both a geographic area and a specific partnership-based approach to SFM". There are three basic elements underlying the Program: relevance to local values and needs; diverse and dynamic partnerships; and SFM. Science and technology support decision-making, along with education in the theory and practice of sustainable management. There are 14 Model Forests in Canada covering 19.8 M ha (see [www.modelforest.net](http://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](http://www.imfn.net)). A further eight countries, including India, are exploring the possibility of joining. Networking and learning from one another has been fundamental to the success of the Program.

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

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

- 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;



**LEFT**  
A meteorological station in a Model Forest Special Project Area in Canada's Yukon.

- Policy and administrative reforms are required, with reorientation of the attitudes of the staff of the forest service.

#### *Other developments in SFM of natural forests*

The ecosystem approach, which developed from the CBD, addresses the management of biological diversity in a range of ecosystems. An examination of this concept and SFM by 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".

Linked to the ecosystem approach is Close to Nature Forestry (CNF), described in a recent review by Bruenig (2009). The reviewer summarised CNF as an essential and very practical feature of an ecosystem-orientated management system for the conservation of natural, near-natural and plantation forest. He stated that it is neither an esoteric concept of foresters nor an abstruse philosophy of nature lovers nor a rigid and old fashioned silvicultural dogma.

Another recent development relates to Reduced Impact Logging (RIL) one of the techniques for tropical moist forest management. RIL includes directional felling, pre-exploitation climber cutting and the use of



logging arches. RIL helps provide suitable conditions for regeneration and also protects the site.

### **Planted forests**

Plantations or planted (enriched) semi-natural forest, now known collectively as planted forests (see *Chapter 1*), are crucial to the various developments in forest management described above. Most of the popular resistance to plantations of 15 or 20 years ago has been rationalised through better understanding of the need for planted trees to meet supplies of wood and fibre 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.

### **Guidelines for management**

The growth in planted forest area has led to the development of guidelines, such as the Voluntary

Guidelines for Responsible Management of Planted Forests (FAO, 2006). A national example is the Tree Planting Guidelines for Uganda, prepared by Uganda's Sawlog Production Grant Scheme, providing practical science-based advice for growing timber plantation crops by non-foresters. It is available on the SPGS website, [www.sawlog.ug](http://www.sawlog.ug).

### **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 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 ([www.iucn.org/themes/fcp/htm](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 by "forest corridors";
- 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.

An example of landscape restoration by means of forest corridors is from the Kinabatangan River in Malaysian Borneo. There the World Wide Fund for Nature (WWF) is working with the owners of oil palm plantations to restore the forest corridor that used to run along the river. It is hoped that this will help con-



serve such rare species as the Asian elephant, the orang-utan and the Sumatran rhinoceros which will contribute to the livelihoods of the neighbouring people through helping to conserve these species which are the “stars” of the local eco-tourism industry.

The Forest Landscape Restoration Implementation Workshop, held in Petrópolis in April 2005, was organised by the Global Partnership on Forest Landscape Restoration (GPFLR) – a network of governments, organisations, communities and individuals of which IUCN, WWF and the UK Forestry Commission are founder members. 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 identified 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](http://www.unep-wcmc.org/forest/restoration/globalpartnership).

An assessment of the potential land available for restoration was presented by the GPFLR at an international meeting in London in December 2009. For more information on the meeting and other work of the Partnership see: [www.ideastransformlandscapes.org](http://www.ideastransformlandscapes.org). Satellite imagery has been interpreted to produce a global map identifying more than a billion ha of former

**LEFT**

Involving local people from the outset is key to the success of forest restoration projects – villagers in northern Tanzania discuss the Hashi Forest project.



**Management of the Protection Tropical Permanent Forest Estate in some ITTO Member Countries, 2005 (%)** TABLE 2.4

Country	Attribution to IUCN Cat I-IV	For soil and water protection	With management plan	Sustainably managed
<b>Africa</b>				
Cameroon	68	n.d.	n.d.	n.d.
Ghana	49	n.d.	n.d.	108
Nigeria	100	n.d.	n.d.	n.d.
<b>Asia &amp; Pacific</b>				
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.
<b>Americas</b>				
Guyana	100	n.d.	25	25
Honduras	27	n.d.	n.d.	n.d.
Trinidad & Tobago	49	n.d.	20	n.d.

Derived from ITTO, 2005; n.d. = no data.

forest land and degraded forest land with restoration potential – about 6% of the world's total land area. The previous potential restoration area was believed to be no more than 850 M ha. The GPFLR believes that restoring forests to some of these lands could be achieved without prejudicing other vital land uses, such as food production, while providing livelihoods and

**Distribution of Botanic Gardens in the Commonwealth, 2006** TABLE 2.5

Region	Number of botanic gardens
Africa	88
Americas	122
South Asia	145
South-east Asia & Pacific	168
Europe	106
Total	629

Source: BGCI, 2006.

absorbing carbon. The GPFLR will now work with individual countries and local communities to deliver restoration where communities benefit and it is also carrying out an economic appraisal of three key elements of FLR projects worldwide to determine financial flows, economic flows and equity. Commonwealth countries involved include Malaysia (Sabah), Uganda, Tanzania and the UK.

### ■ Conservation

Responsible forest management incorporates not only wood production but the conservation of the site and its biological diversity. Most Commonwealth countries have set aside protected areas with the aim of protection of forest 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 tranquility; some are important for research and education while others can contribute to local economies through eco-tourism.

IUCN 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.

In a report on progress towards the CBD's 2010 and 2012 targets for protected area coverage in September 2009, it was noted that 13.5% of the world's forest area is included in nationally protected areas; however, 46% of the 670 WWF terrestrial eco-regions with forest cover have less than 10% of their forest areas protected (the full report is available at [www.unep-wcmc.org/protected\\_areas/pubs.htm](http://www.unep-wcmc.org/protected_areas/pubs.htm)).



Table 2.4 shows that, apart from Malaysia and the column on the attribution of protection areas to one of the IUCN conservation categories, there is a lack of data. This is in part 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). This is a network of protected areas covering an expanse of trans-boundary highlands which includes unique biological diversity – see [www.wwf.or.id](http://www.wwf.or.id).

Forests continue to surprise the world with hitherto undiscovered species. 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 plants have been bred, some have been distributed to major botanic gardens and they are even available for the public to purchase – see [www.wollemipine.com](http://www.wollemipine.com).

WWF has noted that the forests of Borneo (the Malaysian States of Sabah and Sarawak, and Kalimantan the Indonesian part of Borneo) contain plants which are potentially a “medical treasure trove” and 422 new plant species have been found in the last 25 years. Another example is from Papua New Guinea where in 2008 more than 40 previously unidentified species were found in the kilometre-deep crater of Mount Bosavi, a pristine habitat teeming with life that has evolved in isolation since the volcano last erupted 200,000 years ago.

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” ([www.bgci.org](http://www.bgci.org)), and based on that definition the data in Table 2.5 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 SFM

There are a number of threats to the practice of SFM, of which four – fire, attack by insects and disease, invasive species 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 South-east Asia and in 2002 and 2003 by severe fires near Canberra, Australia and in British Columbia, Canada. It is reported that 3.7 M ha of forest worldwide are currently affected annually by fire causing damage estimated at US\$107 million. 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/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 A\$80 million 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 C\$382 million 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

### Black Saturday

BOX  
2.2

In February 2009 a heat wave and high winds of more than 100 km/hour led to bushfires in Victoria, Australia, which killed 173 people and destroyed or severely damaged 5,500 buildings in several towns near the state capital Melbourne, with the insurance bill topping A\$1.12 billion. In the light of forecasts that the December 2009-February 2010 fire season could be particularly high risk the Government took exceptional precautions, including the preparation of "neighbourhood safe places" where people could go should fire threaten their homes. The authorities in Victoria have even proposed the electronic monitoring of known arsonists to prevent them from entering fire-prone areas.

Source: Reuters, 11 October 2009.





**LEFT**  
A fire truck moves away from out of control flames from a bushfire in Australia's Bunyip State Forest in 2009 – fires are a major threat to forests throughout the world.

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 JFM 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 mature elm trees (*Ulmus procera*) in the United Kingdom in the 1970s, from Dutch elm disease (*Ophiostoma ulmi*) spread by elm bark beetle *Scolytus scolytus* and *S. multistriatus*.



### Bacterial Bleeding Canker of Horse Chestnut

BOX  
2.3

Horse chestnut (*Aesculus hippocastanum*), which was introduced to the UK from Turkey 500 years ago, has become a highly popular ornamental and avenue tree with its well-shaped canopy, showy white flowers and prickly fruit containing shiny seeds popularly known as conkers. There may be between 1 and 2 million specimens nationwide.

But in recent years it has been attacked by an aggressive bacterial pathogen which is causing widespread death. The pathogen, which has been identified as *Pseudomonas syringae*, attacks the bark and cambium of the tree, causing cracks and cankers and, as the infection progresses, causing the wood to dry out, frequently leading to the fracture of

branches especially where a fork has been infected. There appears at present to be no means of management or chemical treatment to reduce fatalities; all sizes are killed and neither the white- nor the red-flowered varieties escaping – although a very few individuals may show resistance, for reasons that are as yet unknown. A recently developed treatment from the Netherlands, however, based on allicin (an extract of garlic) is being tested by English Heritage, which may offer some promise, but otherwise the maintenance of tree health is the best line of defence, since healthy trees appear to withstand attack better than unhealthy individuals.

Sources: Mabbett (2008); The Garden (2009); and the website of English Heritage [www.english-heritage.org.uk](http://www.english-heritage.org.uk).

The second is more recent: the infestation of mountain pine beetle (*Dendroctonus ponderosae*) in British Columbia, which attacks all pines. The cumulative area affected by the beetle was 14.5 M ha in 2008, and from 1998 to 2008 (inclusive) it killed an estimated 620 M m<sup>3</sup> of pine in British Columbia or almost half of the province's commercial pine. The outbreak is still spreading – into Alberta and the USA for example – but the rate of spread may have peaked in 2004 (see [www.canadaforests.nrcan.gc.ca/indicator/mountainpinebeetle](http://www.canadaforests.nrcan.gc.ca/indicator/mountainpinebeetle)).

Figures from New Zealand put the threat from pests and diseases into perspective. Forest industry in that country spends US\$0.60 per ha on monitoring pest and disease outbreaks, but US\$3.50 on fire protection. Yet the average yearly losses due to pests and disease is US\$137 million, compared with losses of US\$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 US\$44 million and was continuing to cause loss of increment valued at US\$14.6 million yearly (FAO, 2006).

### Invasive Mesquite

BOX  
2.4

*Prosopis juliflora* (mesquite), which was introduced to Kenya and several other countries to combat desertification, has itself become a problem, invading farmland and damaging farmers' livelihoods.

Now *P. juliflora* is the target of a government control programme after research by the Kenya Forestry Research Institute (KEFRI) found that up to 27 M ha of land were at risk from the plant. The study, carried out in Turkana district in north-west Kenya, also showed that a local acacia tree, *Acacia tortilis*, is declining by over 40% in some areas possibly because *P. juliflora* is displacing it.

Meanwhile the Kenya Forest Service is training farmers on how to live with the shrub, by using its pods for fodder and stems for firewood and charcoal.

Source: Science & Development Network, 2009.



### *Invasive non-native species*

A threat to forest integrity which has recently been recognised is posed by invasive non-native species. They are: “any species that are non-native to a particular ecosystem and whose introduction and spread causes, or are likely to cause, socio-cultural, economic or environmental harm or harm to human health” (see [www.fao.org/forestry/aliens/en/](http://www.fao.org/forestry/aliens/en/)).

The unintentional introduction of such animal or plant species has been helped by the increasing movement of people and goods worldwide. In the absence of their natural controls and competitors they may thrive and spread at the expense of native species, affecting entire ecosystems. But some invasive species have been intentionally introduced into ecosystems outside their native ranges to provide economic, environmental or social benefits – the introduction of ornamental plants to gardens for example. These species have then escaped to become serious problems in forests and other ecosystems.

There is concern in the forest sector that some of the tree species used for agroforestry, commercial plantations or desertification control are alien or non-native to the area and may escape. An example of a genus that has been introduced in many dry and semi-arid countries is *Prosopis*; it provides desertification control, restores degraded lands and can be used as firewood, but in several locations it is spreading almost uncontrolled into agricultural land, or choking irrigation canals – *Box 2.4* gives an example from Kenya.

Overall, there is a lack of information on invasive species and the forest ecosystems that they affect which is hindering the development of control techniques. Two networks have been established with FAO support in order to start to rectify this: the Forest Invasive Species Network for Africa ([www.fao.org/forestry/site/28240/en](http://www.fao.org/forestry/site/28240/en)) and the Asia-Pacific Forest Invasive Species Network ([www.fao.org/forestry/site/28241/en](http://www.fao.org/forestry/site/28241/en)).

### *Illegal logging<sup>4</sup>*

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 US\$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) – however, see *Box 2.5* over.

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 coordination;
- 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.

A possible constraint is that the cost of curbing illegal logging would lead to increases in the price of

<sup>4</sup> The special issue of *International Forestry Review* Vol. 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](http://www.illegal-logging.info).



### Australia and Papua New Guinea Fight Illegal Logging

BOX  
2.5

Formal agreement was reached in June 2009 between the two countries to join forces to tackle illegal logging, including working closely together on SFM and certification; the promotion of trade, investment and sustainable development, including improvements in verifying the legal origin of timber and timber products; and identifying areas for cooperation on climate change mitigation approaches.

Source: CFA Newsletter, No. 46 of September 2009.

timber, but this suggests that there is an economic incentive exists for legitimate producers to support measures to reduce illegal logging (Turner *et al.*, 2008).

Certification is part of, but not the complete answer to, combating illegal logging. The section on certification above has shown that probably more than 21% of the forests of the Commonwealth are already covered by certification schemes. However, they are 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 introduced 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, No. 28 of March 2005). Another approach has recently become available with the mapping of the tree genome, which allows the identification of genetic differences between individual trees, even of the same species, and the mapping of these differences according to their geographic location in a database. It is hoped that this approach will help the Singapore authorities to stamp out illegal logging, by proving where wooden furniture has come from (CFA Newsletter, No. 46 of September 2009). 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 plan than was the case 20 years ago, not only in the developed economies but in developing member countries, and more concessions are controlled by licence. Information is far from complete, and the existence 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. About 21% of the forest area of the Commonwealth is certified.

The global trend towards participatory processes has been reflected in forest management in several Commonwealth countries. Three initiatives: Joint Forest Management, the Iwokrama International Centre for Rain Forest Conservation and Development and the International Model Forest Network 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 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.

Illegal activities largely occur in developing countries, but combating them will involve 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.

A major factor affecting the implementation of sustainable forest management is climate change, which is already causing changes which lead to increased outbreaks of insect and diseases as well as fires, but also may lead to the spread of invasive species.

#### ■ References

- Akumsi, A. (2003), "Community participation in wildlife management: the Mount Cameroon experience", Paper, *12th World Forestry Congress*, Québec City.
- Asamaoah Adam, K., Pinard, M.A. and Swaine, M.D. (2006), "Nine decades of regulating timber harvest from forest reserves and the status of residual forests in Ghana", *International Forestry Review*, Vol. 8 (3).
- Bahuguna, V.K. (2005), "Participatory forest management in India: sharing governance with the people", *CFA Newsletter*, No. 31, December 2005.
- Brack, D. (2003), "Illegal logging and the illegal trade in forest and timber products", *International Forestry Review*, Vol. 5 (3).
- Bruenig, E. (2006), Review of Status of Tropical Forest Management 2005, *International Forestry Review*, Vol. 8 (3).
- Bruenig, E. (2009), *CFA Newsletter*, No. 44, March 2009.
- Campbell, J.Y. (2009), Guest Editorial, *International Forestry Review*, Vol. 11 (2).
- Dawkins, H.C. and Philip, M.S. (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*, Vol. 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](http://www.forest-trends.org), also reported in *CFA Newsletter*, No. 34, September 2006.
- Forestry Commission, UK (2005), Summary of Forestry Commission Statistics, [www.forestry.gov.uk/statistics](http://www.forestry.gov.uk/statistics).
- The Garden* (2009), the journal of the Royal Horticultural Society, July 2009.
- Handmer, J. (2003), In: *Australia burning; fire ecology, policy, and management issues*, (Cary G., Lindenmeyer, D. and Dovers S., eds), CSIRO publishing, Melbourne, p. 142.
- Hocking, D. (2003), "More on forest health", *New Zealand Tree Grower*, August 2003, pp. 27-28.
- 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 Organisation, Yokohama.
- Kumar, S. and Kant, S. (2003), "Community-based forest management in bureaucratic organisations: are they compatible?", Paper, *12th World Forestry Congress*, Québec City.
- Lawrence, A., Anglezarke, B., Frost B., Nolan, P. and Owen, R. (2009), *International Forestry Review*, Vol. 11 (2).
- Mabbett, T. (2008), "Bacterial bleeding canker in horse chestnut", *Quarterly Journal of Forestry*, Vol. 102, No. 4.
- Madingou, E. (2003), "Conflicts arising from the decentralisation of forest resources in Cameroon: the situation and perspectives", Paper, *12th World Forestry Congress*, Québec City.
- Mansur, E. and Zacarias, A. (2003), "From policies to practices: lessons from community forestry in Mozambique", Paper, *12th World Forestry Congress*, Québec City.
- Poore et al. (1989), *No timber without trees: sustainability in the tropical forest*, Earthscan, London.
- Science & Development Network (2009), (accessed on 3.12.09), [www.scidev.net/en/news/saviour-tree-turns-scourge-in-kenya.html](http://www.scidev.net/en/news/saviour-tree-turns-scourge-in-kenya.html).
- Shyam Sunder, S. (1995), "Wildlife conservation and forestry: concerns and policy developments in India", *Commonwealth Forestry Review*, Vol. 74 (1), pp. 35-40.
- Singh, R.V. (2006), History of participatory forest management in India, personal communication.
- Swamy, P.S., Kumar, M. and Sundarapandian S.M. (2003), "Spirituality and ecology of sacred groves in Tamil Nadu, India", *UnasyIva*, No. 213 Vol. 54, pp. 53-58.
- Turner, J.A., Buongiorno, J., Katz, A., Zhu, S. and Li, R. (2008), "Economic incentives exist to support measures to reduce illegal logging", *International Forestry Review*, Vol. 10 (1).
- Varmola, M.I. and Carle, J.B. (2002), *International Forestry Review*, Vol. 4 (2).
- Vyamana, V.G. (2009), "Participatory forest management in the Eastern Arc mountains of Tanzania – who benefits?", *International Forestry Review*, Vol. 11 (2).

# TRINIDAD AND TOBAGO

## OVER 100 YEARS OF FOREST MANAGEMENT



The foundation for the establishment of Forestry Division of Trinidad and Tobago was laid in **1901** with the formation of a one-man branch of the then Crown Lands Department. However, concern over forest resources could be traced even earlier to the eighteenth century, as in **1765**, the first, and probably the oldest, forest reserve in the Western Hemisphere – the Main Ridge of Tobago – was created by the Young Commission through the allocation of 2,475 hectares of land for “the protection of the rains”. This area is now managed by the Department of Natural Resources and the Environment, Tobago House of Assembly and is internationally acclaimed as a first-rate ecotourism site.

Further progress was realized in **1918**, when the one-man Branch was upgraded to the Forest Department and separated from the Crown Lands Department. In **1960**, the Forestry Department became the Forestry Division.

In the early years, the emphasis was on the survey and demarcation of forest reserves. This was then followed by the establishment of commercial timber plantations; primarily teak and pine. Teak was introduced in **1913**, followed by Caribbean Pine in **1946**. In **1932**, the Tropical Shelterwood System was introduced to regenerate the natural forest at the Arena Forest Reserve.

While forest management initiatives must by nature adopt a long-term perspective, forestry institutions must be able to respond promptly to local, national and international concerns. The Forestry Division's initiatives guided by a formal Forest Policy formulated in **1942**, strive to illustrate this dynamism, through the introduction and expansion of several key programmes.

In **1972**, the Northern Range Reafforestation Project was initiated to address widespread watershed degradation occurring in the Northern Range and consequent flooding of low-lying areas.

In **1977**, work was initiated to develop a system of National Parks and Protected Areas for sustainable management of these resources for recreational, historical, scientific and conservation purposes.

In **1997**, a programme to assist private land owners to grow and maintain forest trees on their holdings was started. This not only enhanced the landowners' assets but also assisted in rehabilitating watersheds and generating income in rural areas.

Within the last five years, major effort has gone into the development of a Strategic Plan for the Division and for the revision of the Forest Policy and formulation of a Protected Areas Policy. The Division has also begun work on a national forest inventory including the production of an updated forest cover map.

The current work programme of the Forestry Division encompasses three broad technical components, viz, forest management, parks and recreation and wildlife management. Work also extends to wetland restoration at Nariva Swamp, a project which is attracting international attention, for *inter alia* its carbon sequestration potential in combating global warming.

Like similar institutions in other countries, the Forestry Division of Trinidad and Tobago is making a determined effort to remain relevant to current concerns, especially looming environmental crises. Even so, challenges of outdated legislation and inadequate institutional arrangements must be confronted.

*Forestry Division*  
Trinidad and Tobago



## Benefits from the Forest

Original text for 2007 edition by Gary Q. Bull, Associate Professor, and Steven Northway, Research Scientist, Faculty of Forestry, University of British Columbia, Vancouver, Canada

Data updated and revision of text on Fuelwood and Employment by Jim Ball, Chair, Commonwealth Forestry Association

**T**his chapter describes the many tangible and intangible benefits that are derived from forests. It considers industrial products, such as sawn timber, panels and paper and then looks at fuelwood, a product that is often over-looked by policymakers and planners but is of (literally) vital importance to millions of people in developing countries as the source of domestic energy – and is becoming more important as a source of renewable energy in developed economies. Next, the chapter reviews non-wood products – also often 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, the chapter considers the intangible benefits – the environmental services that forests provide such as watershed control, the protection of farmland and livestock from the effects of the

**BELOW**  
Fuelwood is of vital importance to millions of people in developing countries such as Tanzania.

weather or the sequestration of carbon, and the social and cultural benefits that accrue from the production of these goods and services.

### ■ Industrial products

Figures for the production and consumption of industrial roundwood in Commonwealth countries are summarised in *Table 3.1*, extracted from *Annex 4.1*.

Industrial roundwood production in the Commonwealth in 2006 was 21% of the global total, the same as in 2004. The largest producer is Canada, by a long way; other significant producers include Australia, Malaysia, South Africa, India and New Zealand, but none of them have more than 15% of Canada's production.

The principle Commonwealth roundwood importing countries (more than 100,000 m<sup>3</sup>/year) are Canada, followed by India, UK, Bangladesh, Pakistan and Malaysia, while the principle Commonwealth roundwood exporting countries (more than 1 M m<sup>3</sup>/year) are New Zealand, Malaysia, 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 necessarily 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 *Table 3.2*; they include sawnwood, wood-based panels (plywood, particleboard, fibreboard etc.), pulp and paper and paperboard.

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, Australia and South Africa.

### 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 demand-

**Commonwealth Industrial Roundwood Production and Consumption, 2006 and 2004 (1,000 m<sup>3</sup>)**

TABLE 3.1

Region	Production		Consumption		Consumption /head
	2006	2004	2006	2004	2006
Africa	41,717	44,361	41,348	43,826	0.10
Caribbean	366	355	453	442	0.09
North & Central America	185,832	198,120	186,830	200,048	5.56
South Asia	27,038	22,801	31,664	25,255	0.02
South-east Asia & Pacific	72,976	71,281	57,357	56,659	0.90
Europe	8,105	8,049	7,876	8,065	0.13
Total Commonwealth	336,034	344,967	325,528	334,295	0.16
World	1,635,069	1,644,318	1,635,857	1,646,667	0.25

Source: State of the World's Forests 2009, FAO, Rome.

**Production of Processed Wood Products by Some Commonwealth Countries, 2006 and 2004**

TABLE 3.2

Country	Sawnwood (000 m <sup>3</sup> )	Wood-based panels (000 m <sup>3</sup> )	Pulp for paper (000 tonnes)	Paper and paperboard (000 tonnes)
Canada	58,709 (60,952)	18,189 (16,617)	23,481 (26,222)	18,189 (20,599)
India	14,789 (17,500)	2,554 (2,341)	4,048 (3,425)	4,183 (4,129)
Malaysia	5,129 (5,598)	7,767 (6,963)	124 (124)	941 (981)
Australia	4,784 (4,038)	1,989 (2,083)	1,153 (1,107)	3,221 (3,097)
New Zealand	4,269 (4,369)	2,223 (2,219)	1,562 (1,596)	944 (920)
UK	2,902 (2,783)	3,498 (3,533)	287 (344)	5,813 (6,442)
South Africa	2,091 (2,171)	726 (1,022)	2,915 (1,709)	1,793 (3,774)
Nigeria	2,000 (2,000)	95 (95)	23 (23)	19 (19)

Source: State of the World's Forests 2009, FAO, Rome.



ing 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 forest as a raw material sources to the profitability of the manufacturing sector. This means 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 phyto-sanitary 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 loca-

tions 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 both 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 regions of the Commonwealth, while *Annex 4.2* shows consumption by country.

Worldwide, fuelwood consumption increased between 2004 and 2006 by 6% and in Commonwealth countries by 4%. The consumption in Commonwealth countries represented 33% of total world consumption in 2006. Some country data are missing, however, and even where there are figures they are indicative only and in absolute terms may be unreliable.

Wood as fuel 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 0.59m<sup>3</sup>/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*). Wood energy consumption also increased in many developed



**Summary of Commonwealth Fuelwood Consumption, 2006** TABLE 3.3

Region	000 m <sup>3</sup>	m <sup>3</sup> /head* (2004)
Africa	236,783	0.59 (0.59)
Caribbean	598	0.11 (0.12)
North & Central America	3,855	0.11 (0.12)
South Asia	365,624	0.25 (0.28)
South-east Asia & Pacific	15,876	0.25 (0.20)
Europe	179	0.00 (0.00)
Total Commonwealth	622,915	0.30 (0.33)
World	1,871,450	0.28 (0.28)

Source: State of the World's Forests 2009, FAO, Rome.  
\* population data from Annex 1.1

economies, by 3.5% yearly between 2005 and 2007, with Australia and Canada both using significant quantities of woodfuel (UNECE/FAO 2009). A survey in the UK in 2009 showed that 1% of respondents said that they used wood as a fuel in their home, either on its own, or with other fuels. Of these, just over half said they were occasional users, and 12% used it as the main fuel for domestic heating (see [www.forestry.gov.uk/statistics](http://www.forestry.gov.uk/statistics)).

There have been two other recent developments in the use of wood as a fuel, both more “high-tech” than solid fuelwood. The first is the use of wood pellets, where sawdust, shavings and other residues are used; Canadian exports of wood pellets are expected to reach 10 M tonnes/year by 2010, with British Columbia contributing over 30% of that amount – mainly derived from the conversion of pine which has died as a result of mountain pine beetle attack (Roberts, 2008).

The second development is the growth in the use of ethanol as a form of renewable energy derived from sugar cane, grains such as maize or vegetable oil such as palm oil, driven by increasing prices for crude oil. The conversion of cellulose into ethanol is also being studied; while the feedstocks such as waste wood, recycled newsprint or short-rotation plantations or even grasses are (or could be) more abundant than the other sources, the processing cost is currently higher than for ethanol derived from other sources – although this is also set to decline with further research and economies of scale. Roberts *op. cit.* gives a useful resumé of the situation, but more recently issues have been raised

### The Importance of Fuelwood for Rural Domestic Energy in India

BOX 3.1

A survey in 2004-5 showed that firewood and wood chips were used by 75% of rural households in India, followed by liquefied petroleum gas (LPG) which was used by 9% and dung (9%). Only 1% of rural households had moved to other fuels from firewood and chips since the previous survey in 1999-2000 and even since previous surveys in 1983 (79%), 1987-88 (78%) and 1993-94 (78%), possibly due to slow economic development and/or the unavailability of alternative energy sources. The use of firewood in rural areas seemed to be unrelated to household income, suggesting that few people buy fuel, mostly collecting it themselves.

In urban areas, on the other hand, 57% of the households used LPG, 22% firewood and chips, 10% kerosene and the balance other fuels. The use of LPG had increased by 13% since the 1999-2000 survey, seemingly largely at the expense

Source: Singh, 2008.

of kerosene which decreased by 12%. Since the last survey the use of firewood had decreased only slightly, but by a great deal from 46% of households recorded in 1983 – an annual fall of 1% yearly, probably due to increasing urban prosperity.

It is projected that by 2020 the effect of increasing population, growing urbanisation and greater wealth the proportion of rural households using firewood will fall to about 65% – but the increase in population will still lead to an overall increase in fuelwood consumption of about 10%. If there are no interventions by the government then about half of that new demand will be met from state forests and the balance from trees outside forests; since demand for fuelwood already exceeds supply, then forest degradation will increase still further.



**ABOVE**  
Recent developments in the use of wood as a fuel include pellets made from sawdust, shavings and other residues.

concerning the impact of biofuels on food production – and natural forests.

### 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 cogeneration in industrial facilities.

In both developed and developing economies the property rights assigned to fuelwood are often very poor, the product 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<sup>1</sup>”. There is a vast range of non-wood 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)

<sup>1</sup> This is the working definition adopted by FAO in 1999. The evolution of the definition is described in “Towards a harmonised definition of non-wood forest products”, *Unasylva*, No. 198 Vol. 50, pp. 63-64.



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 specialised 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 (Non-Wood News, 2007). Some species such as the leaves of *Gnetum* spp.

and the fruits of *Irvingia gabonensis* are 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 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

## Rattan

BOX  
3.2

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, birdcages, matting and baskets. The market for rattan furniture in Europe, North America, Japan and other industrialised nations has grown steadily, and the trade in rattan furniture probably represents less than 4% 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 genera 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. Other producers include Sri Lanka and Bangladesh.

Source: Kumar and Sastry, 1999.

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 caesius* 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.



**ABOVE**  
Maple syrup is the most valuable non-wood forest product. In this operation in Quebec, Canada, the pipes connect individual trees to a central vacuum pump which collects the sap through a suction system.

sandalwood plantations – with some Indian companies investing there (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 C\$151.9 million 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 and Dyke, 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 dependent 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 worldwide 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 (No. 198 Vol. 50, p. 56) while *Non-Wood News* of FAO ([www.fao.org/forestry/nwfp/nonwood.htm](http://www.fao.org/forestry/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. But there are relatively few reliable figures to support this claim even for the formal economy, and even fewer for the informal economy. It has, however, been estimated (ILO, 2001) that for every job in the formal forestry sector there were one or even two jobs in the informal sector in developing countries in the late 1990s, mainly related to the production of fuelwood and non-wood forestry products.

*Annex 4.3* gives figures for employment in the forest and in primary production in the forestry sector for

some Commonwealth countries. The importance of the forestry sector in 2006 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 Malaysia (2.3%), Canada (1.6%) and New Zealand (1.4%) does the forestry sector currently account for more than 1% of the total labour force.

*Annex 4.3* also gives the 2006 breakdown of employment into categories: in the forest; in the primary manufacture of wood and wood products; and in the manufacture of paper and paper products. In the four developed economies of Australia, Canada, New Zealand and the United Kingdom, as well as in Malaysia, Ghana and Kenya, primary breakdown of wood is the main source of employment, whereas in the other developing economies it is employment in the forest – except for Bangladesh, where it is the manufacture of paper and paper products.



### LEFT

Forest nursery workers in India – employment is often quoted as one of the important forestry contributions to sustainable rural livelihoods.



The trends in total numbers employed in the forestry sector, as well as the percentage of the labour force employed in the sector, have been downwards since 1990 for most of the countries examined. For example, employment in the United Kingdom and Canadian forestry sectors fell by 37% and 14% respectively in that period, although it rose in Malaysia by 45%; some other developing economies also showed small increases, usually due to growth in primary processing. The loss of share in the total labour force was most marked in Canada (from 2.2% to 1.6%), South Africa (1.0% to 0.5%) and Papua New Guinea (0.9% to 0.4%). No country in fact increased its share of the total labour force since 1990; even in Malaysia it fell slightly from 2.4% to 2.3%.

Globally employment in the forestry sector fell by 1.1% yearly between 1990 and 2000, and by 0.5% yearly between 2000 and 2006, although in the first period tropical countries showed an increase of 1.6% yearly and in the second a decrease of 0.1% yearly. Globally, and on average over the last two decades, the numbers in the three employment categories are roughly the same, so that one job in the formal forestry activities supports 1.2 jobs in the wood industry and one job in the pulp and paper industry<sup>2</sup>. The sample of 17 Commonwealth countries is, however, too small and too heterogeneous to make meaningful comparisons with the global figures.

### Trends

Total employment in the forest sector has been falling since 1990 in the developed economies of the Commonwealth. This has not been the rule in the developing economies, where the employment in the

processing of wood products is increasing, possibly at the expense of the developed countries, and although this trend may be interrupted in the short term due to the global recession it will likely continue in the medium term. The proportion of the total labour force employed in the sector has, however, continued to fall, and despite possible "make work" schemes in the short term this is likely to continue to be the case.

### ■ 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 is, 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 words, 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.

<sup>2</sup> FAO (2008), *Contribution of the forestry sector to national economies, 1990-2006*, Forest Finance Working Paper FSFM/ACC/08, FAO, Rome.





### *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, and the trends in many Commonwealth countries will be for an increase in their use as a mechanism to manage for these services. There are a number of potential advantages: 1. the transaction costs should be lower; 2. new policy actors (e.g. industry, NGOs, foundations) can participate with traditional actors (levels of government and banks) in finding a more acceptable solution to an environmental challenge; 3. there is scope for market rigor in terms of accountability and transparency.

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

### ■ **Socio-cultural benefits**

Increasingly the forest industry has recognised that in many areas it needs a social licence to operate, particularly on public land and that culture, 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 social-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 recognised 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 an 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 the socio-cultural issues. There have been efforts to create many joint venture companies, to develop skills training programmes, 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.

### ■ **Conclusions**

1 The consumption of fuelwood in Commonwealth countries, at over 600,000 m<sup>3</sup>/year, is nearly double 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, 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 usually unquantified, contribution of 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. If 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 Williams, A. (2003), "The case for bushmeat as a component of development policy: issues and challenges", *International Forestry Review*, Vol. 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 Dyke, A. (2006), *Wild harvests from Scottish woodlands*, Forestry Commission, Great Britain (available online at [www.forestresearch.gov.uk](http://www.forestresearch.gov.uk)).
- ILO (2001), *Globalisation and sustainability: the forestry and wood industries on the move*, [www.ilo.org/public/english/dialogue/sector/techmeet/tmfwi01/tmfwir.pdf](http://www.ilo.org/public/english/dialogue/sector/techmeet/tmfwi01/tmfwir.pdf).
- Kumar, A. and Sastry, C.B. (1999), "The international network for bamboo and rattan", *Unasylva*, No. 198 Vol. 59.
- Roberts, D.G. (2008), "Convergence of the fuel, food and fibre markets: a forest sector perspective", *International Forestry Review*, Vol. 10 (1), pp. 81-93.
- Non-Wood News*, No. 14, (2007), FOIP, 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*, No. 198 Vol. 59.
- Singh, K. D. (2008), "Balancing fuelwood production and consumption in India," *International Forestry Review*, Vol. 10 (2), pp. 190-200.
- UNECE/FAO (2009), Workshop on "Current and future woody biomass for energy – monitoring use and understanding technology", 15-16 September 2009, Riga, Latvia. 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*, Vol. 5 (2).



**Australian Government**  
**Department of Agriculture,  
 Fisheries and Forestry**

**The Australian Department of Agriculture, Fisheries and Forestry's role is to develop and implement policies and programs that ensure Australia's agricultural, fisheries, food and forestry industries remain competitive, profitable and sustainable.**

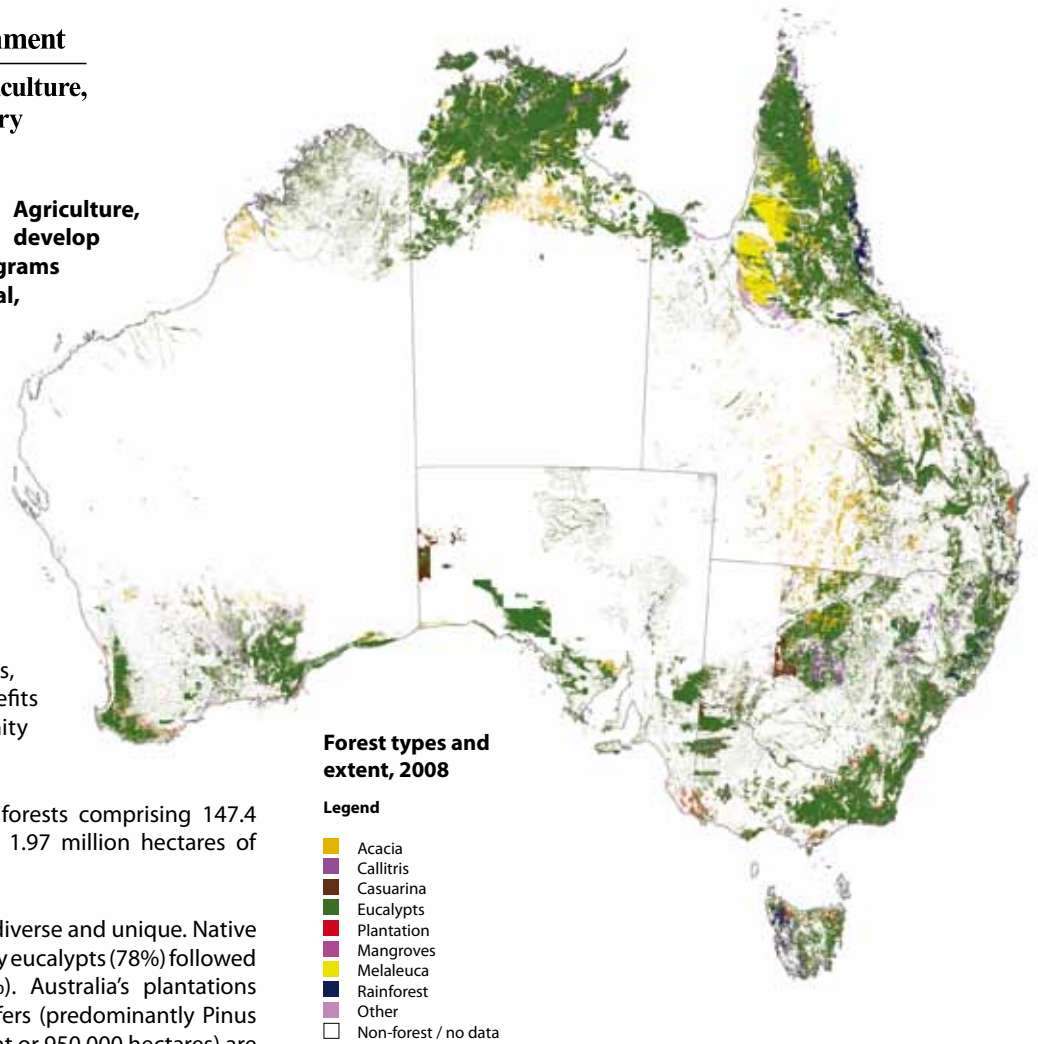
A goal of DAFF is to assist Australia's forestry industry to grow, improve and capitalise on new opportunities while protecting the environment and contributing to the prosperity and quality of life in rural and regional Australia. While forests will continue to provide sustainably produced wood products, they will increasingly provide other benefits such as carbon sequestration, salinity control and biodiversity conservation.

Australia has 149 million hectares of forests comprising 147.4 million hectares of native forests and 1.97 million hectares of plantations.

Australia's native forests are extremely diverse and unique. Native forest types in Australia are dominated by eucalypts (78%) followed by acacias (7%) and melaleucas (5%). Australia's plantations are made up of about half exotic conifers (predominantly *Pinus radiata*), while the other half (48 per cent or 950,000 hectares) are hardwood (predominantly eucalypt) plantations.

About 23.0 million hectares of Australia's public native forest is held in nature conservation reserves, and 9.8 million hectares is available for timber harvesting.

In 2007-08, the value of turnover of Australia's forest products industries was estimated at A\$23 billion. The number of people employed in forestry, logging and wood manufacturing in 2007-08 was 76,800.





# Forest Policy, Law and Administration

By Jim Ball, Chair, Commonwealth Forestry Association

**T**he 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 sometimes been in the forefront of these changes, at other times have reacted to them. It also includes information on the various forestry associations in the Commonwealth and technical publications related to forestry published in Commonwealth countries.

## ■ Policy

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

- A change in focus from wood production towards much broader environmental, social, economic and cultural issues;
- Devolution of responsibility for forest management;
- Involvement of the public in policy development;
- Provision for community involvement in forestry;
- Privatisation especially of plantations; and
- The acceptance of the concept of National Forest Programmes<sup>1</sup> as an aid to policy development and planning.

New interest groups have driven many of these changes; they range from forest-dependent villagers in developing countries to investors in global carbon markets, from urban families who look to forests for recreation to the owners of small woodlands, from environmental NGOs to communities. They all share a common interest in having a say in the management of the forest, or even in ownership.

<sup>1</sup> The term National Forest Programme (NFP) describes the wide range of approaches to the planning, programming and implementation of forestry activities, including policy development, mechanisms for implementation and the collection of reliable data and information through forest inventories and sector studies. A 2006 issue of *Unasylva* (No. 225 Vol. 57) was devoted to NFPs.

Several Commonwealth countries have revised their forest policies and the related legal framework with the participation of relevant stakeholders to allow greater community involvement in forest management. Provision for the devolution of control to the level of communities has been made in the forest policies and legislation of several countries, including Canada, Ghana, India, Uganda and the UK.

Public participation 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) and more recently the development of Canada's Forest Strategy 2003-08 used the internet to reach a large number of stakeholders, including remote communities and young people (Cinq-Mars, 2006). Coates and Fenton (1999) describe the uses of social assessment to incorporate social issues in the development of policy 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, and Mauritius included public participation in reaching consensus on its new forest policy in 2006.

Countries are now much more sensitive to public opinion in developing and revising forest policies. For example, the UK Forestry Commission carries out regular surveys of public opinion of forestry; the latest, in 2009, showed that 98% of respondents selected at least one public benefit as a good reason to support forestry with



public money. As in previous years the three top reasons to support forestry were: “to provide places for wildlife to live”, “to help tackle climate change” and “to provide places for recreation”. In general, support for each benefit was higher in 2009 than in previous years (see [www.forestry.gov.uk/statistics](http://www.forestry.gov.uk/statistics)).

### ■ Administration

A section of a recent publication on forestry agencies is entitled “Public sector forestry agencies at the cross-roads: are they fading into irrelevance?” (Nair, 2008). This title encapsulates those institutional weaknesses of forest services in the public sector that have become apparent in recent years, such as inability to deliver results efficiently, failure to recognise the needs of those who depend on the forest for their livelihoods, reluctance to react to new demands for representation in decision-making or involvement of the private sector, and an inability to recognise that the days of top-down approaches to forest management have been overtaken by new political developments. In response, the arrangements for the administration of many national forestry sectors have been marked by decentralisation, devolution or corporatisation.

Decentralisation, or the shifting of responsibility downwards within an organisation, 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, Great Britain (to Scotland, Wales and England). There has been a movement towards the separation of regulatory and strategic roles from implementation functions: generally the national body is responsible for the national forest policy and national laws related to forests (including conservation and protection) and forest products, for training and (sometimes) for



research, 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.

**ABOVE**  
Coppiced woodland in Formakin, Scotland, UK – several Commonwealth countries have revised their forest policies to allow greater community involvement in forest management.



**ABOVE**  
In Jamaica  
the Forestry  
Department is  
being transformed  
into an Executive  
Agency.

Devolution, or the transfer of power from the centre of an organisation outside that body to local bodies or communities, also reallocates rights and responsibilities and redistributes the benefits – and the risks. The rationale is that it will lead to increased efficiency, equity and participation at the local level by transferring decision-making to those most directly affected – often

called the “stakeholders”. Joint Forest Management – described in more detail in *Chapter 2* – is an example of the devolution of responsibility outside the national forest service.

Corporatisation and privatisation are other means by which institutional responsibility for the management of forests may be transferred in the interests of flexibility and efficiency. Corporatisation refers to the establishment of a corporation that operates largely according to the principles of the private sector – although the public sector still retains ownership of the forest resource. With privatisation the ownership of the forests passes to the private sector. In both cases the government forest service has responsibility for the development of policy, the enforcement of legislation and for relations with other sectors, with other countries and for international relations.

Sarawak, one of the three sovereign entities of the Federation of Malaysia, has also recently moved to corporatise its forest service. It has a forest cover of 71% of the land, producing 12 M m<sup>3</sup> of logs in 2005 with, after processing, an export value of US\$1.87 billion. There had, however, been intense international criticism in the 1980s to the effect that forest management in Sarawak was not sustainable. In response to this the Chief Minister invited ITTO to make recommendations for improved institutional arrangements for the control of forests.

As a result the following changes have been made:

- A streamlined Forest Department, with much reduced staff, has been retained, largely responsible for the laws related to the Forest and the Wildlife Ordinances;
- A new corporation, the Sarawak Forestry Corporation (SFC), was established, to act for the government to manage the forests, collect royalties and fees, enforce the laws, implement policies, undertake research and provide advice to the government.



- A private limited company, Sarawak Forestry Corporation Shd Bhd (Sarawak Forestry), was then established which supplied personnel to the SFC with more flexibility than a government department would have had.

The “reengineering” exercise in Sarawak is not described as privatisation, but: “a unique model of shrinking an existing government department by moving most of its functions to a newly created government corporation. Via an agreement, a private company supplied staff to undertake the work in the new corporation.” This company, like other private companies, has a strong emphasis on efficiency of delivery (Barney Chan, 2008).

Jamaica is moving in a similar direction. Here the Forestry Department is being transformed into an Executive Agency, although the name has remained the same. The transition was set to be completed when this book went to press in April 2010.

The 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 transfer the commercial functions of the New Zealand Forest Service to a State-run enterprise. Between 1990 and 1992 the government then privatised 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. More recently a long-running dispute between the Maori people and the government of New Zealand over the ownership of forest land was settled in 2008 with the transfer of land equivalent to about 10% of New Zealand’s plantation forest. The Central North Island tribal collective of eight Maori tribal groups, representing over 100,000 people, will become New Zealand’s largest single land owner in the forestry sector and will manage the land collectively with strong potential benefits for some of the nation’s poorest people (Asher, 2008).

Arrangements for Ministerial responsibility for forestry vary widely. 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 Forestry Commission together with its executive agencies, Forest Enterprise and Forest Research, is the main government department responsible for advising Ministers on, and for implementing, forestry policy in each of the three countries comprising Great Britain. Following devolution, the Forestry Commission now reports separately in England, Scotland and Wales to the Secretary of State for Environment, Food and Rural Affairs (England), Scottish Ministers and the Welsh Assembly Government. The Secretary of State also has responsibility for UK-wide activities such as international affairs or plant health.

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. Forestry is a small section of another Ministry in many of the Commonwealth SIDS of the Caribbean.

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. The UK Forestry Commission has offered planting grants to private land owners since 1919 and the scheme has been frequently reviewed to include payments for annual management costs or one-off incidents such as storm damage. It has been revised also over the years to take account not only of inflation and the changing objectives of forest policy but also the devolution of control to England, Scotland and Wales where each of the three countries has differing priorities as well as site characteristics of the areas available for planting. Now all forestry work undertaken through any of the grant schemes has to meet the requirements of the UK Forestry Standard (see *Chapter 2*). The Forestry Commission gives direct support to woodland owners but also works in partnership with other Departments and agencies to provide funding to for example forest industries, community and recreational activities, environmental improvements and the Forestry Commission also facilitates development through the use of the national forest estate.

Malaysia, for example, established in 2006 the Forest Plantation Programme, with initial government funding of RM200 million 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 EU-funded project that provides subsidies for private sector tree planters as well as technical support and practical training. During the first phase of the project (2004-2006) over 10,000 ha of plantations were directly supported – both financially and technically – which were established by community groups, small and medium scale investors and a few large-scale overseas investors. A second two-year phase has recently been approved, funded by the EU and Norway, which will help to establish a further 5,000 ha of private sector tree planting (see [www.sawlog.ug](http://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 *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](http://www.forestry.org.au)) has over 1,300 members spread across all states and territories. On 7 June 2007 it absorbed the Association of Consulting Foresters of Australia (ACFA, [www.consultingforesters.org.au](http://www.consultingforesters.org.au)) an independent body of consultant foresters. IFA members are bound by a Code of Ethics to guide professional conduct. Admission to voting membership is open to all forestry professionals and 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 IFA is the only organisation in Australia representing the forestry profession. It produces peer reviewed professional papers in the journal *Australian Forestry* which is published quarterly. It also contributes significantly to government inquiries. The IFA also maintains a media profile and issues media releases and letters to newspaper editors on current issues affecting forestry. It also encourages members to be active in this area.

The IFA launched a Registered Professional Forester (RPF) accreditation programme in 2001. In order to achieve government and employment recognition and to avoid the accusation of restrictive trade practice, applications are 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 specialisation by an appropriate examination or other evidence.



Canada has around 7,500 registered professional foresters (RPF), grouped within independent provincial professional organisations in eight of the 10 Canadian provinces (Gauthier, 2003). A list of them is available as the Canadian Federation of Professional Foresters Associations on the Canadian Institute of Forestry website at [www.cif-ifc.org](http://www.cif-ifc.org). These provinces mainly 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

**ABOVE**  
Arrangements for Ministerial responsibility for forestry vary widely throughout the Commonwealth. In Ghana, for example, the responsible Ministry is that of Lands, Forestry and Mines.



forester in one jurisdiction may not be recognised in another. Recent work on labour mobility and inclusivity by the associations has worked to improve this situation.

A typical example is that of the Association of British Columbia Forest Professionals, whose website ([www.abcfp.ca](http://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 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 (NZIF) was founded in 1927. Its members are the individual professionals in forestry in New Zealand and its primary object is "to be an independent advocate for forestry". It has over 840 members, whose qualifications and areas of expertise reflect the diversity of disciplines involved in managing a modern forest resource from traditional forestry degrees through qualifications in economics, law, micro-biology, hydrology, engineering and resource management. Around 75 members have passed the more stringent requirements for registration, which is recognised as the cornerstone of professionalism within New Zealand forestry, and 37 have been elected Fellows of the Institute in recognition of having achieved eminence in their profession. NZIF members include forest managers, owners and processors, consultants, scientists, teachers, officials in central and local government, those with an interest in forestry and students. Members' interests span forests for timber production, carbon sequestration, environmental

services, conservation and protection. They include both native and introduced tree species.

NZIF is committed to serving the practice of forestry and the wider community through education, accountability and its code of ethics and performance standards. Increasingly it fulfils a quality assurance role, setting the benchmark for professionalism and the quality of advice and practice by which members and others in the profession are measured (see [www.forestry.org.nz](http://www.forestry.org.nz)).

The professional institution in the UK is the Institute of Chartered Foresters (ICF), the professional body for foresters and arboriculturists in the United Kingdom (the only one of the Commonwealth forestry institutes that includes the practice of arboriculture). See [www.charteredforesters.org](http://www.charteredforesters.org). The ICF has 1,130 members, of whom 781 are Fellows and Professional members. Its Mission Statement is: "To lead the profession and promote excellence amongst foresters and arboriculturists, ensuring the sustainable management 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 the 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

**BELOW**

Explaining current management in a eucalyptus plantation in Victoria, Australia, where the forestry profession is represented by the IFA.





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 practise professional forestry accreditation in the Commonwealth are the four developed economies, 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. Unfortunately, as *Chapter 5* describes, fewer foresters are being trained and thus there are fewer professional foresters to influence public opinion and contribute to policy development.

### ■ Summary

Commonwealth countries have been in the forefront of policy and organisational changes in the forestry sector especially since UNCED in 1992. Decentralisation 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. The control of forest resources, which were formerly owned and managed by the State, have been corporatised or privatised 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

- Asher, G. (2008), "Indigenous tribes in New Zealand transform historic grievances into a bright future", *CFA Newsletter*, No. 43.
- Barney Chan (2008), "Institutional restructuring in Sarawak, Malaysia", in *Re-inventing forestry agencies: experiences of institutional restructuring in Asia and the Pacific*, FAO/RAP Bangkok, Publication 2008/05.
- Cinq-Mars, J. (2006), "Internet consultations in support of national forest programmes", *Unasylva*, No. 225 Vol. 57.
- Clarke, M. (1999), "Devolving forest ownership through privatisation in New Zealand", *Unasylva*, No. 199 Vol. 50.
- Coates, S. and Fenton, M. (1999), "The application of social assessment in the Australian Regional Forest Agreement process", *International Forestry Review*, Vol. 1 (1).
- Dansereau, J-P. (2003), "Pertinence of public financial support for forestry activities", Paper, *12th World Forestry Congress*, Québec City.
- Duinker, P.N. (1998), "Public participation's promising progress: advances in forest decision-making in Canada", *Commonwealth Forestry Review*, Vol. 77 (2).
- Gauthier, J. (2003), "The practice of forestry in Canada: the Québec example", Paper, *12th World Forestry Congress*, Québec City.
- Nair, C.T.S. (2008), "Public sector forestry agencies at the cross-roads: are they fading into irrelevance?", in *Re-inventing forestry agencies: experiences of institutional restructuring in Asia and the Pacific*, FAO/RAP Bangkok, Publication 2008/05.
- Wilkinson, G. (2006), "Professional foresters and forestry professionals – the future of the RPF scheme", *The Forester*, Vol. 49 (3), pp. 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*, Vol. 1 (2).

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## Forestry Tasmania exports expertise

Forestry Tasmania is taking its expertise to the world through its consultancy arm, Forest Technical Services.

Forestry Tasmania managing director Bob Gordon said the new service provided expert technical advice to domestic and international clients.

“Forest Technical Services capitalizes on FT’s extensive expertise in assessment and planning, stand management, product development and marketing,” he said.

“For 90 years, we have managed state forests on behalf of the people of Tasmania, and over that time we have developed the skills, expertise and forest research capability that are now much sought after by established and developing forestry companies around the world.

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Services provided by Forest Technical Services include:

- forest pest and disease monitoring and control
- forest management for both native and plantation forestry
- tree breeding and genetic selection
- market identification and development for timber and timber products
- mapping and resource inventory assessment using LiDAR laser technology
- yield planning
- research

Technical services already provided to external clients include delivery of LiDAR laser technology based mapping for geological and dam-building projects.

“We have also provided advice on eucalypt nursery and silvicultural practice in China for the past decade and have developed as a reliable partner in a range of activities, including log product supply, plantation management, forest tourism and forest certification,” Mr Gordon said.

*“Through a recently signed commercial agreement with China’s Yong’An Forestry Group (YFG) we will develop tree breeding and silviculture and will also help develop sustainable management of plantations which is becoming an increasingly high priority in China.”*

Forest Technical Services is also achieving quality results for eucalypt plantations in Chile and is looking at ways to help growers to process and export their product.

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## Professional Education in Forestry

By John L. Innes, FRBC Chair of Forest Management, Faculty of Forestry, University of British Columbia, Vancouver, Canada

Incorporating text from the first edition of *Commonwealth Forests on Technical Education in Forestry* by David Ward

**T**he 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, Edinburgh<sup>1</sup> (Scotland) and Toronto (Canada) in 1907, Bangor (Wales) in 1908 and Adelaide (Australia) in 1911; by the outset of the First World War in 1914,

<sup>1</sup> A lectureship was established in forestry at Edinburgh in 1889, with the BSc in Forestry first awarded in 1907.

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 contrasted with a decline in forestry education at the close of the century. Falling enrolments and the changes in the skills sets needed by professional foresters has caused considerable uncertainty amongst forestry educators. Over the past 20 years, the university-based education of foresters throughout the Commonwealth has been undergoing major and, at times, radical change. This reflects the dramatic changes which have occurred in the roles played by professional foresters, and in the educational backgrounds of those practising in the forestry sector.

This review focuses on the professional education leading to degrees in forestry at Commonwealth

### RIGHT AND OPPOSITE

RIGHT Dr William Schlich (*in the middle of the front row*) with forestry students on a visit to Saxony, Germany in 1892 and OPPOSITE contemporary students in Victoria, Australia.





universities<sup>2</sup>. Although the distinction between many diploma courses and degrees has become blurred, a possibly artificial distinction was made in the first edition of *Commonwealth Forests* between programmes that lead to diplomas (considered as technical education) and programmes that lead to degrees (considered as professional education). The complexity is illustrated by the range of programmes that have been accredited by the UK Institute of Chartered Foresters. Their website lists 12 different types of qualification offered at 18 different UK institutions and University College Dublin, and many are now offered by the same institution. For example, Bangor University offers six Master of Science (MSc) programmes, two Bachelor of Science (BSc), two Post-Graduate Diplomas (PGDip), one

<sup>2</sup> A list of Commonwealth University Faculties and Departments offering training in forestry is at Annex 7.

Higher National Diploma (HND), one Higher National Certificate (HNC) and one Post-Graduate Certificate (PGCert), all of which are accredited. Of the 54 different programmes that the Institute has accredited, only 12 lead to a traditional university undergraduate degree.

#### ■ Technical vs. professional education

The relationship between technical training and professional training is complex and becoming increasingly indistinguishable, particularly with the growing use of MSc programmes to provide either bridging training or to supplement an existing forester's knowledge. 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 increasingly fine distinction between forestry





professionals and trained technicians: for example, the Association of British Columbia Forest Professionals includes both Registered Professional Foresters and Registered Forest Technologists, although the two categories are kept very separate in relation to permitted activities.

The trend from technical school to university is illustrated by the teaching of forestry at Kwame Nkrumah University of Science and Technology in Ghana. According to its website, the Faculty of Forest Resources Technology (FFRT) started in 1922 as a three-year combined Agriculture and Forestry Training school at the Cadbury Hall in Kumasi, Ghana, to train forest technicians for the newly established Forestry Department of Ghana. In 1943, the Forestry Training School was moved to Sunyani and renamed Sunyani Forestry School (SFS) and offered a three year certificate course in Forestry. The School was upgraded to a three-year diploma College and renamed the College of Renewable Natural Resources (CRNR) in 1999 in affiliation with the Kwame Nkrumah University of Science and Technology (KNUST). In 2003 the College was transferred to KNUST. CRNR became the third faculty under the College of Agriculture and Natural Resources of the KNUST in August 2005. The Sunyani Campus has a Department of Silviculture and Forest Management, whereas the main campus of KNUST, in the Faculty of Renewable Natural Resources, has Departments of Agroforestry, Freshwater Fisheries and Watershed Management, Silviculture and Forest Management, Wildlife and Range Management and Wood Science and Technology.

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 the case of Makerere University, Uganda, the programme designed to enable diploma

students to upgrade to a full degree has not been well-received by students. On the other hand, the first jobs of many university-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. 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.

Technical education in forestry is facing the same problems as professional education, with declining enrolments (see below), declining resources and the closure of some schools. For example, Temu *et al.* (2003) argue that technical training in forestry in Africa has almost disappeared since 1999. This has created problems for the recruitment of trained forest technicians, particularly in Africa, where the problem seems to be most acute. The number of colleges offering such training has been in decline for some time, and the further occurrence of skills shortages seems likely.

At the same time, there is growing recognition amongst professional forestry associations that there is a need for continuing education amongst their members. This is hardly surprising given the pace of change in the forestry profession – not only in its breadth but also in its depth. As argued in *Chapter 4*, the professional associations need to ensure that the skills of their membership are continuously updated, and the educational capacity at universities and training colleges seems a logical way of achieving this.

#### ■ 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, with an estimated





30% decline in enrolment globally (Temu and Kiwia, 2008), it 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 have closed their institutions (the Oxford Forestry Institute has been “suspended”), and more closures are anticipated in the near future. The UK 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 also show a decline. The number of students enrolled in forestry programmes 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, there is still a demand for trained foresters, and some countries are beginning to report shortages of suitably qualified forestry graduates.

#### ■ What’s in a name?

The reasons for the decline in forestry enrolments are complex. They have occurred at a time when the demand for university-based education has been increasing, although enrolments in many of the sciences have been decreasing. There are two possible groups of reasons for the decline. The first is that prospective students are simply not aware of forestry. Forestry is not generally taught at the secondary level, and many students are unaware that there is even a discipline called “forestry” and so do not actively seek it out on on-line application websites.

The second set of reasons is based on the premise that students are aware of the discipline, but are making a conscious decision not to enter it. Various reasons have been put forward for this. For example, Temu and Ogweno (2007) consider that it can be attributed to the



purported failure of forestry education to respond to the rapidly changing social, economic and political environments within which forestry is practised. Added to this, the current character of forestry education is not market-orientated (Temu and Kiwia, 2008). Luckert (2004) relates the decline to reduced job opportunities for professional foresters. Weston and Whittaker (2009) propose a more subtle explanation, arguing that students associate the discipline of forestry with an activity undertaken by technicians rather than university graduates. Yet another explanation is that the term forestry has become irreversibly associated with the destruction of forests, rather than with their care and nurturing.

Is forestry 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

**ABOVE**  
Students in the  
International  
Forestry course at  
the University of  
British Columbia,  
Canada.



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” have too many adverse connotations. Others have lowered their entrance standards, a policy that has repeatedly been shown to be ill-advised.

Where it is still used in an institution’s title, the term forestry is often paired with other activities. For example, the University of Port Harcourt (Nigeria) has a Faculty of Forestry and Wildlife Management, Makerere University (Uganda) has a Faculty of Forestry and Nature Conservation, the University of Calabar (Nigeria) has a Faculty of Agriculture, Forestry and Wildlife Management, Sri Jayawardenepura University in Sri Lanka has a Department of Forestry and Environment Science, the University of Chittagong in Bangladesh has an Institute of Forestry and Environmental Sciences, and the University of Ibadan (Nigeria) has a Faculty of Agriculture and Forestry. Sokoine University of Agriculture in Morogoro, Tanzania, has a Faculty of Forestry and Nature Conservation that still contains many of the Departments that have largely disappeared elsewhere, namely Forest Biology, Forest Economics, Forest Engineering, Forest Mensuration and Management, Wildlife Management and Wood Utilisation.

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 Department of Forest and Ecosystem Science at the University of Melbourne is a part of the Melbourne School of Land and Environment. The forestry programme at the

Australian National University is based in the Fenner School of Environment and Society, whereas the forestry programme at Southern Cross University is based in the School of Environmental Science and Management (which is now responsible for the leading four-year undergraduate programme in forestry in Australia). At the University of Queensland, the forestry programme is based in the School of Integrative Systems.

There have been many changes since the first edition of this book. In one of the few examples where forestry has been “promoted”, the Department of Forestry and Range Management at the University of Arid Agriculture Rawalpindi (Pakistan) was formerly located within the Faculty of Livestock and Range Management, but is now in the Faculty of Forestry, Range Management and Wildlife. In most cases, Faculties and Departments of Forestry are being subsumed into other academic units. 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: programmes in Forestry, Forest sciences and Forest Conservation are offered. 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 then School of Environment, Natural Resources and Geography) 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), and the MSc in forest ecology and management offered by the School of Geosciences has been dropped since the first edition. Similarly, the University of Kwa-Zulu Natal in South Africa offers a specialisation in forestry within its BSc in Agriculture (College of Agriculture, Engineering and Science).

The name change is quite subtle, and in many cases, the term “forestry” is being replaced by “forest”, or a

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compound thereof (e.g., forest ecosystem science). An example is provided by the University of Stellenbosch, South Africa, which has a Department of Forest and Wood Science (in the Faculty of AgriSciences) offering undergraduate programmes in Forest and Natural Resource Management and in Wood Products Sciences.

A trend that seems to be strengthening is the tendency for forest-related degrees to be offered by a range of other disciplinary departments. For example, the Faculty of Agriculture at the National University of Rwanda offers a Masters degree in Agroforestry and Soil Management. The Copperbelt University in Kitwe, Zambia, offers a Bachelor of Science (Agroforestry), as well as a Bachelor of Science (Forestry). Both are offered through the School of Natural Resources. The University of Uyo (Nigeria) offers a Bachelor of Agriculture (Forestry and Wildlife) through its Faculty of Agriculture.

Some forestry schools have maintained their connections to the discipline. 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, the Department of Forestry and Wood Technology at the Federal University of Technology, Akure, in Nigeria, and the Faculties of Forestry at the University of British Columbia and Universiti Putra Malaysia are examples. However, very few Commonwealth universities have Forestry Faculties that integrate across the full range of forestry activities, from the forest to the product, and most universities now only provide education in a part of the range of forestry activities.

Should the last remaining Departments and Faculties of Forestry change their name? 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 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.

#### ■ The changing nature of forestry education

In a seminal report, Temu and Kiwia (2008) identify a number of areas where forestry education needs to change. They recommend a number of actions that are needed, including:

- Restructuring forestry education and practice to address environmental and other cross-cutting issues such as food security and poverty;
- Including the management of shrub lands and areas with low forest cover in forestry education;
- Reinforcing courses in forest governance and ethics;
- Initiating a global mechanism to stimulate stronger investment in forestry education, particularly the re-training of educators, review of curricula and development of new and relevant learning resources;
- Making forestry education strategic and relevant to youth and women through well-integrated programmes that reflect the broadened mandate of forestry;
- Strengthening human resources capacity in the management of trees outside forests; and
- Improving collaboration between higher institutions.



While the report was directed at forestry education in Africa, the recommendations are equally valid for many other developing countries in the Commonwealth, and also have relevance for the Commonwealth's developed countries.

Concurrent with the changes in the nature of the forestry profession, the background of those teaching forestry has changed (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. This is because forestry was for long considered to be only about managing forests. However, with the growing recognition that forestry is actually about responding to the needs of forestry stakeholders (Luckert, 2006, Temu and Kiwira, 2008), 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 and may lack teaching in some of the basic skills demanded of foresters (Temu and Kiwira, 2008).

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 to 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 Process<sup>3</sup>, 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 programme<sup>4</sup> are heavily over-subscribed (only one Commonwealth university, the University of Wales, is associated with this initiative).

Within the Commonwealth, a programme with some similarities to the European Union MSc programmes has been established in Australia. The National Forestry Masters Program represents a collaboration between the Australia National University, Southern Cross University, the University of Queensland, the University of Melbourne and the University of Tasmania (Bull and Kanowski, 2009). Students can enrol at any of the five universities, but can take courses offered by other universities in the partnership. A non-traditional course format has been adopted, and many of the individual courses are taught in intensive two-week blocks. This makes it much easier for those in employment to complete the programme. The approach is well-suited to the "Melbourne Model", in which students take a three-year general undergraduate degree, leaving any professional training to the MSc level, and indeed the majority of students enrolled in the National Forestry Masters Program have done so at Melbourne (Weston

3 The Bologna Process of reforms and standardisation of European higher education. See [http://ec.europa.eu/education/policies/educ/bologna/bologna\\_en.html](http://ec.europa.eu/education/policies/educ/bologna/bologna_en.html).

4 The Erasmus Mundus programme is a cooperation 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](http://ec.europa.eu/education/programmes/mundus/index_en).



**RIGHT**  
Waterlogged palm trees in Bangladesh – issues concerning land management are covered in the many new courses that refer to integrated resource management or integrated land management.



and Whittaker, 2009). This general type of undergraduate degree, which may presage the end of more specialised undergraduate degrees, has been adopted in the Commonwealth by the Universiti Brunei Darussalam, amongst others.

These problems have also created opportunities. The diversity of knowledge has enabled the broadening of the expertise in some departments and 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 some of the rapidly evolving teaching technologies. 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).

There has been some progress in broadening the traditional field of forestry. This is evident in the many new courses that refer to integrated resource management or integrated land management. However, in many of these, the forestry component is minor, if it exists at all. There is also evidence that the educational institutes are beginning to recognise some of the special needs associated with particular segments of society within the Commonwealth. For example the University of British Columbia has recently introduced a “Specialisation in Community and Aboriginal Forestry” to its Forest Resources Management Major. The new specialisation allows students to gain a better understanding of the political and socio-economic context of Aboriginal forestry in Canada, and has the potential to fill a major gap in many other Commonwealth (and non-Commonwealth) countries.



### ■ 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, Agroforestry, and Wood Science and Industrial Processing. 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 post-graduate degrees in forestry and agroforestry. A degree in forestry is also offered by the Universidade Eduardo Mondlane in Mozambique while 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. In Nigeria, the Federal University of Technology, Akure, offers a Bachelor in Agricultural Technology in Forestry and Wood 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 & 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 (which received an award as the best government business school in India in 2009), or to receive PhD training or postgraduate diploma courses in Pulp and Paper Technology, Wood Technology or Plantation Technology 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 are a number 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 based courses designed for individuals pursuing careers in the forest sciences or other non-forestry careers. The New Zealand School of Forestry at the University of Canterbury offers a Bachelor of Forestry Science degree,

**RIGHT**

The Virtual University for Small States of the Commonwealth ([www.vussc.info](http://www.vussc.info)) is committed to the collaborative development of open content resources for education, training and capacity building, and the use of information and communications technologies to broaden access to education.



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 are available in Canada, depending on the university.

It is quite likely that the next few years will see major changes in the nature of programmes being offered at Commonwealth universities. The National Forestry Masters Program in Australia provides an example of one pathway. Courses are developed and given by individuals at multiple universities – students are able to move freely between the universities. However, the traditional face-to-face approach is still being used for the delivery of the courses. The Virtual University for Small States of the Commonwealth provides an indication of the potential direction in which specialised forms

of education such as forestry training may take. Open content resources are being developed and delivered remotely, using modern communications technologies to maintain contact between students and instructors.

#### ■ Accreditation<sup>5</sup>

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 practise forestry. This can be problematic, as what constitutes the required training for a forester

<sup>5</sup> See also *Chapter 4* for a description of professional forestry institutes and associations.





Stellenbosch University is an academic institution of excellence, and a respected knowledge partner, which contributes towards building the scientific, technological, and intellectual capacity of Africa. The Department of Forest and Wood Science is the oldest forestry and wood science university department in South Africa with a proud history going back nearly 80 years. It prides itself in the role that it plays in the development of the South African forestry industry through the education and training of forestry graduates, internationally recognised research, and support to national forestry initiatives.

The Department serves as an integrated research and education centre where national and international researchers and students work together on forestry and wood product research and development issues. It is well positioned within Africa to provide academic services, an aspect is recognised by our international academic partners who see the Department as an entry point into Africa and by African students who see Stellenbosch University as a preferred place of study.

The Department prides itself in the fact that it can provide academic services based on the full forestry and wood product value chain from raw material to final product. These services are provided by a core staff compliment of nine academics, and nine support staff. It also relies on six extraordinary visiting professors to assist with research and teaching

The Department offers a four-year Bachelor of Science degree in forestry as well as Honours, Masters and Doctoral programmes. Students can choose within these academic programmes between directions in Forest Sciences and/ or Wood Products Science. Postgraduate academic and research activities are tailored to each student's research interests and foreign students are encouraged to focus on research pertaining to forestry problems in their home countries.

Research at the Department of Forest and Wood Science focuses on:

- Precision forestry.
- Integrated land use management initiatives.
- Biomass and bio-fuel production initiative.
- Wood quality from the plant to the product.

These focus areas are used to strengthen collaboration between researchers responsible for different aspects of the forestry value chain. Central to the research activities at the Department, is collaboration with international partners. The Department has collaborative agreements with a large number of universities and research institutions in Africa, Europe, the USA and Canada.

Stellenbosch University is recognised as one of the four top research universities in South Africa. It takes pride in the fact that it has one of the country's highest proportions of postgraduate students of which almost ten percent are international students. The Department of Forest and Wood Science aims to be the preferred supplier of world-class education, research and outreach in Africa. It offers post-graduate degrees tailored to the individual research interests of students who enroll in the following post-graduate degree programmes:

- Honours in Forestry and Natural Resources Science (BScForHons)
- Masters in Forestry and Natural Resources Sciences (MScFor)
- PhD in Forestry and Natural Resources Sciences (PhD(For))

Students can specialise in Forest Science and/or Wood Product Science within these programmes. From 2012 a Post Graduate diploma in Forest and Wood Science will also be offered. The one-year Honours programme has a 75% coursework component while the Masters and PhD programmes have a 100% research focus.

The Department of Forest and Wood Science welcomes prospective students and researchers from across the world who are interested in joining our small but dynamic forestry family at the southern tip of Africa.

Students interested in studying at Stellenbosch University can contact Ms. Ursula Petersen:

Tel: +27 21 808 3323

Fax: +27 21 808 3603

E-mail: [wood@sun.ac.za](mailto:wood@sun.ac.za)

[www.sun.ac.za/forestry](http://www.sun.ac.za/forestry)





### Learning Outcomes

TABLE  
5.1

The following learning outcomes are required by the Canadian Forestry Accreditation Board before a particular university programme can be accredited:

- An understanding of the science of forest ecosystem structure, dynamics and processes;
- An ability to identify, formulate and solve forest problems;
- An ability to communicate orally and in writing with a variety of audiences including foresters, other professionals, Aboriginals, politicians, groups with special interests and knowledge concerning forestry and the general public;
- An ability to understand the relationships among the natural resources and possess the skills and knowledge to integrate a variety of uses and values in land and resource management plans;
- An understanding of professional and ethical responsibilities, including membership in professional associations;
- A broad global perspective of forestry issues and challenges;
- A recognition of the need for and the ability to engage in lifelong learning;
- A recognition of the need to participate actively in the overall community in which the graduate is a part;
- A general knowledge of contemporary issues affecting forestry;
- An ability to work well with others;
- An ability to work as a team member;
- An ability to lead and supervise effectively; and,
- An ability to work in the forest.

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.

### Expected Competencies

TABLE  
5.2

Standard 3 of the Canadian Forestry Accreditation Board deals with forest management. Under each heading, there are a number of specific tasks – only those from the first heading are given. Readers are referred to the original document for the remaining tasks (source: [www.cfab.ca/English/PDF/Standard3-3.pdf](http://www.cfab.ca/English/PDF/Standard3-3.pdf)).

The basic principle being espoused is that forest ecosystem management balances ecological, social and economic demands with the capacity of forest resources to provide for present and future values.

Graduates of an accredited programme are expected to be able to:

- 1** Describe the variety of values and competing interests in a forest.
  - a** Identify and describe the range of values (timber and non-timber) in a forest.
  - b** Identify the interests and rights present in a forest including Aboriginal Peoples' rights, claims and interests in forests and the importance of implementing processes to determine and address them.
- c** Describe the requirements of and interaction among these values.
- d** Describe the effect and implications of decisions aimed at a given set of objectives.
- e** Describe how values and competing interests are or can be weighed/balanced in decision-making.
- 2** Explain forest strategic and operational planning principles.
- 3** Analyse and apply a range of forest cover manipulation strategies that effectively achieve a given set of objectives while minimising negative impacts on other values.
- 4** Explain the legal and policy framework.
- 5** Discuss forest management concepts.
- 6** Describe how global trends drive and influence forest management.
- 7** Develop a resource planning document that incorporates current economic, environmental and social values into actions that lead to achieving the planning objectives and to future desired conditions and goals.



The Canadian Forestry Accreditation Board has recently reviewed its accreditation process. There is now a focus on learning outcomes (see *Table 5.1*), rather than rigid adherence to a particular set of courses. Each programme must ensure that its curriculum adequately covers each of seven areas of competence: tree and stand dynamics, forest to landscape, forest management, economics and administration of forestry, leadership skills, information acquisition and analysis and professionalism and ethics. Within each area of competence, there is a list of areas that are expected to be covered but, more significantly, there is now a list of expected competencies (see *Table 5.2*).

The diversity of expert skills is apparent in many other programmes. For example, a graduate with a BSc in Agroforestry and Development from Moi University in Kenya is expected to be able, amongst other things, to maintain and improve the quality of the environment through agroforestry, to manage agroforestry resources for multiple benefits on a sustainable basis, to plan, mobilise resources, implement, monitor and evaluate agroforestry development projects, to participate in the process of land use policy formulation and implementation, to identify community needs, and offer advisory and extension services, and to venture into entrepreneurship and marketing.

### ■ 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 Oxford Forestry Institute, there have been questions raised about a successor. Interestingly, there is now an Oxford Centre for Tropical Forests, which appears to be filling the gap left by the closure of the Institute. 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 excep-

tion 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 Tropical Agroforestry. It specifically caters to international students.

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). 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 partnerships 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).



## The International Partnership for Forestry Education

BOX  
5.1

*By Hosny El-Lakany, Director, International Program,  
Faculty of Forestry, University of British Columbia,  
Vancouver, Canada*

Management of forest resources has become an interdisciplinary task calling for a new "breed" of forest professionals qualified to address the three pillars of sustainable forest management (environmental, economic and social aspects) simultaneously. Forestry graduates need to be trained in outreach, cross-sectoral planning and adaptive management involving other sectors such as agriculture, rural development and energy. Traditional forestry is giving way to forests increasingly managed by communities for their essential goods and services within the context of national development strategies and global issues. As this task is believed to be beyond the capabilities and capacities of several forestry schools around the world, some modalities for advancing forestry education have been proposed, including collaborative partnerships. The International Partnership for Forestry Education (IPFE) has thus been created as a voluntary forum for coordinating efforts to improve forestry education, conceived as a new global network of networks to share information, experiences, resources and skills about forests and forestry education.

### IPFE's Vision

Forestry education is responsive to global needs and contextualised in locally relevant social, economic and ecological settings.

### IPFE's 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.

Currently, IPFE's Secretariat is shared between the University of British Columbia, Canada and the University of Joensuu, Finland. The partnership has nearly 40 members comprising universities, international research centres, inter-governmental organisations, international NGOs, regional research and education networks and the International Forestry Students Association (IFSA).

Some of the recent IPFE-supported activities included:

- Regional Forest Education Workshops in Africa, Asia-Pacific and Latin America;
- International Canada-China Forestry Education Symposia in Beijing and Vancouver;
- Forestry Education session at the 13th World Forestry Congress in Argentina, 2008;
- Development of e-learning in forestry in collaboration with Freiburg University, SILVA Net and others.

For more information about IPFE governance, membership and activities visit, [www.ipfe.fi](http://www.ipfe.fi).

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 since its establishment in 2001, appears to have been reasonably successful in promoting cooperation in forestry education in the Congo Basin (Kiyiapi, 2004). However, like many such programmes, it suffers from inadequate resourcing.

One global organisation that offers some potential is the International Partnership for Forestry Education,

established in 2006. This has the mandate to support and improve forestry education, but is critically under-resourced. A description of the network is provided in *Box 5.1*.

### ■ The perspective of forest students

In any discussion of forestry education it is important to consider the views of students. There is no organisation in the Commonwealth solely devoted to forestry students, but there is a global organisation for forestry students: the International Forestry Students Association. In a document prepared for the World Forestry



Congress in 2009, the *Global action plan for forestry education*, IFSA (2009) recognises four major issues: lack of societal recognition of the importance of forests and their management, lack of forestry and environment education institutions, lack of financial means to implement an efficient education within already existing institutions, and a need for adaptation of the curricula and methods to changing requirements.

IFSA (2009) goes on to recognise a number of other problems, noting the decline in enrolments discussed above, the inadequate investment in the forestry sector, and the poor integration of emerging themes such as biodiversity, climate change, environment and agroforestry into traditional forestry curricula. While their action plan is a work in progress, it does contain an important conclusion, namely that forestry education will only succeed if it is integrated with a well-recognised, interesting and performing forest sector.

#### ■ 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 has for some years no longer had 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 in Natural Resource

Management developing at Thompson Rivers University appears to be successful.

Forestry programmes in some of the African countries face a range of problems, including poor enrolments, 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 agroforestry. 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. Temu and Kiwia (2008) point out that many global policy fora have affirmed the importance capacity, yet funding of education remains well below the level needed to generate that capacity.

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 has not been 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 particularly acute because of the affinity of most programmes with the natural sciences. The need to incorporate more social science in forestry programmes may aggravate the problem, and a fundamental re-evaluation is needed of the place of forestry in the academic world.

It is always difficult to look into the "crystal ball", but it is apparent that the forestry education in the Commonwealth will have to change from its current approach. What will be the nature of those changes?



There are mis-matches between the demand for graduates and enrolments, between teaching capacity and teaching demands, and between what is currently being taught and the skills needed by graduates. There are solutions to some of these issues, although low enrolments will remain a challenge. Students located at any particular university face the challenge of acquiring the diversity of skills needed to practise forestry from a limited, and potentially shrinking, number of instructors.

Several options exist to resolve this. They could make greater use of on-line teaching resources, if they were available. However, there needs to be a better system available for the exchange of course materials among universities, and a suitable mechanism in place to ensure that appropriate payments are transferred between universities for the use of such materials. Such courses are greatly enhanced by having a "real" person supervise a student's learning experience, and this may present challenges for faculty members. However, they should not be insurmountable. Modern technologies, such as distance education, have opened up enormous opportunities in this area, but to date have not been properly exploited.

Students could also be more mobile. There are currently no opportunities such as the Erasmus Mundus programme of the European Union, despite the clear possibilities for developing such exchanges. The National Forestry Masters Program in Australia has shown that student mobility is feasible, at least within a country, and most universities in the developed world have strong academic exchange programmes. There is a need to ensure that all Commonwealth universities engaged in forestry education can offer such opportunities. This will require a greater awareness of what is available at each institution offering a forestry education, and also some form of international course and university accreditation.

The other element of mobility surrounds faculty members. While most universities have established

systems for awarding sabbatical leave, this is unlikely to resolve the issue of getting the right people to the right location at the right time. Innovative solutions are required for this, as universities (and education administrations) generally give little credit to individuals who are willing to devote time to such work. In many cases, it may be necessary to move away from the traditional term or semester approach to education and instead adopt a system of short, intensive courses, as used for example in the Australian National Forestry Masters Program.

Another issue concerns the training of university-based educators. Many have been trained in traditional forestry, and are ill-equipped intellectually to deal with the new types of problems and issues that today's foresters need to resolve. For example, 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). Greater networking is required to ensure that individuals better understand what is needed, and how they can best meet those needs.

The Commonwealth provides a huge potential for networking, yet this is hardly been developed and there is a significant lack of cooperation and coordination amongst the forestry programmes offered by Commonwealth universities. Establishing a system for coordination and collaboration amongst the different universities offering professional forestry programmes throughout the Commonwealth would be an invaluable starting point in meeting many of the challenges that forestry education faces.

#### ■ References

- Bull, L. and Kanowski, P. (2009), "The National Forestry Masters Program: a new era of collaboration in professional forestry education", *Proceedings of the 24th Biennial Conference of the Institute of Foresters*



- of Australia, Caloundra, 6-10 September 2009, pp. 91-96.
- Burley, J., Plenderleith, K., Howe, R. and Freer-Smith, P. (2004), "Forest education and research in the United Kingdom", *Proceedings of the International Symposium on Forest Research and Education for the 21st Century*, 12 October 2004, Seoul, Korea Forest Research Institute, 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", *Proceedings of the International Symposium on Forest Research and Education for the 21st Century*, Seoul, Korea Forest Research Institute, pp. 125-135.
- El-Lakany, H. (2004), "Looking outward: Incorporating international forestry in higher forestry education and research", *Unasyuva*, No. 216 Vol. 55, pp. 52-56.
- IFSA (2009), "Global action plan for forestry education", Discussion Paper, Version 2.2, 2 October 2009, International Forestry Students Association, Freiburg, Germany. Available at: [http://www.ifsa.net/upload/download/GAPFE\\_version\\_2\\_2.2.pdf](http://www.ifsa.net/upload/download/GAPFE_version_2_2.2.pdf).
- Innes, J.L. (2004), "Challenges facing forest educators in North America", *Proceedings of the International Symposium on Forest Research and Education for the 21st Century*, Seoul, Korea Forest Research Institute, pp. 136-150.
- Kanowski, P. (2004), "Forest research and education in Australia in 2004", *Proceedings of the International Symposium on Forest Research and Education for the 21st Century*, Seoul, Korea Forest Research Institute, pp. 165-185.
- Kiyiapi, J.L. (2004), "Forestry education in Africa: rethinking current directions", *Unasyuva*, No. 216 Vol. 55, pp. 22-23.
- Längin, D.W., Ackerman, P.A. and Lewark, S. (2004), "Internet-based learning in higher forestry education", *Unasyuva*, No. 216 Vol. 55, pp. 39-44.
- Luckert, M.K. (2004), "Why are enrolments in Canadian forestry programs declining?", *Forestry Chronicle*, Vol. 80 (2), pp. 209-214.
- Luckert, M.K. (2006), "Has the myth of the omnipotent forester become the reality of the impotent forester?", *Journal of Forestry*, Vol. 104 (6), pp. 299-306.
- Miller, H. (2004), "Trends in forestry education in Great Britain and Germany, 1992 to 2001", *Unasyuva*, No. 216 Vol. 55, pp. 29-32.
- Nair, C.T.S. (2004), "What does the future hold for forestry education?", *Unasyuva*, No. 216 Vol. 55, pp. 3-9.
- Temu, A.B., Mwanje, I. and Mogotsi, K. (2003), *Improving agriculture and natural resources education in Africa: a stitch in time*, World Agroforestry Centre (ICRAF), Nairobi, Kenya.
- Temu, A.B., Okali, D. and Bishaw, B. (2006), "Forestry education, training and professional development in Africa", *International Forestry Review*, Vol. 8 (1), pp. 118-125.
- Temu, A.B., and Ogweno, D. (2007), "Global forestry education guidance and monitoring: how imperative is it?" In: Temu, A., Kiwia, A., Kaboggoza, J., Kung'u, J., Chamshama, S. and Chikamai, B. (eds.), *New perspectives in forestry education*, World Agroforestry Centre (ICRAF), Nairobi.
- Temu, A.B. and Kiwia, A. (2008), *Future forestry education: responding to expanding societal needs*, World Agroforestry Centre (ICRAF), Nairobi. Available at: [www.worldagroforestry.org/sea/Portals/1/Policy%20Brief-Future%20Forestry%20Education-Final%2003-4-08%20-final%202.pdf](http://www.worldagroforestry.org/sea/Portals/1/Policy%20Brief-Future%20Forestry%20Education-Final%2003-4-08%20-final%202.pdf).
- Van Lierop, P. (2003), "Trends in forestry education", Paper, *12th World Forestry Congress*, Québec City.
- Weston, C. and Whittaker, K. (2009), "Forestry is a handy word but not the right one for attracting students", *Proceedings of the 24th Biennial Conference of the Institute of Foresters of Australia*, Caloundra, pp. 98-102.

# Forestry Development in Africa: An AfDB Perspective

Africa's total forest cover is estimated at 650 million hectares (ha), accounting for 21.8% of the land area and 16.8% of global forest cover (FAO, 2001)<sup>1</sup>. These forests have immense potential to contribute to the continent's social and economic development as they provide a range of ecological, economic and social services, including the protection of water and soil resources. Forest products form the foundation of many local and national economies across the continent. They provide about 6% of GDP in many African countries, the highest in the world, although the share of forest products in trade is only about 2%.

Africa's forests are, however, threatened by a combination of mutually reinforcing factors which include agricultural expansion, commercial harvesting, increased fuel wood collection, inappropriate land and tree tenure regimes, uncontrolled livestock grazing, and accelerated urbanization and industrialization. FAO estimates that Africa loses four million

hectares of its forest annually. Throughout Africa, there has been an increase in demand for wood products, especially fuel wood, charcoal and round-wood. As a result, the consumption of forest products nearly doubled from 1970 to 1994.

The production and consumption of firewood and charcoal alone rose from 250 to 502 million m<sup>3</sup> during the same period (FAO, 1994)<sup>2</sup>. Recent projections by FAO estimate that consumption will rise by yet another 5% by 2010. Over the last 20 years, about 300 million hectares of mainly tropical forest have been converted to other land uses on a world-wide basis, such as farms and pastures or large-scale plantations of oil palm, rubber and other cash crops. The rate of deforestation on the continent is currently estimated at four times the world's average.

A number of constraints make it difficult for the majority of African countries to implement sustainable forest management practices. Against a wide range of

priorities, the forestry sector is often assigned low priority compared to food security, health, education, and other sectors. As a consequence, insufficient budgetary allocations are provided to the sector. Many African countries, in their day-to-day struggle to satisfy the most basic needs of their populations, are unable to take a long-term view, which is the time-frame, required for the successful implementation of sustainable forestry management programmes.

The existence of weak forestry institutions in many African countries is another reason for the failure to achieve adequate conservation and sustainable management of the continent's forest resources. In addition, mutually reinforcing market and policy failures promote unsustainable management and use of forest resources. A mechanism to promote the participation and involvement of local communities and the private sector in sustainable forestry management initiatives is lacking. Furthermore, budget support from national governments and the international community is inadequate. It is also clear that some of the available financial instruments are not responsive enough to address challenges in the sector.

It is in the context of the foregoing that the Bank began its interventions in the continent's forestry sector. Although the interventions began as far back as 1978, it was in 1994 that the Bank adopted a specific forestry policy to guide its lending to the sector and to assist its regional member countries in their efforts to arrest deforestation and environmental degradation. The Bank's forestry policy emphasizes the need for the sustainable management of Africa's forest resources to ensure environmental protection, sustainable wood supply and a steady flow of non-wood forest products. The forestry policy provides

1 FAO Forest Resources Assessment, 2001

2 FAO Forest Products Yearbook, 1994



Destroying the forest for agricultural purposes, Uganda 2007





**Pine plantation establishment, Tanzania, 2008**

for a strategic framework to enable the Bank to play an effective role in the protection, conservation, management, and sustainable use of forests in its regional member countries.

Lessons learnt from past and current projects show that there are strategic opportunities for the Bank to continue to expand its engagements with its regional member countries in the forestry sector. Some of the identified gaps include weak institutional capacities, limited responsive policy and legal frameworks, and minimal community and private sector participation that are essential for the sector to make its rightful contribution to development. The Bank's interventions can play a catalytic role in encouraging governments and other development partners to invest more in the sector.

The current Bank forestry portfolio comprises 12 projects with a commitment value of UA 189.59 million (about US\$288.7 million). The 12 projects are located in nine countries, namely; Benin, Burkina Faso, Burundi, Cameroon, Ghana, Kenya, Niger, Rwanda and Uganda. The focus of these projects includes: natural resource conservation and management, rehabilitation of degraded indigenous forests, agro-forestry, community fores-

try, and institutional capacity building. Almost all the on-going projects adopt a participatory approach in their design and implementation. In addition, most of the projects are designed as integrated programs with other sectors such as agriculture and water resources. Overall, these projects are having positive impacts through the provision of wood and non-wood forest products as well as environmental benefits. Between 2006 and 2008, for example, a total area of 484,560 ha was reforested while 844,111 seedlings were produced. The projects have also supported over 360,000 beneficiaries, including organised associations and groups through training and capacity building to enable them manage their natural resources sustainably and benefit from them financially. It is clear that other bilateral as well as multilateral donor agencies, non-governmental organisations (NGOs), community-based organisations and private sector operators are also providing support to some of the Bank's regional member countries. There is a need for closer collaboration among various stakeholders in order to avoid a duplication of efforts.

Building on the positive impacts of its current portfolio of projects, the

Bank's future interventions will focus on sustainable forest management at the national and regional levels. Regional interventions will be in line with the Bank's regional public goods strategy. In addition, the interventions will contribute to the development of forest management infrastructure. The Bank is now incorporating climate change concerns into its forestry projects particularly taking advantage of the relatively peaceful situation in the forest nations of Central and West Africa that are emerging out of conflict. Recognising the common African position on the inclusion of Reducing Emissions from Deforestation and Degradation (REDD) in a post-2012 climate change agreement, the Bank will support capacity building, including bankable projects design, monitoring, reporting and auditing to enable Africa take advantage of opportunities under this and other mechanisms for adaptation to and mitigation of climate change.

There is a potential to improve the forestry sector's contribution to Africa's socio-economic development, including poverty reduction, especially in rural areas of the continent. The forestry sector is in a dynamic state and it is undergoing rapid changes in response to challenges brought on by climate change; demand for domestic and industrial wood; and pressures to meet demand for agricultural land, food and environmental services. These changes are impacting the forest cover and the sustainable flow of goods and services therefrom. The future of the sector will depend on the severity of the impact and how society, as a whole, adapts to such changes in terms of policy and fiscal responses. In addition, the future will also depend on the response and budget allocation from national governments as well as support from the donor community.



## Forest Research in the Commonwealth

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

**F**orestry research was started 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 was historically based largely on the Indian model. South Africa in particular has a leading international role in research on plantations. Most countries have their own research institutions based on national and international priorities.
- **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.
- **Cyprus, United Kingdom:** The two Commonwealth countries in Europe with a forestry sector are Cyprus and the UK. Cyprus has developed Mediterranean forestry technologies. The British Forestry Commission was created in 1919 with responsibilities for forest development in Great Britain, but many other forest-related research institutions were based on colonial needs and were established earlier.
- **Indian sub-continent:** 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 shared Indian model.
- **South-east Asia:** Malaysia is the principal country in this region, a leader in management of dipterocarp forests.

- **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.
- **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; Mozambique, formerly a Portuguese colony is a major example. 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:** Cameroon, Gambia, Ghana, Nigeria, Sierra Leone;
- **East Africa:** Kenya, Rwanda, Tanzania, Uganda;
- **Central Africa:** Malawi, Zambia, Zimbabwe;
- **Southern Africa:** Botswana, Lesotho, Mozambique, Namibia, Swaziland, South Africa;
- **African Islands:** Mauritius, Seychelles.

In all countries, but especially in the smaller ones and the islands, it has often been difficult to sustain funding for research programmes even when qualified staff have been in post. 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 coordinates 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 include 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). Several research field stations in sub-Saharan Africa have been set up by the two Consultative Group on International Agricultural Research (CGIAR) centres CIFOR (Centre for International Forestry Research) and ICRAF (World Agroforestry Centre). Their remit is continent-wide and they play important roles in forest research in the Commonwealth countries in Africa.

#### *Major achievements*

Most of the western Africa countries are forest-rich and research departments were established in these countries before the First World War. Particular achievements include 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, silviculture 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 out-



#### **LEFT**

The Kyambura Gorge Forest in Uganda – in eastern Africa all the countries have competent and productive research institutes.



standing capacity and facilities of South Africa have become increasingly 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 order to halt or delay deforestation is not always appreciated and the use of agro-forestry 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; and
- Overall inter-sectoral land management policy, planning and practice.

#### Australia

##### History

Early forest research priorities were to select (mostly exotic) trees for a viable plantation industry and today's efficient programmes for conifer silviculture and utilisation are the result. Government-funded forest research institutions were set up separately by the states and by 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)<sup>1</sup>. For the last 16 years the Forest and Wood Products Research and Development Corporation (FWPRDC) and its successor, Forest and Wood Products Australia (FWPA)<sup>2 3</sup>, have had an increasingly-important role as a coordinator and funder of research. Established in 1980, the Australian Centre for International Agricultural Research (ACIAR)<sup>4</sup> has supported research of mutual interest to Australia and partner countries. The formerly prominent forestry and forest products divisions of CSIRO were disestablished as separate entities in 2008. Relevant expenditure in Australia was reported by Turner and Lambert (2005) – the forest and forest products research effort had declined by about half in the previous 25 years.

1 [www.crc.gov.au/Information/default.aspx](http://www.crc.gov.au/Information/default.aspx), [www.crcforestry.com.au](http://www.crcforestry.com.au) and [www.bushfirecrc.com](http://www.bushfirecrc.com).

2 [www.fwpa.com.au](http://www.fwpa.com.au).

3 [www.fwpa.com.au/Resources/About/annualrep/FWPA\\_Annual\\_Report\\_2009.pdf](http://www.fwpa.com.au/Resources/About/annualrep/FWPA_Annual_Report_2009.pdf).

4 [www.aciar.gov.au](http://www.aciar.gov.au).



### Major achievements

Extensive work on the taxonomy, ecology, silviculture and utilisation of the indigenous forest flora has been carried out. Many endemic species are of importance for plantation development in other countries, and now about 950,000 ha have also been established in plantations in Australia, mostly in the last 20 years. World-leading research was undertaken on plantations of indigenous and exotic species<sup>5</sup>. Timber technology research, including the development of papermaking from eucalypts (Algar, 1988) has supported highly efficient wood industries, and has been internationally recognised by the award of two Marcus Wallenberg prizes<sup>6</sup>. Fire has been extensively studied, and data on very high rates of spread have been incorporated in a

5 Exemplified in "IUFRO World Congress 2005 Host Scientific Awards to Drs Nambiar and Nikles", IUFRO News, Special issue, p. 6, from [www.iufro.org/events/congresses/2005](http://www.iufro.org/events/congresses/2005).

6 [www.mwp.org/prizewinners.cfm](http://www.mwp.org/prizewinners.cfm).

better fire behaviour prediction system to forecast the spread and intensity of wildfires<sup>7</sup>.

### Future challenges – resources for research

Research capacity in forestry and forest products in coming decades will be constrained by shortages of both skilled personnel and funds. The last two decades have seen 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 have been foregone, and their effectiveness is inevitably being eroded by increasing age and iso-

7 For example: [www.bushfirecrc.com/publications/project\\_vesta2.html](http://www.bushfirecrc.com/publications/project_vesta2.html).

### ABOVE

Sorting eucalyptus logs in Victoria, Australia, where the large area of maturing eucalypt plantations established in the last two decades presents a significant challenge for harvesting and marketing.



lation. Future research capacity is also threatened by a marked down-turn in undergraduate numbers (Kanowski, 2006), a problem in many countries. 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 of expansion of both the forest industry and the threats to it.

Some themes which have been identified for research attention are described briefly below.

#### *New horizons for plantations*

The large area of maturing eucalypt plantations established in the last two decades for fibre production presents a significant challenge for harvesting and marketing, as well as an opportunity to establish important processing capacity in Australia.

An ability to grow commercially-successful plantations in the seasonally-dry tropics of northern Australia, and in low-rainfall areas in southern Australia (e.g., land now used for wheat) would be valuable for several reasons: to expand and diversify regional economies (Underwood, 2006), to ameliorate land degradation resulting from salinisation (Maslin *et al.*, 2004) and to accumulate and store carbon from the atmosphere.

#### *The hardwood dilemma*

Australia has been very successful in developing timber industries based on softwood plantations, and more recently short-rotation hardwoods for fibre. These plantations, however, cannot supply a full range of timber products. In particular, strong durable timber for sawlogs, and hardwood for veneers, have been obtained from Australian native forests, but the supply is steadily diminishing (Kile, 2005) and their production from plantations faces economic, commercial and technical challenges, although recent developments in sawing and drying promise to enable plantations

originally established for fibre to be sawn profitably for structural products (Brown *et al.*, 2008).

#### *Forest protection and sustainability*

Both native forests and plantations are threatened by significant pests, diseases, weeds, droughts and fires. For example, Asian gypsy moth<sup>8</sup> is regarded as a potentially-serious insect pest; pitch canker (Matheson, 2006) is a threat to pine plantations. Eucalyptus (guava) rust, established in the Americas, is a serious threat to both planted and native eucalypts. Fire, allied to drought, has caused large losses in 2003 (Kanowski *et al.*, 2005), 2006 and 2009<sup>9</sup> and there have been forecasts that these will be greatly exacerbated by climate change<sup>10</sup>. Sustaining productivity will require ongoing research in forest health, stand management, nutrition and genetics.

#### *Forestry and society*

The social context of forestry has changed markedly in the last quarter-century, and some views on forest management (Poynter, 2005) and land use remain conflicting. Public pressure has resulted in the transfer of much native production forest to reserves, while the establishment of plantations on former agricultural land (encouraged by taxation concessions) is also a source of controversy (Schirmer *et al.*, 2003).

#### *Water and climate change*

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, essential for forest growth, is increasing (Clifton *et al.*, 2006, Nambiar *et al.*, 2005); it is proposed to thin or fell plantations near

8 [www.affa.gov.au/content/output.cfm?ObjectID=A3F126C7-F434-4457-948251929FBD75BB](http://www.affa.gov.au/content/output.cfm?ObjectID=A3F126C7-F434-4457-948251929FBD75BB).

9 [www.royalcommission.vic.gov.au](http://www.royalcommission.vic.gov.au).

10 [www.csiro.au/csiro/content/standard/ps271.html](http://www.csiro.au/csiro/content/standard/ps271.html).



# THE TANZANIA FORESTRY RESEARCH INSTITUTE

The Tanzania Forestry Research Institute (TAFORI) is a National Institution which was established by Act No. 5 of 1980. It has the mandate to conduct, coordinate and promote the carrying out of Forestry Research as well as to ensure documentation and dissemination of research results for sustainable forest management in the country and to contribute to the enhancement of socio-economic and environmental benefits for present and future generations.

**TAFORI's Vision:** To have and maintain a recognised position of one of the knowledge and technology contributors leading to sustainable management of forests and allied natural resources for balanced science-based enviro-socio-economic benefits.

**TAFORI's Mission:** To enhance research capacity for effective carrying out, co-ordination, documentation and dissemination of research results for sustainable forest and associated natural resources management to enhance economic, social and environmental benefits to stakeholders.

**Function of the Institute:** The Tanzania Forestry Research Institute is a corporate body, which carries out the following functions: sets up experiments relating to planting, growth, development and conservation, and the use of local and exotic tree species; investigates causes and suggests ways of controlling and preventing the occurrence of forest diseases and pests; coordinates research and provides advice to the government, public institutions and other persons on the practical applications of modern techniques suitable for development and conservation of the soil, fauna and flora; provides advice on the establishment and development of wood industries; cooperates with the Government and any person or group of persons in providing facilities for the training of researchers; establishes a system of documentation and dissemination of research results, by placing inquiries and/or collecting prepared and/or published statistics relating to forestry; encourages the development of forestry through the protection of the forestry

industry, provision of consultancy services, and increasing the supply, sale, utilisation and conversion of timber and carries out any other activity deemed by the Board of Directors as being of interest to the Institute.

The operational priorities are: Training researchers; building basic infrastructure at Morogoro, the permanent headquarters; strengthening research centres; disseminating research results and consolidating income-generating activities.

Research programmes include: Management of Natural Forests; Community and Farm Forestry; Plantation Forestry and Tree Improvement; Forest Resource Assessment; Forest Operations and Utilisation; Socio-economics; Policy and Forestry Extension.

Capabilities: TAFORI has the capacity to offer consultancy in Management of Natural Forests; Community and Farm Forestry; Plantation Forestry and Tree Improvement; Forest Resource Assessment; Forest Operations and Utilisation; Socio-Economics, Policy and Forestry Extension. In an attempt to consolidate income-generating activities, more than fifty consultancies have been undertaken by TAFORI between 1987 and 2009. Five in Community and Farm Forestry, twenty in Management of Natural Forests, five in Plantation Forestry, twelve in Forest Utilisation and eight in Forest Resource Assessment.

TANZANIA FORESTRY RESEARCH INSTITUTE (TAFORI)  
P.O. Box 1854  
Morogoro  
Tanzania

Tel: +255 023-2614498  
Fax: +255 023-2613725

E-Mail: [tafori@morogoro.net](mailto:tafori@morogoro.net)  
Website: [www.tafori.org](http://www.tafori.org)



Perth to increase catchment water yield.

Climate change promises to have a profound effect on Australian forests. 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 are likely to detract from forest growth, and to increase vulnerability to pests and diseases, and particularly fires. In some regions of southern Australia droughts and fires have already significantly damaged the forest estate.

## ■ New Zealand

### *History*

New Zealand forestry originally followed the Commonwealth "norm" of a Forest Service responsible for a government forest estate, within which a Research Section carried out research. Today, the NZ Forest Service is no longer in existence, the outstanding plantation forests are owned by the private sector and research is carried out by a Crown Research Institute called Scion, (formally the Forest Research Institute which later became Forest Research). Although other New Zealand organisations carry out some research in forestry their contribution is very small compared with that of Scion. The Forest Research buildings, staff numbers and overall budget are much as they were but the research emphasis and sources of funding have changed.

### *Achievements and challenges*

There is now less emphasis on growing forests (and less emphasis on pine plantations), although *Pinus radiata* still dominates (89% by area) New Zealand's plantation resource with its outstanding rate of growth and its very positive response to stand treatment. In the past there was considerable emphasis on plantation regimes but now priorities have changed with a much wider research emphasis – viz, realising the economic potential of environmental values, measuring forestry's

carbon footprint, climate change, unlocking gene data-banks, etc. New Zealand has millions of hectares of marginal land – land currently uneconomic and unsuitable for sustainable intensive food or feed production – and there is ongoing research on how to transform this land so that it is suitable for tree growing.

There is also greater emphasis on increasing the profitability of the New Zealand Forest Industries, especially solid wood processing. As well as a better means of predicting radiata pine quality there is also research on the acetylation which, by modifying physical and chemical properties of wood, has the potential to endow plantation-grown softwoods with the performance properties of the very best tropical hardwoods.

Another important research area is what Scion refers to as the bioeconomy (lignocellulosic materials, bioplastics, bioenergy, etc.). Whilst it is very unlikely to reward forest growers with greater stumpage returns this research could be very important to replace our dependence on fossil fuels.

Some research funding still comes as a central government grant but this is not as generously available as in the past. Increasingly, research funding comes from contracts some of which are with other government organisations, and, unheard of in the past, research funding is now expected to return a profit – in the 2008/2009 year the net profit was some NZ\$2.3 million (on an operating revenue of NZ\$44 million).

Not all Scion's research is directly related to forestry and as the country tries to reduce its national carbon footprint Scion is increasing research in all aspects of carbon accounting.

## ■ Canada

### *History*

Canada, like India and Australia, is a federal nation in which 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 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 as Forintek Canada Corporation. The forest industry funded and set up the 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 has now been combined into FP Innovations. The newly established Canadian Wood Fibre Centre of the Canadian Forest Service takes its research direction from the CEO and Board of FP Innovations as part of the strong relationship between industry and federal research.

Most of the provinces have had their own forest research divisions, but presently only 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, more universities have developed specific forest research programmes, and a number of others have faculty members involved in forest-related research. Academic standards are ensured through an accreditation programme run by the Canadian Forestry Accreditation Board, which has recently changed to a results-based



approach to assessing individual programmes (see *Chapter 5*). Currently, some university forestry programmes are under review and the future composition of university-based forestry education and research in Canada is likely to change significantly in coming years.

The Sustainable Forest Management Network (SFM Network) was established in 1995 as one of Canada's Networks for Centres of Excellence (NCE). It encouraged networking between researchers, governments, industry, First Nations and others, and provided funding for research on all aspects of sustainable forest management. The Network placed particular emphasis on the training of future forestry researchers: 26 students from the programme are now in academic positions in universities in Canada, over 75 are now working for provincial territorial and federal government departments and more than 50 are employed with industry and consulting companies.

**ABOVE**  
Mountain Pine Beetle damage in British Columbia – the epidemic is an example of a climate-mediated event affecting the Canadian forestry sector.



### **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 Forest Program, which includes an international component developed through partners in other countries (*described in Chapter 2*). Canada currently has 14 Model Forests that bring together hundreds of partners, including private citizens, forest companies, parks, Aboriginal communities, provincial governments and universities. Primary funding comes from the Natural Resources Canada – Canadian Forest Service through the Forest Communities Program, with additional support for each Model Forest coming from within its partnership.

### **Future challenges**

As economic events of 2008 were described by both government and industry as "the perfect storm", the future outlook for forestry in Canada can only be positive. However, there are significant challenges ahead. Climate change in particular is creating uncertainty. While many areas may benefit from increased growth rates, the effects on ecosystems are less certain. In addition, warmer climates may make forests more susceptible to pests and disease, with the Mountain Pine Beetle epidemic in British Columbia and the Western Spruce Beetle outbreak in Yukon being good examples of climate-mediated events. Concurrently, the Canadian forestry sector continues to struggle. Exports are still largely focused on the USA, and the sector is therefore dependent on the health of the US economy. Some market diversification is occurring, although while

exports to Asia are increasing, they are still only a small proportion of the exports to the USA.

The future of forestry research and education in Canada is also very uncertain. The federal and provincial governments have cut back forestry research expenditures, and the perilous financial state of most companies means that most industrial R&D is negligible. Universities are also undergoing a period of change, and some of the current departments and faculties seem likely to close. The professional forestry associations remain relatively healthy but will be challenged by the fundamental changes that are occurring in the nature of the profession. As the number of locally trained foresters declines, the associations will need to adopt more flexible approaches to those trained and qualified elsewhere.

Current priorities include woodlands and the environment (understanding the complex interactions between forests and their physical and historic environment) and the protection of trees and forests from threats such as insects and disease remains an important ongoing programme.

### **Commonwealth countries in Europe**

The two European Commonwealth countries with significant forestry programmes are Cyprus and the United Kingdom.

#### **Cyprus**

The Republic of Cyprus has a long tradition of natural and plantation forest management and its forestry training school has a high international reputation. Research is based in the Forest Service and organised on the Indo-Germanic model. Notable research has been carried out into reforestation and forest protection, from which field-tested technologies have been developed. Future challenges include the impacts of climate change.



### *United Kingdom – 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 the UK, and England in particular, was, and still is, very substantially deforested, research was initially focussed on supporting the national policy of creating a national strategic resource of lumber, mainly for mining. 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. Much, if not most, of the planting is done by the private sector, often heavily subsidised by government. The Forestry Departments of the four universities of Aberdeen, Bangor, Edinburgh and Oxford carried out research mainly on British priorities but also on overseas topics.

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, later the Oxford Forestry Institute, played a leading role in tropical forest research on a broad range of subjects. (The Institute closed in 2004; for a brief account of its achievements see Burley et al., 2009). 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.

### *United Kingdom – major achievements*

The research objectives of the Forestry Commission research stations are described as “addressing the social, economic and environmental aspects of sustainable forestry in a multifunctional landscape”. For British forestry the silviculture and management of all the major species for planting (many of which are exotic) have been developed and published and management technologies for all major site types for afforestation published. Current sub-themes in which much progress has been made 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



**LEFT**  
A scientist from the Forestry Commission's Northern Research Station in Midlothian, Scotland, takes soil measurements from the root plate of a windblown Sitka spruce tree.



- 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 an important ongoing programme.

#### **United Kingdom – future challenges**

All of the above are important within the context of climate change, which is now of overriding importance. In November 2009 the Forestry Commission presented its report *Combating climate change – a role for UK forests*, subtitled *An assessment of the potential of the UK's trees and woodlands to mitigate and adapt to climate change*. This report, believed to be the first such national study in response to the 2007 global 4th Assessment Report of the IPCC was published a month before the Copenhagen meeting of the UNFCCC (Read *et al.*, 2009).

The report was prepared by an independent panel of scientists with the following objectives:

- Review and synthesise existing knowledge on the impacts of climate change on UK trees, woodlands and forests;
- Provide a baseline of the current potential of different mitigation and adaptation actions; and
- Identify gaps and weaknesses to help determine research priorities for the next five years.

Considerable detail of priorities for future research is given; the following selective list gives an indication of some of the major identified information domains:

- Role of greenhouse gases in forest dynamics;
- Forest growth and productivity;
- Modelling for decision-making;
- Forest vulnerability;

- Carbon sequestration and stocks;
- Carbon balance of forest operations;
- Carbon accounting models for new species;
- Bioscience and energy;
- Future consumption of biomass fuel and other forest products;
- Economics of ancillary woodland benefits; and
- Limiting factors for species in use.

#### **The Indian sub-continent**

By far the greatest amount of research on the forests of the sub-continent has 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. India itself is a federal country with much of its research decentralised in the states. History and achievements are considered separately for the pre- and post-Second World War periods.

#### **History – pre-WW2**

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 as well as the present day Republic of India. Research on forests in the Indian sub-continent followed the setting up the Indian Forest Service in 1867 under the leadership of Dr Dietrich Brandis, the first Inspector General of Forests, who was appointed in 1864. He brought with him long experience and the principles of sustained management in the forests of Saxony. Government of India research institutions were set up at Dehra Dun (Imperial Forest Research Institute and College, 1906 – now the Forest



Research Institute, FRI). Research was carried out also by silviculturists in individual states; some of these research teams were already well established before 1900.

For the first half of the 20th century the pattern of state ownership of (reserved) forests was the norm, although very large areas of private forests, notably in the self-governing Princely States (of which there were over 600 at the time of independence). Research was carried out both by specialised scientists and by professional foresters within the Forest Service. This structure was used as a model for the smaller countries of the Commonwealth, including Great Britain itself, when the Forestry Commission was established in 1919.

Initially the main concerns of forest research were: documenting the silvicultural characteristics (silvics) of indigenous trees, 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 the traditional forest products and watershed protection, wildlife management was also important.

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

#### **Major achievements – pre-WW2**

Undoubtedly, bringing the bulk of India's forests under sustained yield management through carefully controlled Working Plans was one of the major achievements during this period, so that the forest destruction that had marked the era before the setting up of the Indian Forest Service was a thing of the past. Research and education had played a key role in this.

At the same time an enormous amount of traditional knowledge had been collated and published and many major advances in knowledge also resulted from the work of the silviculturist, 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 been prepared. By the 1920s the silvics of all the major tree species had been studied and published (e.g. Troup, 1921), 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. Extensive studies on properties of wood, bamboo and non-timber forest products were carried out and published.

#### **History – post-WW2**

Almost immediately after the end of the Second World War and long before recovery from the war efforts, all the countries in the region attained independence. Forest research and education, like forest administration, was now centralised in each nation. Continued steady population increase – in some cases more than an order of magnitude greater than that during the colonial

#### **ABOVE**

The latest forest policy for India subordinates direct economic benefit to environmental stability and maintaining ecological balance.

# Council for Scientific and Industrial Research (CSIR) and .....



**T**he CSIR's forestry research team is uniquely placed with research ranging from developing genetically improved planting stock to making use of the latest technologies for analysing wood properties and whole plantations – enabling the client to make sound economic decisions.

In South Africa, the forest, timber, pulp and paper sector contributes more than R12 billion annually, and provides some 170,000 jobs. This contribution to the South African economy can only be sustained with investment in sound research alliances and partnerships, providing a platform for the development of competent researchers and in-depth research capability.

The Forestry and Forest Products Research Centre at the CSIR works closely with the University of KwaZulu Natal, with research and development focused on understanding the fibre characteristics of timber, the properties of the raw material, how this knowledge can add value in processing operations, and how processing can be improved.

The research builds on existing world class capability, and is rendered in support of South African and global forest products companies. The primary focus lies in the optimisation of plantation forest resources grown for the pulp, paper and timber sectors, aimed at maximising fibre quality, value and uniformity of wood fibre entering processing operations. The key value addition lies in supporting companies to better understand the quality of the fibre resources that they own, or buy, and to support them in extracting maximum value from that resource. Key competencies are in wood chemical and physical properties, wood anatomy, pulp and paper manufacture,



# University of KwaZulu Natal (UKZN)



remote sensing, geographic information services (GIS), and tree physiology.

This research capacity is enhanced by the tree improvement research group. Local and international stakeholders are given the opportunity to use applied tree-breeding and genetics expertise to develop their own knowledge or to acquire better trees at a faster rate. This research typically addresses the research needs of afforestation or reforestation planning and planting material supply.

Key competencies in this research area include quantitative genetics, applied tree breeding and tree improvement strategy

development, tree domestication and site-genotype matching.

According to Flic Blakeway, competency area manager for forestry at the CSIR and director of the Centre, their unique advantage is the ability to understand and apply the fact that improved wood quality and thus a better product starts at the genetic level. The different research groups are continuously complementing each other, with research and findings from the one group informing and impacting on the other.

The forestry research teams also maintain strong industry links in South Africa, Africa and abroad, with 13 industry and sector partnerships and research relationships.

For more information, please contact Felicity (Flic) Blakeway at [fblakeway@csir.co.za](mailto:fblakeway@csir.co.za) or visit the website at [http://www.csir.co.za/nre/forestry\\_resources/index.html](http://www.csir.co.za/nre/forestry_resources/index.html).





period – put ever-increasing demands on the forest lands both for farming and forest products.

In 1989 the Indian Council of Forestry Research and Education (ICFRE) was set up to oversee forestry research in India. It comprised eight research stations (including FRI itself) in different agro-ecological zones of the country. Another positive development was the creation in many of the Indian states of Agricultural Universities, 26 of which run courses in forestry; these have now been harmonised by the adoption of a unified MSc syllabus and run in parallel with increasing amounts of forest research, particularly in sociological subjects. India, of course, has by far the largest forest sector in the region but Pakistan, Bangladesh and Sri Lanka exhibit similar trends, with centralised research and similar forest policies.

#### *Major achievements – post-WW2*

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. Forest research provided the scientific basis for many achievements. Among these are the formulation of national forest policy, the development of social forestry programmes, conservation acts restricting the transfer of forest lands to agriculture and other non-forest uses and the recognition of the rights of forest dweller. The latest forest policy for India subordinates direct economic benefit to environmental stability and maintaining ecological balance. A recent result is a wastelands reforestation programme which has been developed for large areas of degraded land.

#### *Future challenges*

The challenges facing forest research today are greater than ever before. Sociological pressures continue to build in relation to the natural and /or managed forests

in most parts of the region and Working Plans are becoming increasingly difficult to administer and implement. India has become the leader in collaborative management of state forests in partnership with local people (Joint Forest Management, described in *Chapter 2*) and many of the areas requiring research relate to changes in forest management, and to dwindling areas of productive forest. The role of NGOs and the private sector in research is increasing steadily, especially in researching the needs of rural people.

Recent initiatives in research in India focus on climate change, biodiversity conservation, bio-informatics and biotechnology. Highlights of recent achievements include strengthening of research institutions by the establishment of an India Forest Information System and creation of an advanced research centre for bamboo and rattan. ICFRE has strengthened its collaboration with UNFCCC, with which it has accredited observer status, and has an accepted proposal for carbon conservation under REDD. Important published work includes guidelines for germplasm testing and studies of carbon sinks under the Clean Development Mechanism (CDM). General research focus includes increasingly poverty alleviation and optimising the value of non-wood forest products and forest services.

#### ■ **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, while natural forest and plantation silviculture and genetic improvement have also been studied.

#### **Future challenges**

Major forest research challenges for South-east 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 impacts of climate change are an increasingly important area of research, especially in coastal areas.

#### ■ **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. For the low-lying islands in particular social and ecological issues resulting from climate changes, notably sea level rises and tsunamis, are likely to be the most important of all.

#### ■ **The Caribbean and South America**

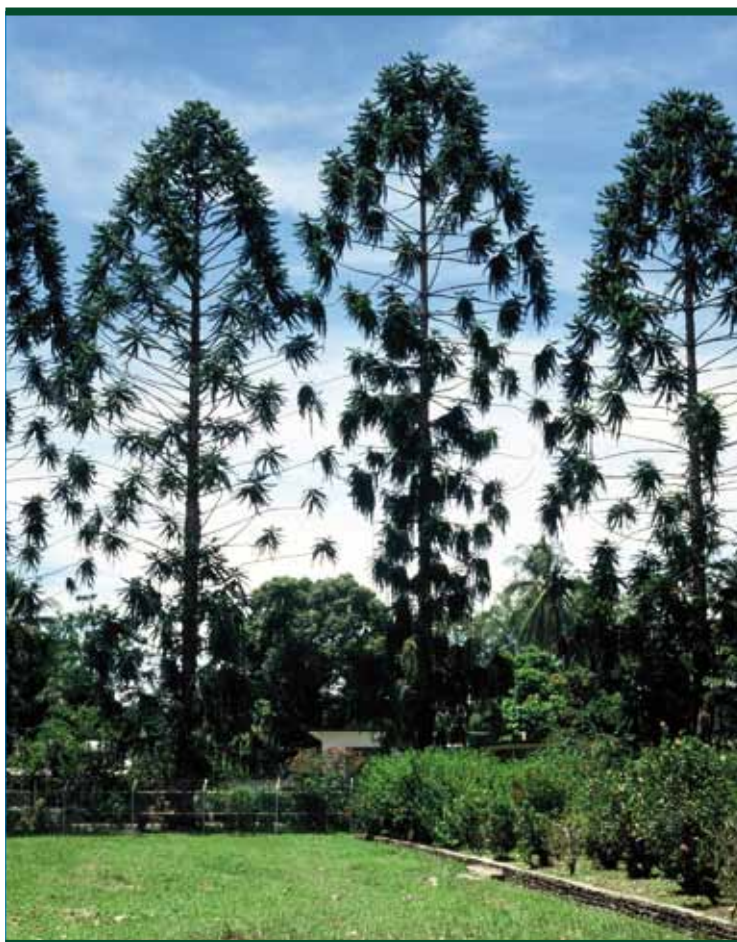
The Commonwealth countries of the region are mostly small islands with small areas of forest; exceptions are Guyana (for a description of Iwokrama Forest see *Chapter 2*) and Belize.

#### **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

#### **BELOW**

*Araucaria* sp. on the campus of the Papua New Guinea Forest Research Institute.





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.

Canada has allocated more than C\$65 million in funding for a new research programme to help the poorest adapt to climate change. The Department for International Development (DFID) of the UK supported a Forest Research Programme (FRP) for developing countries (many of which are Commonwealth) from 1990 to 2006.

### ■ **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 plantations at high altitudes and 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 some way to go. India's Joint Forest Management 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 mitigation of ecological effects of climate change,



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, detection and control of pests and diseases and of invasive species.

Other new directions will include social research related to the growth of urban populations 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.

#### ■ References

- Algar, W.H. (1988), "Forestry and forest products", *Technology in Australia 1788-1988*. Available from: [www.austehc.unimelb.edu.au/tia](http://www.austehc.unimelb.edu.au/tia).
- Brown, A.G. and Beadle, C.L. (eds) (2008), *Plantation eucalypts for high-value timber*, Rural Industries Research and Development Corporation (RIRDC), Canberra, Publication No. 08/113, 182 pp. Available from: <https://rirdc.infoservices.com.au/items/08-113>.
- Burley, J., Mills R.A., Plumtre, R.A., Savill, P.S., Wood, P.J. and Wright, H.L. (2009), "Witness to history: a history of forestry at Oxford University", *British Scholar*, Vol. 1 (2), pp. 88-113, ISSN 1941-6105.
- Carron, L.T. (1985), *A history of forestry in Australia*, ANU Press, Canberra.
- Clifton, C. et al. (2006), "Water, land use change and 'new forests': what are the challenges for south-western Victoria?", *Australian Forestry*, Vol. 69 (2), pp. 95-100.
- Kanowski, P.J. et al. (2005), "Inquiries following the 2002-2003 Australian bushfires: common themes and future directions for Australian bushfire mitigation and management", *Australian Forestry*, Vol. 68 (2), pp. 76-86.
- Kanowski, P. (2006), "Forestry education – where are the students, and what should we do?", *Australian Forestry*, Vol. 69 (4), pp. 241-242.
- Kile, G. (2005), "The hardwood dilemma", *Australian Forestry*, Vol. 68 (4), pp. 229-230.
- Maslin, B. and McDonald, M. (2004), *AcaciaSearch: evaluation of acacia as a woody crop option for southern Australia*, RIRDC, Canberra, Publication No. 03/017, 267 pp. Available from: <https://rirdc.infoservices.com.au/items/03-017>.
- Matheson, A.C. et al. (2006), "Heritability of response to inoculation by pine pitch canker of seedlings of radiata pine", *Australian Forestry*, Vol. 69 (2), pp. 101-106.
- Nambiar, E.K.S. and Ferguson, I. (eds) (2005), *New forests: wood production and environmental services*, CSIRO Publishing, Collingwood.
- Poynter, M. (2005), "Collaborative forest management in Victoria's Wombat State Forest – will it serve the interests of the wider community?", *Australian Forestry*, Vol. 68 (3), pp. 192-201.
- Read, D.J., Freer-Smith, P.H., Morison, J.I.L., Hanley, N., West, C.C. and Snowdon, P. (eds). (2009), *Combating climate change – a role for UK forests: an assessment of the potential of the UK's trees and woodlands to mitigate and adapt to climate change*, main and synthesis reports, The Stationery Office, Edinburgh, ISBN: 978-0-11-497351-3.
- Schirmer, J. and Tonts, M. (2003), "Plantations and sustainable rural communities", *Australian Forestry*, Vol. 66 (1), pp. 67-74.
- Troup, R.S. (1921), *The silviculture of Indian trees*, Clarendon Press, Oxford, 3 vols.
- Turner, J. and Lambert, M. (2005), "Expenditure on forest and forest products research in Australia 1981-1982 to 2001-2002", *Australian Forestry*, Vol. 68 (3), pp. 202-210.
- Underwood, R.J. (2006), "Prospects for high-value hardwood timber plantations in the dry tropics of northern Australia", *Australian Forestry*, Vol. 69 (2), pp. 142-145.

# What if...



LIVELIHOODS AND LANDSCAPES STRATEGY

- ... governments really understood the importance of forests to rural livelihoods?
- ... more of the value of forest services reached forest dependent peoples?



... we broke down the barriers  
preventing local control over forests?

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# International Union for Conservation of Nature

***Lost and degraded forests are not a lost cause. Why are we not restoring more of the world's forests? There is a huge opportunity!***

**Two-thirds of the earth's original forest cover has been lost.**

**More than three quarters of the world's forests are lost or degraded.**

**Only about one fifth remains relatively undisturbed.**

In the decade between 1990-2000 the world lost about 0.22% of its forest each year, and then 0.18% between 2000-2005. While some Commonwealth countries (e.g. India, New Zealand, UK, Swaziland and The Gambia) showed a net increase in forest area, 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.<sup>1</sup>

The continuing global loss and degradation of forests requires urgent action. Measures to tackle deforestation are high up the

political agenda but we can also restore currently degraded forests at the same time, effectively protecting what we have left while bringing back some of what we've lost. As Truman Young<sup>2</sup> argues, it's about a mindset that is not just dominated by combating loss in the short-term, but also about promoting recovery in the long-term.

This is important for our future, and the future of our planet. With a global population already approaching 7 billion, and forecast to increase to more than 8 billion by 2025, the pressure on all of our natural resources is immense. But the area of forest continues to shrink and what's left is increasingly degraded. With this comes the loss of the forest goods and services that we all depend on, like a secure supply of clean water, wood for fuel and timber, and habitat for wildlife.

Of course, not all converted or degraded forests are suitable for restoration. Some of the world's most productive agricultural lands were once forests and will remain in agriculture, as will urban and industrial areas that were previously covered by forest. However, vast areas that are only marginally productive could grow

trees once more, and those trees could perform many functions and meet multiple demands.

A recent study for the Global Partnership on Forest Landscape Restoration estimated that more than 1 billion hectares of lost forests and degraded lands are suitable and available for restoration (<http://www.ideastransformlandscapes.org/>). This is equivalent to an area the size of Canada.

These are the landscapes of opportunity.

The global carbon sequestration potential of restoration of this area has been estimated conservatively as at least 70Gt carbon, comparable to that from avoided deforestation – so the two strategies must go hand in hand.

Even though the December 2009 Copenhagen climate change summit was not as successful as had been hoped, it did result in detailed negotiations on a mechanism on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (REDD). Within this a major shift in thinking was seen from a narrow focus on avoided deforestation to a broader approach to REDD that encompasses the “plus” – including the role of restoration in enhancing forest carbon stocks, as well as

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<sup>1</sup> Commonwealth Forestry Association (2007). Commonwealth Forests: An overview of the Commonwealth's forest resources.

<sup>2</sup> Young, T. P. (2000). "Restoration ecology and conservation biology." *Biological Conservation* 92: 78-83.

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conservation and the sustainable management of forests. A REDD-plus mechanism has the potential to catalyse unprecedented support for forest restoration.

The good news is that forests can and do recover. People around the world, including in many Commonwealth countries, are restoring forest landscapes in different ways and for multiple purposes, such as:

- Climate change mitigation through carbon sequestration
- Contributions to rural livelihoods and better access to firewood
- Increased food security
- Security and quality of the water supply
- Reduced risk of flooding and mud slides
- Biodiversity conservation, and
- Production of forest products to serve markets near and far.

Fortunately, there are countless examples of successful landscape restoration around the world, from Australia to India, Ghana, Uganda and the United Kingdom, amongst many others.

For years the indigenous Benet People living around Mount Elgon National Park in Uganda have suffered the effects of marginalisation and severe landscape degradation that have impacted on their forests' capacity to deliver their

livelihood needs. With IUCN support, communities have identified barriers to landscape restoration, one of the most important being uncontrolled livestock grazing. By developing a community land management by-law, more than 20 km of contours have been planted and 1000 ha of Benet landscape has been restored. This has created a more productive landscape in which agriculture and non-timber forest products can make better contributions to livelihoods. At the same time, pressure on the resources within the National Park area is now under better control.

In the Indian state of Orissa in the buffer zone of the Simlipal Tiger reserve, long-term restoration of the forest-agriculture matrix has been based not on planting trees, but on changing governance structures. Institutional development is the key to the whole process in the landscape and Winrock International India and IUCN have assisted community groups in their application of participatory resource management principles. This helps ensure that the benefits of non-timber forest products are more equitably shared and provide incentives for villagers to better manage and enhance areas of woodland. The

Orissa Forest Department has been supportive and with their help drives for awareness building for bio-diversity conservation, forest protection and livelihood enhancement have become routine. Joint Forest Management committees and other forest protection groups have been integrated up to the district level, giving the groups more influence over the decisions that affect them. Increasingly the village Joint Forest Management committees now look beyond the forest, seeing management of the broader landscape as the goal.

So, we can do it. We can restore the balance between man and nature in forest landscapes. Experiences around the world show this. But it isn't happening on the scale that's needed.

Our challenge together is to do what needs to be done to turn today's loss into tomorrow's gain.

*Carole Saint-Laurent, Senior Forest Policy Advisor, IUCN & Coordinator, Global Partnership on Forest Landscape Restoration.*

*James Gordon, Livelihoods and Landscapers Strategy, IUCN ([www.iucn.org/forest](http://www.iucn.org/forest)).*



## The Commonwealth and the International Forestry Dialogue

By Jim Ball, Chair, Commonwealth Forestry Association

**T**his chapter describes the international forestry dialogue which has been ongoing since the UN Conference on Environment and Development (UNCED) in 1992. It includes both meetings and participation in the Conventions and Agreements.

### ■ International forestry-related events

This section covers the Commonwealth Forestry Conference and 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.

#### *The Commonwealth Forestry Conference*

The Commonwealth Forestry Conference is an informal forum for foresters, and all those with an interest in the forestry sector, to meet to exchange knowledge and

experience. Meetings are hosted by different Commonwealth countries 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 Commonwealth Heads of Government Meeting (CHOGM) which is held every two years. In recent years CHOGM has focused on climate change issues; in 2007 (Uganda) it issued the "Lake Victoria Commonwealth Climate Change Action Plan" while at the meeting in November 2009 (Trinidad & Tobago) – see [www.chogm2009.org/home](http://www.chogm2009.org/home) – it delivered the Port of Spain Consensus to the 15th Conference of the Parties (COP) of the UNFCCC which was held in Copenhagen in December 2009 (see below) noting that there were only "a few short years" remaining to address the threat of climate change and that an international, legally-binding agreement was essential.

#### BELOW

Delegates to the 3rd British Empire Forestry Conference in September 1928 pose for a group photo at Albert Hall in Canberra, Australia.







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 SCCF 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 in the UK.



Venues and Themes of Commonwealth Forestry Conferences

TABLE 7.1

Year	Location	Theme*
1920	United Kingdom (London)	
1923	Canada	
1928	Australia and New Zealand	
1935	South Africa	
1947	United Kingdom	
1952	Canada	
1957	Australia and New Zealand	
1962	East Africa	
1968	India (New Delhi)	Changing objectives of forest management
1974	United Kingdom	The forest and global environment
1980	Trinidad & Tobago	Forestry's contribution to social and economic development
1985	Canada (Victoria)	Investment in forestry – the needs and opportunities
1989	New Zealand (Rotorua)	Forestry – a multiple-use enterprise
1993	Malaysia (Kuala Lumpur)	People, the environment and forestry – conflict or harmony
1997	Zimbabwe (Victoria Falls)	Forestry in a changing political environment: challenges for the 21st century
2001	Australia (Fremantle)	Forests in a changing landscape
2005	Sri Lanka (Colombo)	Forestry's contribution to poverty reduction
2010	UK (Edinburgh)	Restoring the Commonwealth's forests: tackling climate change

\* There were no themes before 1968.

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 the UK. *Table 7.1* shows all of the venues and the themes for recent Conferences.

Discussions in the early Conferences were related to general aspects of forest management but themes have been introduced since 1968 to broaden discussions and



focus them on the changing priorities of the forestry sector. 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 has rarely been more than about 400, and the atmosphere has always been low-key and informal, facilitating discussion and the exchange of experiences between Commonwealth foresters.

### *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.

**Venues and Themes of Post-WW2 World Forestry Congresses** TABLE 7.2

Number	Year	Location	Theme*
III	1949	Finland (Helsinki)	
IV	1954	India (Dehra Dun)	
V	1960	USA (Seattle)	Multiple use of forest and associated lands
VI	1966	Spain (Madrid)	Role of forestry in world economic changes
VII	1972	Argentina (Buenos Aires)	Forests and socio-economic development
VIII	1978	Indonesia (Jakarta)	Forests and people
IX	1985	Mexico (Mexico City)	Forest resources in the integral development of society
X	1991	France (Paris)	Forests, a heritage for the future
XI	1997	Turkey (Antalya)	Forestry for sustainable development: towards the 21st century
XII	2003	Canada (Québec City)	Forests, source of life
XIII	2009	Argentina (Buenos Aires)	Forests in development: a vital balance

\* There were no themes before 1960.

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. Themes were introduced from 1970.

The functions of the Congress are advisory, not executive, and participants attend it 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 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 XIII Congress (Argentina) was the best-attended, with over 7,000 participants from 160 nations. It was also remarkable for the message sent to COP-15 (see below) which stated that the Congress “notes with concern the impacts of climate change on forests and strongly emphasise[d] the important role forests play in climate change mitigation and adaptation as well as the need for forest-dependent people and forest ecosystems to adapt to this challenge”. The message stressed that forests represent far more than just carbon sequestration.

The host of the next Congress will be decided at FAO’s Committee on Forestry in October 2010.

### *The IUFRO World Congress*

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 five-year intervals, scientists from all parts of the world to discuss technical and scientific issues related to forestry research and development.

### *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 (YoM), 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 (FAO, 2001); they are complex ecosystems with high biological diversity but sensitive to fluctuations in climate. Mountain forests are also very important to the livelihoods of mountain people and if climate change leads to more frequent and intense storms, mountain regions will become more hazardous to live in, and the downstream effects of these storms could be even more destructive.

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 51 countries, 16 intergovernmental organisations and 98 major groups (e.g. NGOs and the private sector) are members. See [www.mountainpartnership.org](http://www.mountainpartnership.org).

The 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 two 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-

Number	Year	Location	Theme*
X	1948	Zurich (Switzerland)	
XI	1953	Rome (Italy)	
XII	1956	Oxford (UK)	
XIII	1961	Vienna (Austria)	
XIV	1967	Munich (Germany FR)	
XV	1971	Gainesville (USA)	Research's role in the intensification of forestry practices and activities
XVI	1976	Oslo (Norway)	Forestry in a world of limited resources
XVII	1981	Kyoto (Japan)	Research today for tomorrow's forests
XVIII	1986	Ljubljana (Yugoslavia)	Forest research serving society
XIX	1990	Montreal (Canada)	Science in forestry: IUFRO's second century
XX	1995	Tampere (Finland)	Caring for the forest: research in a changing world
XXI	2000	Kuala Lumpur (Malaysia)	Forests and society: the role of research
XXII	2005	Brisbane (Australia)	Forests in the balance: linking tradition and technology
XXIII	2010	Seoul (South Korea)	Forests for the future: sustaining society and the environment

\* There were no themes before 1971.

induced factors and by climate change and causes land degradation with potentially devastating consequences in terms of social and economic costs. See [www.iydd.org](http://www.iydd.org).

An International Year of the Forest was held in 1985, with the theme of *Forestry and Food Security*. It was organised by FAO. In 2011, the *International Year of Forests* will be celebrated, with the aim of raising awareness and promoting global action to sustainably manage, conserve and protect the world's forests. The UN General Assembly, which proclaimed the Year, requested the secretariat of the United Nations Forum on Forests (UNFF) of the Department of Economic and Social Affairs to serve as the focal point for the implementation of activities for the observance of the Year,



in collaboration with Member States, and with the Collaborative Partnership on Forests (CPF) among others. The Year will follow the International Year of Biodiversity in 2010, which is being organised by the secretariat of the Convention on Biological Diversity.

The Year will be officially launched at UN Headquarters New York during the ninth session of UNFF (24 January-4 February 2011). A concept paper is being developed which will be presented in 2010 (see [www.un.org/esa/forests/2011](http://www.un.org/esa/forests/2011)).

#### *International and national forestry-related Weeks and Days*

The first World Forest Week was organised by FAO in March 2009, in conjunction with FAO's Committee on Forestry (COFO). It focused on two topics:

- Sustainable forest management and climate change; and
- Adapting forest policies and institutions to change.

It built on the success of two regional forest weeks held in 2008:

- Asia-Pacific Forestry Week, April, Hanoi, Vietnam ([www.fao.org/forestry/44155/en/](http://www.fao.org/forestry/44155/en/)); and
- European Forest Week, October, Rome, Italy and Brussels, Belgium ([www.europeanforestweek.org/home/en/](http://www.europeanforestweek.org/home/en/)).

The first Arbor Day was celebrated in Nebraska, USA in 1872. The FAO Conference proposed in 1971 that a World Forestry Day should be held on 21 March 1973, but it does not seem to have been acted upon by FAO<sup>1</sup>. There is a World Environment Day, 5 June, established by the UN General Assembly in 1972 to mark the opening of the Stockholm Conference on the Human Environment, which is organised by the UN Environment Programme (UNEP). The theme for 2009 was *Your*

<sup>1</sup> Editor's note: I recall being involved in discussions on re-instating the World Forestry Day in FAO in the 1990s, but a major problem is finding a season suitable for planting trees for all countries.

*Planet Needs You – Unite to Combat Climate Change* (see [www.unep.org/wed/2009](http://www.unep.org/wed/2009)).

A Forest Day has been celebrated at the annual COP of the UNFCCC since 2007. Forest Day 3, at COP-15 in Copenhagen, considered how to include forests in climate change considerations, moving on from considering whether to include forests in the previous two Days.

Since 2003 International Mountain Day has been celebrated on 11 December each year. It aims to create awareness about the importance of mountains to life, to highlight the opportunities and constraints in mountain development and to build partnerships that will bring positive change to the world's mountains and highlands. See [www.fao.org/mnts/intl\\_mountain\\_day](http://www.fao.org/mnts/intl_mountain_day).

A number of countries have national forestry days. Maple Leaf Day, celebrated on the last Wednesday of September, during National Forest Week, is the day on which Canadians are urged to reflect on the link between their lives and the maple leaf – symbolising Canada's historic economic and environmental link with trees. New Zealand has celebrated its national Arbor Day since 1892, and since 1977 on 5 June yearly. Malaysia holds World Forestry Day on a date close to 21 March each year, with an appropriate theme; in addition each of the 12 states of the Malaysian Federation also do so. The states of Victoria and New South Wales in Australia celebrate World Forestry Day, the former on 27 September, the latter on 21 March every year. Jamaica commemorates National Tree Planting Day yearly in October.

#### ■ Commonwealth countries and international forestry fora and forestry-related agreements

"Climate change cannot be won without the world's forests. This, however, will be a complex and challenging feat. Nonetheless, it is one of the best large-scale investments we can make against climate change that could result in an equally large-scale dividend."



Ban Ki-moon, UN Secretary-General, September 2008.

“Given the scale of emissions from deforestation, any climate change deal that does not fully integrate forestry will fail to meet the necessary targets.”

Nicholas Stern, 2006.<sup>2</sup>

Commonwealth countries are strongly involved in all of the main international forestry-related fora and conventions. Links are given in *Annex 7.1* and membership of each in *Annex 7.2*.

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

#### Forestry-related fora

The UN Conference on Environment and Development (UNCED) was held in Rio de Janeiro (Brazil) in 1992. It issued the Rio Declaration on Environment and Development, Agenda 21 (a programme of action for sustainable development, of which Chapter 11 refers to forests), and the non-legally binding authoritative statement of principles for a global consensus on the management and sustainable development of all types of forest. From UNCED came the major environmental agreements, the CBD, UNFCCC and UN Convention to Combat Desertification (UNCCD), described below, as well as the UN Commission on Sustainable Development (UNCSD).

The World Summit on Sustainable Development (WSSD) met in 2002 in Johannesburg, South Africa, 10 years after UNCED – hence the alternative title “Rio+10”. It adopted two documents: the Johannesburg Plan of Action and the Johannesburg Declaration on Sustainable Development. The emphasis moved from the environment to people.

<sup>2</sup> [www.hm-treasury.gov.uk/independent\\_reviews/stern\\_review\\_economics\\_climate\\_change/stern\\_review\\_report.cfm](http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm).



**LEFT**  
Ban-ki Moon:  
climate change  
cannot be won  
without the  
world's forests.

Before that the Millennium Summit had been held in 2000 in New York. It adopted the Millennium Declaration whose themes were elaborated into the Millennium Development Goals (MDG). The MDG comprise eight overarching goals, 18 targets and 48 indicators; MDG 7 – “achieve environmental sustainability” – is directly related to forests, although the others are also linked to differing degrees.

UNFF was established in 2000 by the Economic and Social Council of the United Nations (ECOSOC), in its

**BELOW**  
WSSD moved the  
emphasis from the  
environment to  
people.





Resolution 2000/35. UNFF succeeded the Intergovernmental Panel on Forests (IPF), which had been established in 1995, and the Intergovernmental Forum on Forests (IFF). The principal objective of UNFF is the promotion of "... 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. UNFF has adopted over 270 proposals for action towards sustainable forest management, which had previously been identified by the IPF/IFF processes (see [www.un.org/esa/forests/](http://www.un.org/esa/forests/)).

Sessions of UNFF are held every two years, the most recent being in 2009 at UN Headquarters in New York. Perhaps the most significant outcome of these was the adoption of the Non-legally Binding Instrument on All Types of Forests (NLBI) at the 7th Session in 2007, a reiteration of the agreement reached at UNCED in 1992 (the Forest Principles). A report on UNFF-7 can be found in *CFA Newsletter*, No. 37 of June 2007, which drew attention to one of the positive features of the agreement in that it makes reference for the first time to "sustainable forest management (SFM), as a dynamic and evolving concept, aiming to maintain and enhance the economic, social and environmental values of all types of forests, for the benefit of present and future generations". Some countries, however, were dissatisfied with the NLBI and a group of 30 "like-minded countries" met by invitation during UNFF-7 to consider a Canadian draft for a legally binding instrument.

Since the time available at regular sessions is limited for in-depth discussion, several member countries have organised expert meetings to review, before the two-yearly sessions, the complex and often politically sensitive forestry issues included in the UNFF multi-year programme of work. Two recent examples of Common-

wealth involvement in country-led initiatives (CLI) are the Workshop on Forest Governance and Decentralisation in Africa, (South Africa and Switzerland) and the Australian-Swiss Region-led Initiative on regional input in support of the UN Forum on Forests, both in 2008.

The Collaborative Partnership on Forests (CPF) is a voluntary arrangement among 14 international organisations and secretariats with substantial programmes on forests.<sup>3</sup> Its mission is "to promote the management, conservation and sustainable development of all types of forest and strengthen long-term political commitment to this end". One of its objectives is to support UNFF and its member countries through the provision of major inputs to UNFF and other important international forest dialogues, including the UNFCCC, CBD and UNCCD. In 2008 it prepared the CPF Strategic Framework for Forests and Climate Change, a proposal for a coordinated forest-sector response to climate change (see [www.fao.org/forestry/16639-1-0.pdf](http://www.fao.org/forestry/16639-1-0.pdf)).

ITTO's origins lie in the fourth session of the UN Conference on Trade and Development (UNCTAD) which negotiated the International Tropical Timber Agreement (ITTA) in 1983 (see below under forestry-related agreements). ITTO was established in 1986 amidst increasing worldwide concern for the fate of tropical forests and in the belief that the tropical timber trade was one of the keys to economic development in developing countries with tropical forests.

ITTO is both a commodity agreement – related to trade and industry – and environmental agreement, concerned with the sustainable management of forests. Its members are divided into producing and consuming countries, of which there are 33 and 26 respectively.

ITTO develops internationally agreed policy documents to promote sustainable forest management and

<sup>3</sup> These are CIFOR, FAO, ITTO, IUFRO, CBD, the Global Environment Facility (GEF), UNCCD, UNFF, UNFCCC, the UN Development Programme (UNDP), UNEP, ICRAF, the World Bank and IUCN.



forest conservation and assists tropical member countries to adapt their policies and implement them through projects. ITTO also collects, analyses and disseminates information on the production and trade of tropical timber and funds a range of projects and other action aimed at developing industries at both community and industrial scales.

### Forestry-related agreements

The forestry-related agreement that has been most in the news in recent years is the UNFCCC. It set out a framework for action to stabilise greenhouse gases<sup>4</sup> (GHG) to avoid “dangerous anthropogenic interference with the world’s climatic system”. It came into force in 1994 and 190 countries have now ratified it. Climate change is believed to be one of the greatest threats to sustainable development with serious impacts on the environment and natural resources, human health, food security, economic activity and poor and disadvantaged groups. The need for international action to ameliorate climate change was recognised in the Commonwealth Climate Change Action Plan, issued by CHOGM in 2007<sup>5</sup> for example.

The world’s climate varies naturally, but scientists agree that rising concentrations of anthropogenically-produced GHG in the Earth’s atmosphere are leading to changes in it. Anthropogenic climate change is the result of increasing GHG emissions caused or influenced by development factors such as economic growth, technology, population and governance; and evidence of climate change impacts on both natural and human systems is increasing. There are, however, large differences in emissions of GHG among countries, and *Annex 1.2* shows the wide range in CO<sub>2</sub> emissions, from 0.1 tonne/head/year in Mozambique or Rwanda to 20

tonnes/head/year in Canada or nearly 30 tonnes/head/year in Guyana.

A review of the economics of climate change, with some mentions of forestry, which continues to attract international notice, is the Stern Review Report on the Economics of Climate Change which was made to the UK Treasury in October 2006 (*reference at footnote 2*). 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 stabilised at 450 parts per million carbon dioxide equivalent (ppm CO<sub>2</sub>e) and a 10% chance of temperatures exceeding 5°C if GHG emissions are stabilised at 550 ppm CO<sub>2</sub>. Stern stated that the global community should aim to stabilise GHG emissions in the range of 450-550 ppm CO<sub>2</sub> since 450 ppm CO<sub>2</sub> would be difficult to achieve given the current stock of GHG in the atmosphere. Furthermore, the risk of “very harmful impacts” increases significantly at stabilisation above 550 ppm CO<sub>2</sub>.

Negotiations of the UNFCCC have been assisted by the comprehensive assessments of climate change

**Commonwealth Members of ITTO in 2009** TABLE 7.4

<i>Producing countries</i>	<i>Consuming countries</i>
<b>Africa</b>	Australia
Cameroon	Canada
Ghana	New Zealand
Nigeria	United Kingdom
<b>Asia &amp; Pacific</b>	
Fiji	
India	
Malaysia	
Papua New Guinea	
Vanuatu	
<b>Latin America</b>	
Guyana	
Trinidad & Tobago	

4 The gases include CO<sub>2</sub> but also methane and nitrous oxide.

5 See [www.thecommonwealth.org/document/34293/35144/173014/climateactionplan.htm](http://www.thecommonwealth.org/document/34293/35144/173014/climateactionplan.htm).



prepared by the IPCC. The IPCC, which was established by the World Meteorological Organisation and UNEP in 1988, has undertaken four global Assessment Reports (AR) – in 1990, 1995, 2001 and 2007. The next is due in 2014. The IPCC has stated that the effects of climate change have already been observed, and precautionary and prompt action is necessary to mitigate and adapt to the effects. The Fourth AR calculated that about 20% of anthropogenic CO<sub>2</sub> emissions during the 1990s resulted from land use change, primarily deforestation, although 25% of total emissions were believed to be absorbed by terrestrial ecosystems.

Forests are considered by the UNFCCC as sinks (which remove and store greenhouse gases from the atmosphere) or as sources of those gases, depending on the age of the forest, the management regime and the effects of disturbances such as insect or pest attack or forest fires. The reduction of deforestation and land degradation and the increase in forest cover are vital for both mitigation and adaptation.

The Kyoto Protocol was agreed at COP-3 of the UNFCCC in Kyoto, Japan in 1997. It came into force in 2005 and currently has been ratified by 184 countries. It commits industrialised countries and countries in with economies transition to a market economy (known as Annex I parties) to emission reduction targets of six greenhouse gases by an average of 5.2% below 1990 levels between 2008-2012 (known as the first commitment period), with specific targets which vary among countries.

Annex 1 countries may include in their target the emissions and removals of GHG deriving from certain direct human-induced land-use change and forestry activities, including removals from afforestation<sup>6</sup> and reforestation<sup>7</sup> and emissions from deforestation, as well

6 Defined as planting of new forests on lands that have not been forested for a period of at least 50 years.

7 Limited in the first commitment period to those lands that did not contain forest on 31 December 1989.

as possible emissions and removals from forest management, the management of cropland and grazing land, and re-vegetation. In addition, project-based activities under two flexible mechanisms created by the Kyoto Protocol – Joint Implementation (JI) and the Clean Development Mechanism (CDM)<sup>8</sup> – could count towards an Annex 1 country's reduction commitment.

At COP-11 (2005, Montreal, Canada) forests were discussed under the agenda item "Reducing emissions from deforestation in developing countries: approaches to stimulate action", proposed by Papua New Guinea among nine other countries.

Two workshops were held on this issue in 2006 in Rome, Italy, and in 2007 in Cairns, Australia then discussions continued at COP-13, where the Bali Action Plan was adopted. This addressed enhanced national and international action on climate change mitigation, including, *inter alia*, "consideration of policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation in developing countries, and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries". In further talks on a financial mechanism to compensate developing countries for the recovery and maintenance of carbon stocks in forests, it has been suggested that it should cover three areas:

- Reduced emissions from deforestation and forest degradation in developing countries (REDD);
- Conservation, sustainable management of forests, and stock enhancement in addition to REDD (REDD+); and
- All terrestrial carbon in addition to REDD+ (REDD++).

8 JI projects are those undertaken jointly by two Annex I countries while CDM projects are those undertaken in developing countries.





There is also the UN Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries, known as the UN-REDD programme, developed by three partners – FAO, UNDP and UNEP. It was created to assist developing countries to answer some of the questions related to REDD and to help them prepare to participate in a future REDD mechanism. There are nine initial country programme activities in Africa, Asia and Latin America, including Papua New Guinea, Tanzania and Zambia with Sri Lanka as one of the observer countries.

The Prince's Rainforests Project (PRP) which was set up in 2007 by HRH The Prince of Wales has the goal of "making the forests worth more alive than dead". The project focuses on two objectives:

- To identify appropriate incentives to encourage rainforest nations to slow their deforestation rates; and
- To raise awareness of the link between rainforests and climate change.

An Informal Working Group on Interim Finance for REDD (IWG-IFR) was established in 2009, which has issued its first report outlining an interim Emergency Package that could deliver reductions in deforestation of around 25% by 2015, with an estimated funding requirement of between €15 and €25 billion. The Emergency Package would fill the current funding gap that exists before the money to be raised under the UNFCCC negotiations is widely available to rainforest nations.

The Forest Carbon Partnership Facility (FCPF) of the World Bank aims to assist developing countries in their efforts to reduce emissions from deforestation and forest degradation by providing value to standing forests. It will help to build the capacity of developing countries in tropical and subtropical regions to reduce emissions from deforestation and forest degradation, and to tap into any future system of positive incentives for REDD – a form of Payment for Environmental Services (PES).

The Adaptation Fund was established by the Parties to the Kyoto Protocol to finance concrete adaptation projects and programmes in developing countries that are Parties to the Protocol. It is financed by 2% of the Certified Emission Reduction (CERs) issued for projects of the CDM and with funds from other sources.

The negotiations of COP-15, held in Copenhagen, Denmark in December 2009 attracted strong international attention well before the event. It was one of the largest gatherings of the world's leaders ever in its final two days, and for that reason it had been hoped that the outcome would be a legally binding agreement with quantified emission reduction targets. It was not to be; given the very large difference in stage of development and CO<sub>2</sub> emissions between countries (see *Annex 1.2*) it is not surprising that many developing economies felt it was hardly up to them to make economic sacrifices. Some countries, however, including members of the Commonwealth, agreed the text of the Copenhagen Accord but this was only "taken note of" in the final plenary session. The Accord (see [http://unfccc.int/files/meetings/cop\\_15/application/pdf/cop15\\_cph\\_auv.pdf](http://unfccc.int/files/meetings/cop_15/application/pdf/cop15_cph_auv.pdf)) includes text on future consultations and analysis, and countries willing to do so were able to register support for the Accord by the end of January 2010.

But the outcome for the forestry sector was more positive: a new body was established on REDD+ and six nations (including Australia and the UK) had already pledged US\$3.5 billion between 2010 and 2012 as contribution to a much larger fund of US\$25 billion which the six nations stated was to "slow, halt, and eventually reverse deforestation" (UK Government Press Release, 17 December 2009) in developing countries – the gathering of pledges to which had been led by the Prince's Rainforest Project. But targets and timetables were still lacking for the aim of slowing or stopping deforestation.

The CBD, which entered into force in 1993, has been ratified by 190 countries. It is an international legal

**RIGHT**

The outcome of COP-15 for the forestry sector was more positive – delegates attend Forest Day 3.

instrument for the conservation and sustainable use of biological diversity whose website describes it as recognising “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”. Its Strategic Plan (adopted in 2002) commits the signatories “to achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on Earth”. One of the Thematic Programmes of the CBD is concerned with Forest Biodiversity, which notes that forests are: “biologically diverse systems, representing some of the richest biological areas on Earth. They offer a variety of habitats for plants, animals and micro-organisms. However, forest biodiversity is increasingly threatened as a result of deforestation, fragmentation, climate change, and other factors.”

The UNCCD, whose full title is the Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification Particularly in Africa, entered into force in 1996 and now has 192 member countries. The Secretariat is in Bonn, Germany but the International Fund for Agricultural Development (IFAD), based in Rome, administers the Convention’s Global Mechanism (GM).

The UNCCD recognises the physical, biological and socioeconomic aspects of desertification, the importance of redirecting technology transfer so that it is demand-driven, and the involvement of local communities in combating desertification and land degradation.

The Ramsar Convention on Wetlands, whose full title is the Convention on Wetlands of International Importance, is one of the oldest of the environmental treaties; it has been ratified by 159 countries. It is an intergovernmental treaty that provides the framework for national action and international cooperation for the



conservation and wise use of wetlands and their resources. The treaty was adopted in the Iranian city of Ramsar in 1971 and came into force in 1975.

CITES, the Convention on International Trade in Endangered Species of Wild Fauna and Flora, includes a number of forest species (see *Annex 7.3*). There are five forest tree species included in Appendix 1, which are endangered due to international trade and whose trade is only permitted in exceptional circumstances. There are 19 Appendix 2 forest tree species – including one tree fern – that may become endangered if trade is not regulated through controls to prevent unsustainable use, including several that occur in Commonwealth countries such as *Prunus Africana* from West Africa and several *Taxus* spp. (South Asia). There are eight Appendix 3 tree species (species that are subject to domestic regulation), none of which have been declared by Commonwealth countries.

The ITTA is the international treaty under which ITTO operates. It entered into force on 1 January 1997, superseding the International Tropical Timber Agreement, 1983. It focuses on the world tropical timber economy and the sustainable management of the resource base, encouraging both the timber trade and the improved management of the forests. In addition, it contains provisions for information sharing, including non-tropical timber trade data, and allows for the consideration of non-tropical timber issues as they relate to tropical timber.

#### ■ 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). There are 11 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.

- Southern African Development Community (SADC, formerly SADCC). There are 13 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 – [www.mcpfe.org](http://www.mcpfe.org)) has 40 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 10 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 ACS are *inter alia* the strengthening of regional cooperation; 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 UNFF.

### ■ Forest law, enforcement and governance

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

The G-8, meeting in Birmingham, England in May 1998, launched the G-8 Action Programme on Forests, and considered the impact of illegal forest activities so great that a resolution (VI) was included to reduce illegal logging<sup>9</sup>. 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*, No. 30 of September 2005).

Besides the G-8 Action Programme on Forests other international action has included:

- Forest Law, Enforcement and Governance (FLEG) Conferences in East Asia 2001, Africa 2003, Europe and North 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;
  - US President's Initiative against Illegal Logging, 2003;
  - G-8 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.
- Some 71% 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 sources<sup>10</sup>, while big building companies, which account for 70% of consumption, are adopting the same policy.
- The Timber Trades Federation<sup>11</sup>, which represents the timber industry in the UK, is taking action through:
- An Indonesian Action Plan (with the Netherlands and Belgium);
  - The EU €7 million 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.

9 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/>.

10 See *CFA Newsletter*, No. 27 December 2004.

11 UK Timber Trade Federation [www.ttf.co.uk](http://www.ttf.co.uk) and *CFA Newsletter*, No. 30 of September 2005.



### ■ Debt for nature swaps

A method of financing conservation projects in developing countries is through debt-for-nature swaps. Conservation and other international organisations 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% 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 June 2006), while the second, a Tropical Forest Conservation and Debt Reduction Agreement, was signed between Botswana and the USA (*The Voice*, Francistown, 10 October 2006).

### ■ Summary

Forests and forestry are the focus of a great deal of international attention, and Commonwealth

countries have played an important part in international forestry-related conventions, agreements and meetings.

Climate change is the international environmental issue attracting most attention at present; in relation to forests the provisions of the Kyoto Protocol could have considerable potential for attracting funds through various mechanisms including the newly-established REDD+ to the conservation and establishment of forests because of their role in sequestering carbon. It still remains to be seen, however, whether this potential will be realised, and how.

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



**LEFT**  
Processing roundwood in Venda, South Africa – initiatives to buy timber only from legal and sustainable sources are helping to promote the good governance of forests.

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# Sustainable Forest Management in South Africa

Forest resources provide significant environmental goods and services that benefit South African society. Although the 43 million ha of forests cover only 35.8% of the country, the forest sector contributes R14.8 billion to the economy (DWAF, 2008), representing 11.6% of total export earnings. In South Africa forestry resources, in particular woodlands, contribute significantly to rural livelihoods and income generation through fuelwood, construction materials, medicinal plants and a range of other non-timber forest products. Seventy percent of people living in rural areas are poor with three out of four children living in households with incomes below the minimum subsistence level (Quan, 2008). This creates huge pressure on natural resources, leading to degradation and depletion. For this reason, it is necessary to put in place measures to ensure sustainable utilisation of forest resources for the continued benefit of future generations. This paper reviews sustainable forest management in South Africa and outlines programmes that have been put in place to ensure achievement of the objectives of sustainable forest management.

## Sustainable Forest Management (SFM)

Sustainable forest management has broad social, economic and environmental goals. One of the driving forces behind SFM is the Rio Declaration on Development and the Environment, adopted by more than 178 governments at the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992.

## Forest resources in South Africa

Natural forests are valued for many different reasons in South Africa. They cover an estimated area of 492,700 ha, which is less than 0.4% of land surface

of South Africa (DWAF, 2007). But they have the highest biodiversity per unit area of any biome in South Africa. Woodlands represent the dominant vegetation type in South Africa covering an area of more than 39 million ha (Mucina and Rutherford, 2006), of which more than 5.7 million ha are within protected reserves. Commercial plantations cover approximately 1.26 million ha of the country and over 80% of them occur in the three provinces of Mpumalanga, KwaZulu-Natal and Eastern Cape. Approximately 68% of the area covered by plantation estates in South Africa is planted with exotic tree species.

## Programmes

The National Forests Act (NFA) of 1998 recommends the development of a set of Principles, Criteria, Indicators and Standards (PCIS) which the government uses to monitor and report on progress towards SFM. Besides the PCIS, other programmes were put in place including Participatory Forest Management (PFM), the main purpose of which is to encourage community participation in the management of forests; Forest Enterprise Development (FED) the use of forestry resources to establish forestry business and ensure that Small, Medium, and Micro Enterprises (SMME) benefit; and most recently the Forest Sector Broad Based Black Economic Empowerment (BBBEE) Charter which provides for transformation and growth of the sector. It opens opportunities for more people to participate in the mainstream economy. If communities living adjacent to forests do not participate meaningfully in their management it will result in the lack of appreciation of the value and significance of the resource. This could also result in unsustainable harvesting practices, uncontrolled fires and lead to deforestation.

## Challenges

The key challenge in implementing the PCIS is the availability of human and financial resources. Reporting is also a challenge due to lack of self audits as well as District, Regional and National audits. Another challenge is that woodlands are distributed over large areas, and are often inhabited by vulnerable communities who are heavily dependent on these woodlands for sustenance. This could result in over utilisation of the resources with resultant deforestation. In terms of the implementation of the PFM programme the main challenge is to manage expectations. Participants have high expectations, such as employment opportunities and when these expectations are not realised, the objectives of the programmes tend to suffer. Implementation of the Forest Sector BBBEE Charter is still in its infancy, but the challenge rests in growing the sector, especially with limited land available for further afforestation and water constraints.

## Conclusion

Participation by local communities in forestry management issues will go a long way to ensure sustainable management of forests resource. The development of the SMME Strategy will help to ensure that communities and SMMEs benefit from forestry resources by ensuring sustainability. Introducing improved information management systems will result in better ways of collecting data to ensure effectiveness of the PCIS as tools for sustainable forest management.

*Andile Churchill Mkwalo and Tebog Mathiane, Department of Agriculture, Forestry and Fisheries, Republic of South Africa.*

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# A vibrant and sustainable forest sector for the lasting benefit of the nation



The Department of Agriculture, Forestry and Fisheries (DAFF), as a custodian of forestry resources in South Africa, is responsible for the promotion of the sustainable management of the country's forest resources for the benefit of the nation. The vision of the forestry sector is "A vibrant, profitable, equitable, sustainable and growing forest sector to be utilised for the lasting benefit of the nation and developed and managed to protect and improve the environment".

In order to realize the vision, DAFF together with its stakeholders have developed a strategy document that maps the path the sector will embark on over the next 20 years. The strategic focus areas are, among others, the expansion of the forest estate; improvement of quality of life through forestry; conservation of forest biological diversity; enhanced and streamlined regulatory environment; securing timber supply and establishment of a knowledge-based forest enterprise.

**For Forestry information contact: The DDG: Forestry**

**DDGForestry@nda.agric.za**

**Tel: 012 319 7886**

**DA-GF-13&14**

**Fax: 012 319 7841**



**agriculture,  
forestry & fisheries**

Department:  
Agriculture, forestry & fisheries  
REPUBLIC OF SOUTH AFRICA



## Main Challenges and Opportunities in Commonwealth Forestry

By Jim Ball, Chair, Commonwealth Forestry Association

**T**he challenges facing Commonwealth foresters are largely the same as those faced by their colleagues worldwide, but the opportunities to resolve them may be greater due to the shared language of Commonwealth countries and their history of collaboration.

This chapter draws out some of the many challenges and opportunities facing the 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 to work together on common problems.

### ■ Challenges

Two of the major challenges facing the world today are climate change and poverty. Forestry is related to both.

Forests and forestry practice may be affected by climate change, may contribute to it, or may mitigate it. The challenge is to reduce both the impact of climate change on forests and the contribution that deforestation makes and to promote the ameliorating role of

forests. The development of the means of implementing REDD+ will be a major challenge – and opportunity.

The rise in sea level associated with climate change will affect Commonwealth countries especially – not just the SIDS and low-lying countries such as Bangladesh but all countries. “We are all Maldivians now,” said the President of the Maldives during a BBC discussion at the Copenhagen COP-15 Summit in December 2009.

Poverty affects many countries in the Commonwealth. For foresters the task is to develop the potential contribution of forests to the alleviation of poverty. Directly, this contribution may consist of the provision of forest fruits or the grazing of livestock, 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. Payments for ecosystem services provided by forests may be important in the future, and it will be important to ensure that such payments reach the poorest and the disadvantaged. Indirectly, the involvement of people in community forestry may contribute to better governance. 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.

The impact of poverty may be reinforced by climate change, for it is likely to affect the poor and disadvantaged the most, for example through drought, or flooding of the low-lying areas where they often live, or salinisation of the poor soils on which they rely for cultivation.

Forest landscape restoration is one way to mitigate climate change and to alleviate poverty. Forests restored in the landscape will provide a range of other environmental benefits, and will contribute to sustainable livelihoods in rural areas. There are several challenges to

#### BELOW

The southern slopes of the Meghalaya Hills in north-east India – forests have a major role to play in combating climate change.







the implementation of such restoration of forests, including political will, funding, the acquisition of suitable sites, the development of techniques and more.

The previous chapters have shown that the challenges facing those who manage the forest resources of the Commonwealth include the following:

Deforestation, where the rate of forest loss for the countries of the Commonwealth appears to have increased slightly since 2000-05. Certain African and South-east Asia-Pacific Commonwealth countries are particularly affected, although in the Americas, South Asia and Europe the loss of forest area has halted.

The high rate of deforestation is reflected also in the loss of primary forest types in Papua New Guinea and in certain African countries. The rate of loss elsewhere appears to have slowed or even stopped.

- Deforestation is matched to a certain extent by afforestation, and the rate of planting seems to be increasing slightly in recent years. Planted forests provide most of the world's industrial wood and fibre, and there is no reason to suppose that the situation is different in Commonwealth countries. Planted forests make up 3.9% of the area of Commonwealth forests in 2010, although much more in certain countries. The challenge will be to continue the rate of establishment, possibly through the encouragement of agro-forestry or innovative means such as outgrower schemes in the private sector.
- The protection of forests will continue to be a challenge. Natural forests must be protected against activities such as encroachment or illegal logging, and issues of forest law, enforcement and governance remain. Planted forests require protection from fire, pests, climate change and many other threats.
- 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 plans than was the case 20 years ago; 41 Commonwealth countries are members of one or more of the C&I processes and about 21% of the area of Commonwealth forests is certified under one scheme or another – although most of the certified forests are in the developed economies. But evidence of support in terms of funds or staff for sustainable management of Commonwealth forests 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.

- Urbanisation, along with the growth of slums, provides a challenge for tree planning in cities – including the establishment of peri-urban forests. Urban people are increasingly cut off from the countryside and from forests, and educating them in the issues concerning the conservation of the natural world will be an increasing challenge.

The continuing 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 need to develop mechanisms both to adapt forests to the effects of climate change, and to contribute to its amelioration through carbon sequestration. Among the mechanisms required will be the adaptation of forest systems (including plantations) to drought and to the increased risk of fire and pest attack, the maintenance of forest biological diversity, and the development of forest



**RIGHT**  
The continuing preponderance of fuelwood in Commonwealth wood consumption shows the need to develop sustainable supplies.



management practices to maintain or increase water catchment yields.

- Contributing more directly to informed public opinion and policymaking. To do this research programmes will increasingly need to move towards social, economic and political concerns in addition to their traditional strength in silviculture and ecology.
- Research into social and cultural, as well as technical aspects, of participatory forestry.
- But these 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 – especially in the developed economies and to some extent in Africa – and the adaptation of programmes to reflect changing requirements. The demand for graduates does not always match enrolments, nor does teaching capacity reflect teaching demands, nor does what is currently taught meet the skills needed by graduates. In several

Commonwealth universities 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 problems. There is a special opportunity to promote south-south cooperation and collaboration. The particular case of the Commonwealth Forestry Conference is worth noting, where foresters from the 54 countries of the Commonwealth (and others) have the opportunity to come together every four years to exchange experiences. Changes in the format of the Conference in recent years have increased the opportunity for foresters to contribute to the sessions and to meet informally.

The Commonwealth accounts for one-third of the world's people and one-fifth of its forests. It is thus entitled to play a major role in the global dialogue on forests and related issues. The Commonwealth also



includes 27 of the world's 39 SIDS, which are those most immediately threatened by rising sea levels due to global warming.

Specific opportunities to play a part in technical or policy-related forestry topics include areas where Commonwealth foresters have been leaders:

- Forest landscape restoration, a concept relevant to virtually all Commonwealth countries. There is an important opportunity to take part in the development of this new concept.
- Decentralisation, devolution of responsibility and the involvement of communities, and the privatisation of planted forests, where several Commonwealth countries have been pioneers. Others could learn from their experience.
- The Commonwealth includes several professional associations and institutes; although usually representing national interests, nevertheless they offer through their journals, newsletters 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.

There are two related opportunities in forestry education. The first is 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 challenges<sup>1</sup>; there is an excellent opportunity for the forestry faculties of Commonwealth universities to take the lead in instituting such a forum.

<sup>1</sup> The FAO Advisory Committee on Forestry Education held its last meeting in 1996.

Commonwealth-wide recognition of the imminent and usually negative impact of climate change on society, 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.

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

Above all, the development of REDD+ is an important opportunity for Commonwealth researchers to collaborate in the development of the means for its implementation; for example, by sharing experience in drafting information for the public and policymakers, identifying the underlying causes of forest loss and forest degradation, developing methods for monitoring and reporting, and (eventually) ways of distributing any funds equitably and efficiently.

A final challenge facing all foresters, which has become apparent in preparing and then updating this review of forestry in the Commonwealth, is the lack of reliable and current data on forests and the forestry sector – and this is not only confined to countries with developing economies. All of the challenges described above 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.

# Congo Basin Forest Fund (CBFF)

The Congo Basin rainforest is the second largest tropical forest in the world, after the South American Amazon. The forest covers an area of over 200 million hectares, approximately twice the size of France. It is home to more than 100 million people, 10,000 plants species, 1,000 bird species and 400 species of mammals. It serves as a critical habitat for biodiversity conservation and home to three of the world's four great apes species. It also provides vital regional and global ecological services, representing about one-fifth of the world's remaining closed canopy tropical forest.

The Congo Basin forest is of local, regional, and global environmental significance. In addition, it is a vital ecosystem for the entire world, as it helps to regulate atmospheric oxygen and carbon, leading some to describe it as "the world's" second lung. The forest represents a rich resource in terms of food, shelter, and livelihoods for inhabitants of the region. It therefore



**The Congo Basin is as a critical habitat for biodiversity conservation.**

serves as an economic resource for ten of the basin's countries.

Over the years, the Congo Basin rainforest has been coming under pressure as a result of poverty, increased

logging and changing patterns of agriculture, population growth and activities by the oil and mining industry. This is resulting in increasing deforestation. Non-sustainable forest management practices have a negative impact on the inhabitants, the countless species that could be driven to extinction and on the climate.

Launched in June 2008 by the Prime Ministers of the United Kingdom (UK) and Norway in conjunction with the African Development Bank (AfDB), the Congo Basin Forest Fund (CBFF) has US\$200 million, with the UK and Norway contributing US\$100 million each.

The Fund supports transformative and innovative initiatives by the region's governments, civil society and private sector with a view to slowing down the rate of deforestation by developing the capacity of the people and institutions in Congo basin countries. This is expected to enable them manage their forest more sustainably. This includes assisting local communities to find livelihoods that are consistent with



**The rainforest is coming under pressure as a result of increased logging and changing agricultural patterns in Cameroon.**



forest conservation and developing new approaches that will bring genuine change and ensure future sustainable forest management. The CBFF grant funding will be mainly used on activities that help to slow down the rate of deforestation and degradation, reduce poverty among forest dwellers and contribute to a reduction in greenhouse gas emissions, while maximizing carbon storage.

The Fund supports activities and projects which complement particular aspects of the Central Africa Forests Commission (COMIFAC) convergence plan. The CBFF works closely with Central African governments, regional institutions, COMIFAC, ECCAS, Congo

Basin technical partners, development finance institutions, NGOs and the private sector.

Although the CBFF is designed to directly benefit Congo Basin countries that protect the forest, it is considered as a global public good which will have continental, as well as global benefits. The Fund is administered by a governing council co-chaired by the 2004 Nobel Laureate and the Congo Basin Forest Ecosystem Goodwill Ambassador, Wangari Maathai, as well as the former Canadian Prime Minister, Paul Martin. The Fund's governing council is responsible for its strategic direction and it ensures broad

development partner and stakeholder participation in the Fund. The CBFF Secretariat is based in Tunis, Yaoundé and Kinshasa.

The CBFF applies two mechanisms to build up its project pipeline. These include: 1) a regular competitive call for proposals; and 2) projects initiated by the CBFF Governing Council, the Reference Group or other stakeholders in response to identified gaps and needs not addressed by submissions received under calls for proposals. The first competitive call for proposals has already been initiated and the Governing Council has approved ten projects for funding.



**The Congo Basin forest helps to regulate atmospheric oxygen and carbon.**



## Annex 1: Data on Commonwealth Countries

**Annex 1.1: Land Area and Population, 2006**

Country	Land area (000 ha)	Population (000)	Country	Land area (000 ha)	Population (000)
<b>Africa</b>					
Botswana	56,673	1,858	Guyana	19,685	739
Cameroon	46,540	18,174	<b>Total Commonwealth Central &amp; North America</b>	<b>931,317</b>	<b>33,596</b>
Gambia	1,000	1,663	<b>Total Commonwealth Americas</b>	<b>934,236</b>	<b>38,828</b>
Ghana	22,754	23,008	<b>South Asia</b>		
Kenya	56,914	36,553	Bangladesh	13,017	155,990
Lesotho	3,035	1,994	India	297,319	1,151,751
Malawi	9,408	13,570	Maldives	30	300
Mauritius	203	1,251	Pakistan	77,088	160,943
Mozambique	78,638	20,971	Sri Lanka	6,463	19,207
Namibia	82,329	2,046	<b>Total Commonwealth South Asia</b>	<b>393,917</b>	<b>1,488,191</b>
Nigeria	91,077	144,719	Total South Asia	412,917	1,516,480
Seychelles	46	86	<b>South-east Asia &amp; Pacific</b>		
Sierra Leone	7,162	5,742	Australia	768,230	20,530
South Africa	121,447	48,282	Brunei Darussalam	527	381
Swaziland	1,720	1,133	Fiji	1,827	833
Uganda	19,710	29,898	Kiribati	81	93
United Republic of Tanzania	88,580	39,458	Malaysia	32,855	26,113
Zambia	74,339	11,696	Nauru	2	10
<b>Total Commonwealth Africa<sup>a</sup></b>	<b>761,575</b>	<b>402,102</b>	New Zealand	26,771	4,139
Total Africa	2,963,666	943,453	Papua New Guinea	45,286	6,201
<b>Americas</b>			Samoa	283	185
Antigua & Barbuda	44	84	Singapore	69	4,381
Bahamas	1,001	327	Solomon Islands	2,799	484
Barbados	43	292	Tonga	72	99
Dominica	75	67	Tuvalu	3	10
Grenada	34	105	Vanuatu	1,219	220
Jamaica	1,083	2,698	<b>Total South-east Asia &amp; Pacific<sup>c</sup></b>	<b>880,024</b>	<b>63,679</b>
St Kitts & Nevis	26	49	<b>Europe</b>		
St Lucia	61	163	Cyprus	924	845
St Vincent & the Grenadines	39	119	Malta	32	404
Trinidad & Tobago	513	1,328	United Kingdom <sup>d</sup>	24,269	60,738
<b>Total Commonwealth Caribbean<sup>b</sup></b>	<b>2,919</b>	<b>5,232</b>	<b>Total Commonwealth Europe<sup>e</sup></b>	<b>25,225</b>	<b>61,987</b>
Belize	2,281	281	<b>Total Commonwealth</b>	<b>2,994,977</b>	<b>2,054,787</b>
Canada	909,351	32,576	<b>Total World</b>	<b>13,013,868</b>	<b>6,592,998</b>

Source: State of the World's Forests 2009, FAO, Rome.

The regional groupings in Table 1.1 (and other tables) are those used by the Commonwealth; they do not always correspond with those of the UN, hence the absence of FAO regional totals for the Caribbean, North & Central America, South-east Asia & the Pacific and Europe.

This and other tables exclude the Falkland Islands and South Georgia, and the Sandwich Islands, since neither have any forest. But they include:

a British Indian Ocean Territory and St Helena;

b British Virgin Islands;

c Pitcairn Island;

d Channel Islands and Isle of Man;

e Gibraltar.

Rwanda joined the Commonwealth as its 54th member at the Commonwealth Heads of Government meeting in November 2009. Its area in 2006 was 2.47 M ha with a population of 9.5 million.



### Annex 1.2: Socio-economic Indicators Related to the Forestry Sector, 2006

The following data give some social and economic indicators related to the forest sector of each Commonwealth country in the year 2006:

- Total population (thousands), population growth (%/year) and population density (people per square kilometre) may be linked to pressure on forests;
- Urban population (percentage of the total population) and urban population growth (%/year) reflect movement from rural areas to the towns and cities, and thus a

reduction in shifting cultivation, but a possible shift from wood as domestic fuel to charcoal;

- GDP, in US\$/head at the 2007 exchange rate, is related to increased demand for wood products, either as sawn timber, panels or processed wood as paper or board;
- Internet usage (number of users/100 people) relates to the spread of education and the ease of communication;
- CO<sub>2</sub> emissions (thousands of tonnes and tonnes/head) reflect part of the contribution that a country makes to global warming.

Country	Population (000)	Population growth, 2005-10 (%/year)	Population density (people/sq km)	Urban population (%)	Urban population growth, 2000-05 (%/year)	GDP (US\$/head)	Internet usage (users/100 people)	CO <sub>2</sub> emissions (000 mt and mt/head)
<b>Africa</b>								
Botswana	1,882	1.2	3.2	57	1.6	4,755	3.4	4,301/2.4
Cameroon	18,549	2.0	39.0	55	3.7	1,019	2.2	3,839/0.2
Gambia	1,709	2.6	151.3	54	4.7	307	3.8	286/0.2
Ghana	23,478	2.0	98.4	48	3.8	532	2.7	7,190/0.3
Kenya	37,538	2.7	64.7	21	3.2	650	7.9	10,588/0.3
Lesotho	2,008	0.6	66.1	19	1.0	725	2.9	n.a.
Malawi	13,925	2.6	117.5	17	4.8	164	0.5	1,045/0.1
Mauritius	1,262	0.8	618.5	42	0.8	5,124	24.1	3,197/2.6
Mozambique	21,397	1.9	26.8	35	4.3	349	0.9	2,167/0.1
Namibia	2,074	1.3	2.5	35	3.0	3,084	4.0	2,471/1.2
Nigeria	148,093	2.3	160.3	48	4.1	917	6.0	114,025/0.8
Rwanda	9,725	2.8	369.2	19	9.2	242	0.7	572/0.1
Seychelles	87	0.5	190.4	53	1.6	8,209	35.7	546/6.4
Sierra Leone	5,866	2.0	81.8	41	6.0	318	0.2	994/0.2
South Africa	48,577	0.6	39.8	59	1.6	5,133	10.8	437,032/9.2
Swaziland	1,141	0.6	65.7	24	0.9	2,399	4.0	957/0.9
Uganda	30,884	3.2	128.1	13	4.2	346	2.5	1,826/0.1
United Republic of Tanzania	40,454	2.5	42.8	24	3.6	335	1.0	4,352/0.1
Zambia	11,922	1.9	15.8	35	1.9	938	4.2	2,288/0.2
<b>Americas (Caribbean)</b>								
Antigua & Barbuda	85	1.3	192.6	39	2.2	11,437	35.6 (2005)	414/5.1
Bahamas	331	1.2	23.9	90	1.7	18,965	31.9	2,009/6.3
Barbados	294	0.3	683.5	53	1.4	11,765	59.5	1,269/4.4
Dominica	67	0.3	89.7	73	0.8	4,667	8.4 (2000)	106/1.6
Grenada	106	Insignificant	307.2	31	Insignificant	4,167	18.6	216/2.1

continued overleaf


**Annex 1.2: Socio-economic Indicators Related to the Forestry Sector, 2006 (continued)**

Country	Population (000)	Population growth, 2005-10 (%/year)	Population density (people/ sq km)	Urban population (%)	Urban population growth, 2000-05 (%/year)	GDP (US\$/ head)	Internet usage (users/ 100 people)	CO <sub>2</sub> emissions (000 mt and mt/head)
Jamaica	2,714	0.5	246.9	53	1.0	3,823	46.5	10,592/4.0
St Kitts & Nevis	50	1.1	193.2	32	0.7	9,776	24.3	125/2.6
St Lucia	165	1.1	306.0	28	0.5	5,723	34.5	367/2.3
St Vincent & the Grenadines	120	0.5	310.3	46	1.2	3,749	8.4	198/1.7
Trinidad & Tobago	1,333	0.5	259.9	24	1.1	13,661	3.0	117/1.2
<b>Central &amp; North America</b>								
Belize	288	2.1	12.5	48	2.4	4,320	12.4	792/2.9
Canada	32,876	0.9	3.3	80	1.2	39,004	67.9	639,403/20.0
Guyana	738	-0.2	3.4	28	-0.1	1,219	21.3	1,445/29.6
<b>South Asia</b>								
Bangladesh	158,665	1.7	1,101.9	25	3.5	437	0.3	37,165/0.2
India	1,169,016	1.5	355.6	29	2.3	784	5.4	1,342,960/1.2
Maldives	306	1.8	1,025.4	30	4.0	3,020	6.6	726/2.5
Pakistan	163,902	1.8	205.9	35	3.0	913	7.6	125,669/0.8
Sri Lanka	19,299	0.5	294.2	15	0.2	1,425	2.1	11,534/0.6
<b>South-east Asia &amp; Pacific</b>								
Australia	20,743	1.0	2.7	88	1.3	37,924	75.1	326,757/16.3
Brunei Darussalam	390	2.1	67.7	74	2.9	30,058	43.4	8,810/24.1
Fiji	839	0.6	45.9	51	1.9	3,724	9.4	1,071/1.3
Kiribati	95	2.1	131.0	47	4.0	801	2.2	29/0.3
Malaysia	26,572	1.7	80.6	67	3.7	5,704	43.8	177,584/7.0
Nauru	10	0.3	483.3	100	2.2	5,474	n.a.	143/14.2
New Zealand	4,179	0.9	15.4	86	1.2	25,603	78.8	31,570/7.8
Papua New Guinea	6,331	2.0	13.7	13	2.4	989	1.8	2,449/0.4
Samoa	187	0.9	66.1	22	1.3	2,348	4.5	150/0.8
Singapore	4,436	1.2	6,343.0	100	1.5	30,159	39.2	52,252/12.2
Solomon Islands	496	2.3	17.2	17	4.2	860	1.6	176/0.4
Tonga	100	0.5	134.3	24	1.1	2,328	3.0	117/1.2
Tuvalu	11	0.5	405.0	48	1.4	2,441	16.2	n.a.
Vanuatu	226	2.4	18.6	23	3.5	1,635	3.5	88/0.4
<b>Europe</b>								
Cyprus	855	1.1	92.4	69	1.4	23,774	42.2	6,750/8.2
Malta	407	0.4	1,286.6	95	0.9	14,612	31.7	2,453/22.3
United Kingdom	60,769	0.4	250.2	90	0.4	39,207	56.0	587,261/9.8

Source: United Nations (2007), *World Statistics Pocketbook 2007*, UN Department of Economic & Social Affairs.





## Annex 1.3: Agricultural Land Use, 2000

Country	Area (000 ha)		
	Arable	Permanent crops	Pasture
<b>Africa</b>			
Botswana	377	3	25,600
Cameroon	5,960	1,200	2,000
Gambia	285	5	459
Ghana	3,950	2,150	8,350
Kenya	4,500	560	21,300
Lesotho	330	4	2,000
Malawi	2,100	140	1,850
Mauritius	100	6	7
Mozambique	3,900	235	44,000
Namibia	816	4	38,000
Nigeria	28,200	2,650	39,200
Seychelles	1	6	0
Sierra Leone	490	60	2,200
South Africa	14,753	959	83,928
Swaziland	178	13	1,200
Uganda	5,060	2,100	5,112
Tanzania	4,000	1,000	43,000
Zambia	5,260	27	30,000
<b>Total Commonwealth Africa</b>	<b>80,260</b>	<b>11,122</b>	<b>348,206</b>
<b>Americas</b>			
Antigua & Barbuda	8	2	4
Bahamas	7	4	2
Barbados	16	1	2
Dominica	5	14	2
Jamaica	174	110	229
St Kitts & Nevis	7	1	2
St Lucia	4	14	2
St Vincent & the Grenadines	7	7	2
Trinidad & Tobago	75	47	11
<b>Total Commonwealth Caribbean</b>	<b>303</b>	<b>200</b>	<b>256</b>
Belize	64	35	50
Canada	45,810	6,368	15,435

Source: The State of Food and Agriculture 2007, FAO, Rome.

Country	Area (000 ha)		
	Arable	Permanent crops	Pasture
Guyana	480	30	1,230
<b>Total Commonwealth Central &amp; North America</b>	<b>46,354</b>	<b>6,433</b>	<b>16,715</b>
<b>Total Commonwealth Americas</b>	<b>46,657</b>	<b>6,633</b>	<b>16,971</b>
<b>South Asia</b>			
Bangladesh	8,084	400	600
India	160,555	9,200	11,040
Maldives	0	0	0
Pakistan	21,302	658	5,000
Sri Lanka	895	1,015	440
<b>Total Commonwealth South Asia</b>	<b>190,836</b>	<b>11,273</b>	<b>17,080</b>
<b>South-east Asia &amp; Pacific</b>			
Australia	50,304	296	404,900
Brunei Darussalam	9	4	6
Fiji	200	85	175
Kiribati	0	0	0
Malaysia	1,820	5,785	285
Nauru	0	0	0
New Zealand	1,500	1,841	13,863
Papua New Guinea	205	650	175
Samoa	59	68	2
Singapore	1	1	0
Solomon Islands	18	56	40
Tonga	15	11	4
Tuvalu	0	0	0
Vanuatu	20	85	42
<b>Total Commonwealth South-east Asia &amp; Pacific</b>	<b>54,151</b>	<b>8,882</b>	<b>419,492</b>
<b>Europe</b>			
Cyprus	98	42	4
Malta	8	1	0
United Kingdom	5,876	52	11,036
<b>Total Commonwealth Europe</b>	<b>5,982</b>	<b>95</b>	<b>11,040</b>

# Forest Management and Administration in Zambia

## I INTRODUCTION

Organised forestry in Northern Rhodesia (as Zambia was called before independence) started in 1931. From a very small beginning as a unit in the Department of Agriculture, it was slowly built up until a full Forest Department was established in 1947. The foundations of the Department were carefully laid in those early days, and present day policies and practices, with a few changes to reflect the current situation, are still firmly based upon them.

The mission statement of the Forestry Department is to ensure sustainable flow of wood and non-wood forest products and services while at the same time ensuring protection and maintenance of biodiversity for the benefit of present and future generations through the active participation of all stakeholders.

### 1.1 Provincial and District Organisation

Zambia is divided into nine provinces. In terms of Forestry administration, each province is headed by a Principal Extension Officer (formerly Provincial Forest Officer). He/she is responsible for all forestry activities in that province. Each Province is divided into districts and each district headed by a District Forestry Officer, with a staff of Extension Assistants.

### 1.2 Specialist Branches

There are two specialised research units in the department namely, Silviculture Research Unit and Forest Products Research Unit. Both these units have their headquarters in the Copperbelt Province District of Kitwe.

#### 1.2.1 Silviculture Research

The work of this Unit is to research optimum methods of tree propagation and management for both indigenous and exotic tree species. This includes the studies of seed production, nursery techniques, growth rates, soil characteristics, land preparation and different tending methods. The study of plant diseases and insect pests, and methods of controlling these pathogens and pests is also an important part of the Unit's research.

#### 1.2.2 Forest Products Research

This Unit is concerned with identifying, recording and disseminating information on best practice in timber testing, processing, seasoning and preservation. Work includes testing the strength and natural durability of timbers and much work

was done refining techniques to make timber resistant to termite and fungal attacks.

#### 1.2.3 Beekeeping Division

Its function is to promote beekeeping in the rural areas of Zambia by training beekeepers and by assisting with hive construction, top bar and frame hives including marketing linkages for beeswax and honey.

#### 1.2.4 Forest Management Division

Its work is concerned with the reservation of new forest areas and preparation of forest management plans. The Division is also responsible for the implementation of initiatives like REDD and integrated land use assessment programmes.

## 2 FOREST RESOURCES IN ZAMBIA

Zambia has a surface land area of about 752,614 km<sup>2</sup> and forests cover about 49.9 million ha (66% of land cover). The forest vegetation type is mainly *Miombo* (Semi-evergreen forests), *Baikiaea*, *Munga*, *Mopane*, *Kalahari* woodlands (Deciduous Forests), *Ripian*, *Swap*, *Parinari*, *Itigi*, *Lake Basin Chipya* (Evergreen forests), *Termitary* associated bushes (Shrub thickets), grasslands and wooded grasslands. Plantations cover about 61,000 ha of which 7,000 ha is managed by the Forestry Department and 50,000 ha under Zambia Forestry and Forests Industries Corporation (ZAFFICO).

The growing stock is estimated to be 2.9 billion m<sup>3</sup> that provides about 70% of the nation's energy needs. About 9.6% of the forests in Zambia are gazetted as protected forest areas or local forest reserves for the supply of timber and non-timber forest products, and the protection of water catchments, national monuments and biological diversity. Total biomass is estimated at about 6 billion tonnes as national biomass (below and above) which translates into about an estimated 2.8 billion tonnes of carbon stored in forests. In addition, there are 15.6 million ha of forests in game management areas and 6.4 million ha in National Parks.

### 2.1 Forest Utilisation Trend

Forest products make a significant contribution to rural livelihoods in Zambia. There is a high level of domestic dependency on forest products for day-to-day subsistence, including fuel, shelter, food, pasture and fodder, medicines and household utility items. Forests provide goods, employment and business opportunities (e.g. pit-sawing and trading in wild fruits).

High population growth and increasing population density not only exerts pressure on socio-economic services but also on land, leading to deforestation, biodiversity loss, land degradation and scarcity of agricultural land. Demand for land (including settlements and agricultural expansion), demand for timber, charcoal, fuelwood production, forest fires and infrastructure development are the main causes of deforestation. Each of these problems is related to, and even exacerbates, the others. Currently deforestation is estimated at between 250,000 to 300,000 ha per annum.

### **3 CURRENT GOVERNMENT INITIATIVES IN THE FORESTRY SECTOR**

The Government prepared a 20 year forestry action plan (1997 – 2017) called the Zambia Forestry Action Plan (ZFAP), which covers the period 1998 to 2018. The Plan recognised that the vast forestry resources were under considerable strain and proposed policy and programme actions to ensure sustainable protection, management, production and utilisation of the country's forest resources.

#### **3.1 Participatory Forest Management**

Joint Forest Management (JFM) is aimed at promoting collaborative management of forests between government and local communities and the private sector. The initiative provides an opportunity for increased user rights and benefit sharing mechanisms that would help in developing stewardship principles in stakeholders.

#### **3.2 UN-REDD programme**

The UN-REDD is a collaborative programme supported by three United Nations Agencies namely UNDP, FAO and UNEP aimed at preparing Zambia for the post 2012 Kyoto Protocol climate change regime. It is expected that a National Strategy to reduce emissions from deforestation and forest degradation will be developed.

#### **3.3 Integrated Landuse Assessment (ILUA) Project**

The programme aims at strengthening the capacity in planning and implementation of Sustainable Forest Management and REDD through better information, capacity

building dissemination of information, and improved multi-sectoral dialogue to ensure informed decision making processes.

#### **3.4 National Forestry Programme Facility (NFPF)**

The National Forest Programmes Facility (NFPF) provides an appropriate platform for multi-stakeholder dialogue and agreed action towards sustainable forest management through participation of non-state actors in various studies.

### **4 AREAS REQUIRING COLLABORATION AND SUPPORT:**

- Update information on forest resources, socio-economics, and land-use for planning and sustainable management of forest resources;
- Development of criteria and indicators for sustainable forest management in Zambia;
- Developing a tracking system for forest produce to ensure appropriate control and management of forests;
- Developing appropriate research strategies focusing on applied research aimed at improving silvicultural methods of managing indigenous forests and forest products research;
- Need for Capacity development in new and emerging areas of forest management like climate change; and
- Developing a forest information management system that responds to current challenges.

**Department of Forests  
Ministry of Tourism, Environment &  
Natural Resources (MTENR)  
Kwacha House, Cairo Road  
PO Box 34011  
Lusaka  
Zambia  
Tel: +260 21 234375  
Fax: +260 21 226131  
E-mail: [info@mtenr.gov.zm](mailto:info@mtenr.gov.zm)  
Website: [www.mtenr.gov.zm](http://www.mtenr.gov.zm)**



The Republic of Zambia

The Ministry of Tourism, Environment and Natural Resources - MTENR





## Annex 2: The Forest Resource

**Annex 2.1: Extent of Forest and Other Wooded Land (OWL), 2010**

Country	Forest			OWL 000 ha	Country	Forest			OWL 000 ha
	000 ha	% land area*	ha forest/ head*			000 ha	% land area*	ha forest/ head*	
<b>Africa</b>					<b>South Asia</b>				
Botswana	11,351	20	6.1	34,791	Guyana	15,205	77	20.6	3,580
Cameroon	19,916	42	1.1	12,715	<b>Total Central &amp; North America</b>	<b>326,732</b>	<b>35</b>	<b>9.7</b>	<b>95,644</b>
Gambia	480	48	0.3	103	<b>Total Americas</b>	<b>327,975</b>	<b>35</b>	<b>8.4</b>	
Ghana	4,940	22	0.2	0	<b>South-east Asia &amp; Pacific</b>				
Kenya	3,467	6	0.1	28,650	Australia	149,300	19	7.3	135,367
Lesotho	44	1	<0.1	97	Brunei Darussalam	380	72	1.0	50
Malawi	3,237	34	0.2	0	Fiji	1,014	56	1.2	78
Mauritius	35	17	<0.1	12	Kiribati	12	15	0.1	0
Mozambique	39,022	50	1.9	14,566	Malaysia	20,456	62	0.8	0
Namibia	7,290	9	3.6	8,290	Nauru	0	0	0	0
Nigeria	9,041	10	0.1	4,088	New Zealand	8,269	31	2.0	2,557
Rwanda	435	18	<0.1	61	Papua New Guinea	28,726	63	4.6	4,474
Seychelles	41	88	0.5	0	Samoa	171	60	0.9	22
Sierra Leone	2,726	38	0.5	189	Singapore	2	3	<0.1	0
South Africa	9,241	8	0.2	24,558	Solomon Islands	2,213	79	4.6	129
Swaziland	563	33	0.5	427	Tonga	9	13	0.1	0
Uganda	2,988	15	0.1	3,383	Tuvalu	1	33	0.1	0
Tanzania	33,428	38	0.8	11,619	Vanuatu	440	36	2.0	476
Zambia	49,468	67	4.2	6,075	<b>Total South-east Asia &amp; Pacific</b>	<b>210,993</b>	<b>24</b>	<b>3.3</b>	<b>143,153</b>
<b>Total Africa</b>	<b>197,713</b>	<b>26</b>	<b>0.5</b>	<b>149,624</b>	<b>Europe</b>				
<b>Americas</b>					Cyprus	173	19	0.2	214
<b>Caribbean</b>					Malta	0	1	0	0
Antigua & Barbuda	10	22	0.1	16	United Kingdom <sup>b</sup>	2,885	12	<0.1	20
Bahamas	515	51	1.6	36	<b>Total Commonwealth Europe</b>	<b>3,058</b>	<b>12</b>	<b>&lt;0.1</b>	<b>234</b>
Barbados	8	19	<0.1	1	<b>Total</b>				
Dominica	45	60	0.7	0	<b>Commonwealth</b>	<b>813,163</b>	<b>27</b>	<b>0.4</b>	<b>393,994</b>
Grenada	17	50	0.2	1	<b>Total World</b>	<b>4,033,060</b>	<b>31</b>	<b>0.6</b>	<b>1,144,687</b>
Jamaica	337	31	0.1	188					
St Kitts & Nevis	11	42	0.2	2					
St Lucia	47	77	0.3	0					
St Vincent & the Grenadines	27	68	0.2	0					
Trinidad & Tobago	226	44	0.2	84					
<b>Total Caribbean</b>	<b>1,243</b>	<b>43</b>	<b>0.2</b>	<b>328</b>					
<b>Central &amp; North America</b>									
Belize	1,393	61	5.0	113					
Canada	310,134	34	9.5	91,951					

Source: FAO, FRA2010.

Notes: \* from Annex 1.1; a Includes Andaman Islands and Nicobar Islands; b Includes Channel Islands and Isle of Man.

The Overseas Territories of Australia, New Zealand and the UK are excluded from the above. They include:

Australia – Christmas Island, Cocos Islands, Macquarie Island, Norfolk Island;

New Zealand – Antipodes Islands, Bounty Islands, Chatham Islands, Cook Islands (16,000 ha forest), Niue (19,000 ha forest), Tokelau;

UK – Anguilla, British Antarctic Territory, Bermuda, British Indian Ocean Territory (3,000 ha of forest), British Virgin Islands, Cayman Islands, Falkland Islands, Gibraltar, Montserrat, St Helena, Ascension Island and Tristan da Cunha (2,000 ha of forest), Turk & Caicos Islands, Pitcairn Island (4,000 ha forest), South Georgia and South Sandwich Islands, Sovereign Base Areas on Cyprus.


**Annex 2.1 (continued): Commonwealth Low Forest Cover Countries**

Africa – Kenya, Lesotho, Namibia, South Africa  
 South Asia – Maldives, Pakistan  
 South-east Asia & Pacific – Nauru, Singapore  
 Europe – Malta

**Annex 2.1 (continued): Commonwealth Members of the Alliance of Small Island States**

Africa – Mauritius, Seychelles  
 Americas – Antigua & Barbuda, Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Jamaica, St Kitts & Nevis, St Lucia, St Vincent & Grenadine, Trinidad & Tobago  
 South-east Asia & Pacific – Fiji, Kiribati, Maldives, Nauru, Papua New Guinea, Samoa, Singapore, Solomon Islands, Tonga, Tuvalu, Vanuatu  
 Europe – Cyprus, Malta

**Annex 2.2: Area and Change in Extent of Primary<sup>a</sup> forest, 1990-2010**

Country	Area of primary forest (000 ha)				% forest area 2010	Rate of annual change (%/year)		
	1990	2000	2005	2010		90-00	00-05	05-10
<b>Africa</b>								
Gambia	1	1	1	1	<1	0	0	0
Ghana	395	395	395	395	40	0	0	0
Kenya	694	674	664	654	19	-0.29	-0.30	-0.3
Malawi	1,727	1,330	1,132	934	29	-2.58	-3.17	-3.77
Nigeria	1,556	736	326	0	0	-7.21	-15.03	-100
Rwanda	7	7	7	7	2	0	0	0
Seychelles	2	2	2	2	5	0	0	0
Sierra Leone	224	157	133	113	4	-3.49	-3.26	-3.21
South Africa	947	947	947	947	10	0	0	0
<b>Total Africa</b>			<b>3,607</b>	<b>3,053</b>				
<b>Americas</b>								
Belize	599	599	599	599	43	0	0	0
Canada	165,448	165,448	165,448	165,448	53	0	0	0
Dominica	28	28	27	27	60	0	0.31	0
Grenada	2	2	2	2	12	0	0	0
Guyana	–	6,790	6,790	6,790	45	–	0	0
Trinidad & Tobago	62	62	62	62	27	0	0	0
<b>Total Americas</b>			<b>172,928</b>	<b>172,928</b>				
<b>South Asia</b>								
Bangladesh	436	436	436	436	30	0	0	0
India	15,701	15,701	15,701	15,701	23	0	0	0
Sri Lanka	257	197	167	167	9	-2.62	-3.25	0
<b>Total South Asia</b>			<b>16,304</b>	<b>16,304</b>				

continued overleaf


**Annex 2.2: Area and Change in Extent of Primary<sup>a</sup> forest, 1990-2010 (continued)**

Country	Area of primary forest (000 ha)				% forest area 2010	Rate of annual change (%/year)		
<b>South-east Asia &amp; Pacific</b>								
Australia	–	–	5,233	5,039	3	–	–	-0.75
Brunei Darussalam	313	288	275	263	69	-0.83	-0.92	-0.89
Fiji	490	445	448	449	44	-0.94	0.14	0.04
Malaysia	3,820	3,820	3,820	3,820	19	0	0	0
New Zealand	–	–	2,144	2,144	26	–	0	0
Papua New Guinea	31,329	29,534	28,344	26,210	91	-0.59	-0.83	-1.55
Singapore	2	2	2	2	100	0	0	0
<b>Total South-east Asia &amp; Pacific</b>			<b>40,266</b>	<b>37,927</b>				
<b>Europe</b>								
Cyprus	13	13	13	13	8	0	0	0

Source: FAO, 2010.

Notes: a 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, have been omitted.

**BELOW**

The extent of primary forest in Canada has not changed over the last two decades.





### Annex 2.3: National Importance of Forest Ecological Zones

<i>National proportion</i>			
<i>Major forest types</i>	<i>Highest</i>	<i>Second</i>	<i>Third</i>
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%); Papua New Guinea (80%); Samoa (100%); Singapore (100%); Solomon Islands (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%); Papua New Guinea (5%)
Tropical montane	Rwanda (100%); Kenya (53%)	Namibia (3%); South Africa (2%); Malaysia (6%); Papua New Guinea (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 2.4: Change in Extent of Forest, 1990-2010

Country	1990-2000		2000-2005		2005-2010	
	000 ha/yr	%	000 ha/yr	%	000 ha/yr	%
<b>Africa</b>						
Botswana	-118	-0.90	-118	-0.96	-118	-1.01
Cameroon	-220	-0.94	-220	-1.02	-220	-1.07
Gambia	2	0.42	2	0.43	2	0.38
Ghana	-135	-1.99	-115	-1.97	-115	-2.19
Kenya	-13	-0.35	-12	-0.34	-11	-0.31
Lesotho	n.s.	0.49	n.s.	0.47	n.s.	0.46
Malawi	-33	-0.88	-33	-0.94	-33	-0.99
Mauritius	n.s.	-0.03	-1	-2.05	n.s.	-0.06
Mozambique	-219	-0.52	-222	-0.54	-211	-0.53
Namibia	-73	-0.87	-74	-0.94	-74	-0.99
Nigeria	-410	-2.68	-410	-3.33	-410	-4.00
Rwanda	3	0.79	8	2.28	10	2.47
Seychelles	0	0.00	0	0.00	0	0.00
Sierra Leone	-20	-0.65	-20	-0.68	-20	-0.70
South Africa	0	0.00	0	0.00	0	0.00
Swaziland	5	0.93	5	0.87	4	0.80
Uganda	-88	-2.03	-88	-2.39	-88	-2.72
Tanzania	-403	-1.02	-403	-1.10	-403	-1.16
Zambia	-1.67	-0.32	-167	-0.33	-167	-0.33
<b>Total Africa</b>	<b>-1,889</b>	<b>-0.83</b>	<b>-1,868</b>	<b>-0.88</b>	<b>-1,854</b>	<b>-0.91</b>
<b>Americas</b>						
Antigua & Barbuda	n.s.	-0.30	n.s.	-0.40	0	0.00
Bahamas	0	0.00	0	0.00	0	0.00
Barbados	0	0.00	0	0.00	0	0.00
Dominica	n.s.	-0.55	n.s.	-0.57	n.s.	-0.59
Grenada	0	0.00	0	0.00	0	0.00
Jamaica	n.s.	-0.11	n.s.	-0.10	n.s.	-0.12
St Kitts & Nevis	0	0.00	0	0.00	0	0.00
St Lucia	n.s.	0.64	n.s.	0.13	0	0.00
St Vincent & the Grenadines	n.s.	0.27	n.s.	0.23	n.s.	0.30
Trinidad & Tobago	-1	-0.30	-1	-0.31	-1	-0.32
<b>Total Caribbean</b>	<b>-1</b>	<b>-0.08</b>	<b>-1</b>	<b>-0.10</b>	<b>-1</b>	<b>-0.11</b>
<b>Central &amp; North America</b>						
Belize	-10	-0.63	-10	-0.65	-10	-0.68

Source: FAO, FRA2010.  
n.s. = not significant.

Country	1990-2000		2000-2005		2005-2010	
	000 ha/yr	%	000 ha/yr	%	000 ha/yr	%
Canada	0	0.00	0	0.00	0	0.00
Guyana	0	0.00	0	0.00	0	0.00
<b>Total Central &amp; North America</b>						
	<b>-10</b>	<b>n.s.</b>	<b>-10</b>	<b>n.s.</b>	<b>-10</b>	<b>n.s.</b>
<b>South Asia</b>						
Bangladesh	-3	-0.18	-3	-0.18	-3	-0.18
India	145	0.22	464	0.70	145	0.21
Maldives	0	0.00	0	0.00	0	0.00
Pakistan	-41	-1.76	-43	-2.11	-43	-2.37
Sri Lanka	-27	-1.20	-30	-1.47	-15	-0.77
<b>Total South Asia</b>	<b>75</b>	<b>0.11</b>	<b>389</b>	<b>0.54</b>	<b>85</b>	<b>0.12</b>
<b>South-east Asia &amp; Pacific</b>						
Australia	42	0.03	-200	-0.13	-924	-0.61
Brunei Darussalam	-2	-0.39	-2	-0.41	-2	-0.47
Fiji	3	0.29	3	0.34	3	0.34
Kiribati	0	0.00	0	0.00	0	0.00
Malaysia	-79	-0.36	-140	-0.66	-87	-0.42
Nauru	0	0.00	0	0.00	0	0.00
New Zealand	55	0.69	9	0.11	-8	-0.10
Papua New Guinea	-139	-0.45	-139	-0.47	-142	-0.49
Samoa	4	2.78	0	0.00	0	0.00
Singapore	0	0.00	0	0.00	0	0.00
Solomon Islands	-6	-0.24	-5	-0.24	-6	-0.25
Tonga	0	0.00	0	0.00	0	0.00
Tuvalu	0	0.00	0	0.00	0	0.00
Vanuatu	0	0.00	0	0.00	0	0.00
<b>Total South-east Asia &amp; Pacific</b>	<b>-121</b>	<b>-0.06</b>	<b>-474</b>	<b>-0.22</b>	<b>-1,165</b>	<b>-0.54</b>
<b>Europe</b>						
Cyprus	1	0.63	n.s.	0.14	n.s.	0.04
Malta	0	0.00	0	0.00	0	0.00
United Kingdom	18	0.68	10	0.37	7	0.25
<b>Total Europe</b>	<b>19</b>	<b>0.67</b>	<b>11</b>	<b>0.36</b>	<b>7</b>	<b>0.24</b>
<b>Total Commonwealth-1,927</b>						
	<b>-0.23</b>	<b>-1,953</b>	<b>-0.23</b>	<b>-2,939</b>	<b>-0.36</b>	





## Annex 2.5: Planted Forests, 1990-2010

Country	Area (000 ha)				% total 2010 forest area	% change/year		
	1990	2000	2005	2010				
<b>Africa</b>								
Botswana	0	0	0	0	-	0	0	0
Cameroon	-	-	84	-	-	-	-	-
Gambia	1	1	1	1	<1	0	0	0
Ghana	50	60	160	260	5	1.8	21.7	10.2
Kenya	238	212	202	197	6	-1.2	-1.0	-0.5
Lesotho	6	8	9	10	23	3.2	2.6	2.3
Malawi	132	197	285	365	11	4.1	7.7	5.1
Mauritius	15	15	15	15	43	0	0	0
Mozambique	38	38	24	62	<1	0	-8.8	20.9
Namibia	0	0	0	0	-	0	0	0
Nigeria	251	316	349	382	4	2.3	2.0	1.8
Rwanda	248	282	323	373	86	1.3	2.8	2.9
Seychelles	5	5	5	5	12	0	0	0
Sierra Leone	7	8	11	15	1	1.7	7.2	5.3
South Africa	1,626	1,724	1,750	1,763	19	0.6	0.3	0.2
Swaziland	160	150	145	140	25	-0.6	-0.7	-0.7
Uganda	34	32	31	51	2	-0.6	-0.6	10.5
Tanzania	150	200	230	240	1	2.9	2.8	0.9
Zambia	60	60	60	62	<1	0	0	0.7
<b>Total Africa</b>	<b>3,021</b>	<b>3,308</b>	<b>3,684</b>	<b>3,941</b>	<b>2</b>			
<b>Americas</b>								
Antigua & Barbuda	0	0	0	0	0	0	0	0
Bahamas	0	0	0	0	0	0	0	0
Barbados	0	0	0	0	0	0	0	0
Dominica	0	0	0	0	0	0	0	0
Grenada	0	0	0	0	0	0	0	0
Jamaica	9	8	8	7	2	-0.8	0	-2.3
St Kitts & Nevis	0	0	0	0	0	0	0	0
St Lucia	1	1	1	1	2	0	0	0
St Vincent & the Grenadines	0	0	0	0	0	0	0	0
Trinidad & Tobago	15	16	17	18	8	0.7	1.2	1.2
<b>Total Caribbean</b>	<b>25</b>	<b>25</b>	<b>26</b>	<b>26</b>	<b>2</b>			
Belize	2	2	2	2	<1	0	0	0

continued overleaf



## Annex 2.5: Planted Forests, 1990-2010 (continued)

Country	Area (000 ha)				% total 2010 forest area	% change/year			
	1990	2000	2005	2010		1990-2000	2000-2005	2005-2010	
Canada	1,357	5,820	8,048	8,963	3	15.7	6.7	2.2	
Guyana	0	0	0	0	0	0	0	0	
<b>Total Central &amp; North America</b>	<b>1,359</b>	<b>5,822</b>	<b>8,050</b>	<b>8,965</b>	<b>3</b>				
<b>Total Americas</b>	<b>1,384</b>	<b>5,847</b>	<b>8,076</b>	<b>8,991</b>	<b>3</b>				
<b>South Asia</b>									
Bangladesh	239	271	278	237	16	1.3	0.5	-3.1	
India	5,716	7,167	9,486	10,211	15	2.3	5.8	1.5	
Maldives	0	0	0	0	0	0	0	0	
Pakistan	234	296	318	340	21	2.4	1.4	1.4	
Sri Lanka	242	221	195	185	10	-0.9	-2.5	-1.1	
<b>Total South Asia</b>	<b>6,431</b>	<b>7,955</b>	<b>10,277</b>	<b>10,973</b>	<b>15</b>				
<b>South-east Asia &amp; Pacific</b>									
Australia	1,023	1,176	1,628	1,903	1	1.4	6.7	3.2	
Brunei Darussalam	1	1	2	3	1	0	8.4	6.5	
Fiji	92	130	153	177	17	3.5	3.3	2.8	
Kiribati	0	0	0	0	0	0	0	0	
Malaysia	1,956	1,659	1,573	1,807	9	-1.6	-1.1	2.8	
Nauru	0	0	0	0	0	0	0	0	
New Zealand	1,261	1,809	1,854	1,812	22	3.7	0.5	-0.5	
Papua New Guinea	63	82	92	86	<1	2.8	2.3	-1.4	
Samoa	0	32	32	32	2	0	0	0	
Singapore	0	0	0	0	0	0	0	0	
Solomon Islands	44	28	27	27	1	-4.6	-0.5	0	
Tonga	1	1	1	1	11	0	0	0	
Tuvalu	0	0	0	0	0	0	0	0	
Vanuatu	0	0	0	0	0	0	0	0	
<b>Total South-east Asia &amp; Pacific</b>	<b>4,441</b>	<b>4,918</b>	<b>5,362</b>	<b>5,848</b>	<b>3</b>				
<b>Europe</b>									
Cyprus	24	28	29	31	18	1.3	1.3	0.7	
Malta	0	0	0	0	0	0	0	0	
United Kingdom	1,965	2,145	2,189	2,219	77	0.9	0.4	0.3	
<b>Total Europe</b>	<b>1,989</b>	<b>2,173</b>	<b>2,218</b>	<b>2,250</b>	<b>74</b>				
<b>Total Commonwealth</b>	<b>17,266</b>	<b>24,201</b>	<b>29,617</b>	<b>32,003</b>	<b>4</b>				
<b>Total World</b>	-	-	-	<b>264,001</b>					



## Annex 2.6: Forest Ownership, 2005

	Forest %			OWL %		
	Public	Private	Other	Public	Private	Other
<b>Africa</b>						
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
<b>Americas</b>						
Antigua & Barbuda	–	–	–	–	–	–
Bahamas	80.0	20.0	–	80.1	19.9	–
Barbados	4.1	95.9	–	–	–	–
Bermuda	–	–	–	–	–	–
Dominica	–	–	–	–	–	–
Grenada	69.0	31.0	–	69.0	31.0	–
Jamaica	27.6	65.1	7.3	5.1	91.1	3.5
St Kitts & Nevis	–	–	–	–	–	–
St Lucia	47.1	52.9	–	4.0	96.0	–
St Vincent & the Grenadines	–	–	–	–	–	–

Source: FAO, 2006.

Notes: – information not available or not relevant; countries with no information available omitted.

	Forest %			OWL %		
	Public	Private	Other	Public	Private	Other
Trinidad & 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
<b>South Asia</b>						
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	–	–	–	–
<b>South-east Asia &amp; Pacific</b>						
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	–	–	–	–	–	–
<b>Europe</b>						
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

# THE FORESTRY AND WILDLIFE SECTOR — AT THE FOREFRONT OF BIODIVERSITY CONSERVATION IN CAMEROON

*In two decades the forestry and wildlife sector has really taken off in Cameroon. It became the third economic sector after agriculture and oil. This is the result of a series of reforms that have led to considerable opening up of the sector.*

## FORESTRY AND WILDLIFE POTENTIAL IN CAMEROON

### THE CAMEROONIAN FOREST

- 22.5 million ha of forest
- 17.5 million ha of exploitable forest
- 14 million ha of permanent forest
- 14 million ha fixed domain with:
- 8 million ha of production forest (60%)
- 6 million ha of forest and wildlife reserves (40%)

Since 2005, the Government has suspended activities in community forests, sources of several cases of illegal logging. The emergency cleaning up measures taken will consider the resumption of activities in forests that have a simple management plan. There are now 105 forest management units of which 92 are allocated and nine earmarked for conservation.

### PROTECTED AREA

The current network of protected areas covers an area of 8,138,800 ha or about 20% of the country. The protected areas are grouped into several categories:

- 17 national parks
- 6 wildlife reserves
- 1 wildlife sanctuary and two others under creation
- 3 zoological gardens
- 46 areas of interest to lease hunting
- 22 areas of interest community-managed hunting.

### REFORMS

Immediately after the UNCED in Rio in 1992, Cameroon created the Ministry of Environment and Forestry, which was divided into two separate ministries in 2004 (the Ministry of Forestry and Wildlife and the Ministry of Environment and Nature Protection). The formulation of a new forest policy was effective in 1993. In 1994, the Government adopted a new forestry code and the law to lay down forestry, wildlife and fisheries regulations. In 1996 it adopted an environmental code and a framework law on the management of the environment.

Alongside these initiatives, the Head of State was active on the international level and convened in March 1999, the first Summit of Heads of State of Central Africa on the sustainable management of moist forest ecosystems Africa Central. WWF and its President Emeritus, HRH The Duke of Edinburgh provided active support to this sub-regional forum but with global ramifications. This Summit came out with a landmark statement which serves as a benchmark for other sub-regional initiatives on sustainable forest management the “Yaoundé Declaration”. Its main conclusions expounded in 12 points outline sectoral activities within the signatory States. In less than two



decades, the forestry and wildlife sector has become the third largest contributor to GDP after agriculture and oil.

The involvement of non-state actors in the activities of the sector in Cameroon is a unique case whose echo resounds in the sub-region. Significant innovations mark this break and reflect the opening up of the sector. Thus we can see, the adoption of a procurement mechanism in awarding titles, the introduction of three levels of independent observers for transparent management of the sector, the development of a land use plan (the only one in the sub-region), and the gradual transition to forest certification, the right of pre-emption that defines access of people living close to the resource, the concepts of community or council forest that lay emphasis on access to resources and as well as community-managed hunting grounds. Pygmies are not left out. Since last year, the Ministry of Forestry and Wildlife conceded to the Ministry of Social Affairs under the implementation of the FESP, aspects related to improving the livelihoods of pygmies. The research component of this broad multi-stakeholder programme has been transferred to the Ministries of Higher Education on the one hand and Scientific Research and Innovation on the other. In order to enhance the involvement of local people in the management of resources and revenue from wildlife and forest exploitation, and thus better establish that openness to other industries, the Ministry of Forestry and Wildlife organised in March 2010 the second forum on forest management in Cameroon. The recommendations of this forum will be included in the brainstorming initiated for several years now on the revision to the 1994 Forest Law.

Through these reforms and ownership of the participatory approach, the Cameroonian Government is resolutely committed on the path of governance. These

efforts witnessed a turning point with the formal signing of a Voluntary Partnership Agreement between the Government and the European Union under the FLEGT Process in May 2010.

#### ECONOMIC DIVIDENDS OF THE SECTOR

From 1992 to 2010, forest revenues increased from \$4 billion to over \$40 billion. Since 2000, 70 municipalities and forest communities have received over 60 billion CFA Francs in Annual Forest Royalties. As concerns wildlife royalties over 250 million CFA Francs have been distributed to over 50 communities each year. 150 council and community forests have been created of which 50 are operating normally with 10 having a simple management plan.

#### FUTURE GREEN

With the international financial crisis of 2009, the Head of State decided to considerably ease the conditions for exercising the forestry profession thereby stabilising the activities of production units. Instructions have been given to the Government to ensure that Cameroon attains tertiary processing so as to bring added value to the national economy.

In terms of wildlife and protected areas, about 20% of the national territory is reserved for conservation. The fight against poaching has achieved the following results in 2009:

- 322 outstanding disputes against poachers sent to court
- Over 600 pieces of ivory seized representing about 200 elephants killed
- 463 guns seized (war and hunting arms)
- More than 27 tons of bush meat seized and auctioned
- 7,300 rounds of ammunition recovered.

The future will also witness the renewal of timber resources as a vast national reforestation programme is underway. The objective of planting more than two million trees per year was largely exceeded in 2009. With the support that the sector now provides to councils and communities, reforestation will receive a greater impulse in an environment marked by the effective implementation of decentralisation.



Ministry of Forestry and Wildlife  
Yaoundé  
Cameroon

Tel: +237 22 22 94 83 or 22 22 94 86  
Fax: +237 22 22 94 84

Websites: [www.minfof-cm.org](http://www.minfof-cm.org)  
[www.minfof.gov.cm](http://www.minfof.gov.cm)

FAR LEFT: Poaching is a challenge to the Cameroonian Government. Elephants killed in Bouba Ndjidda National Park in February 2010; fifteen elephants were killed by poachers from Chad.

ABOVE LEFT: The Minister of Forestry and Wildlife, Prof. Elvis Ngolle, introducing the framework of the national tree planting campaign to the population in the Far North Cameroon; and, BELOW LEFT: The Minister planting a tree as part of the campaign.



## Annex 3: Management and Conservation

**Annex 3.1: Management of the Production, Tropical\* Permanent Forest Estate (000 ha), 2005**

Country	Natural					Planted		
	Total area	Concessions/under licence	With management plan	Certified	Sustainably managed	Total area	With management plan	Certified
<b>Africa</b>								
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
<b>Asia &amp; Pacific</b>								
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
Papua New Guinea	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
<b>Americas</b>								
Guyana	5,450	3,800	3,730	0	520	12	0	0
Trinidad & Tobago	127	75	75	0	15	15.4	15.4	0

Source: ITTO, 2005.

Notes: \* 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), 2005**

Country	Total area	Attribution to IUCN Cat I-IV	For soil and water protection	With management plan	Sustainably managed
<b>Africa</b>					
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.
<b>Asia &amp; Pacific</b>					
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
Papua New Guinea	1,700	362	n.d.	n.d.	n.d.
Vanuatu	8.37	0	n.d.	n.d.	n.d.
<b>Americas</b>					
Guyana	980	980	n.d.	243	243
Trinidad & Tobago	59.1	29.2	n.d.	12	n.d.

Source: ITTO, 2005.

Notes: \* except India, whose tropical and non-tropical PFEs could not be differentiated so the figures cover both types;  
n.d. = no data.



### Annex 3.3: Commonwealth Member Countries of International Processes on Criteria and Indicators for Sustainable Forest Management

Process*	Commonwealth Member Countries
African Timber Organisation	Cameroon, Ghana, Nigeria, Tanzania
Dry Forest in Asia	Bangladesh, India, Sri Lanka
Dry-zone Africa	Botswana, Gambia, Kenya, Lesotho, Malawi, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Uganda, Zambia
International Tropical Timber Organisation** <a href="http://www.itto.or.jp">http://www.itto.or.jp</a>	Cameroon, Fiji, Ghana, Guyana, India, Malaysia, Papua New Guinea, Trinidad & Tobago, Vanuatu
Lepaterique Process of Central America	Belize
Montreal Process <a href="http://www.mpci.org/links_e.html">http://www.mpci.org/links_e.html</a>	Australia, Canada, New Zealand
Near East	Cyprus, Malta, Pakistan
Pan-European Forest Process <a href="http://www.mcpfe.org">http://www.mcpfe.org</a>	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 of 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, India, Malaysia, Pakistan, Sri Lanka New Zealand**, Papua New Guinea, Solomon Islands United Kingdom
Canadian Standards Association (CSC)	Canada
Malaysian Timber Certification Council (MTCC)*	Malaysia

\* For a description of the MTCC certification scheme see *CFA Newsletter*, No. 30, September 2005.

\*\* New Zealand is establishing its own National Standard, which will be subject to independent verification (*CFA Newsletter*, No. 30, December 2005).

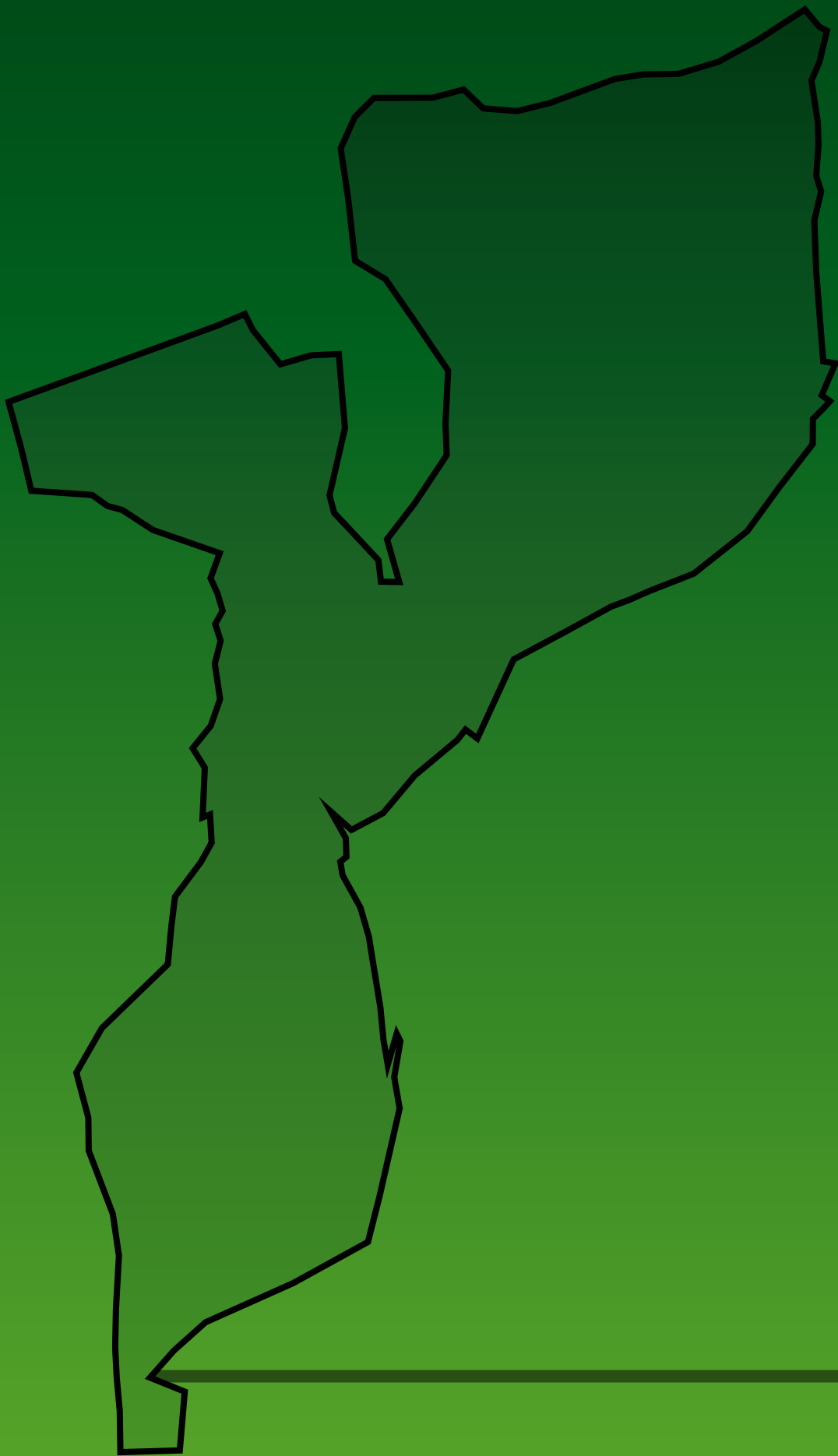
### Annex 3.5: IUCN Protected Area Categories

- I. Strict Nature Reserve/Wilderness Area: protected area managed mainly for science of wilderness protection.
- II. National Park: protected area managed mainly for ecosystem protection and recreation.
- III. Natural Monument: protected area managed mainly for conservation of specific natural features.
- IV. Habitat/Species Management Area: protected area managed mainly for conservation through management intervention.
- V. Protected Landscape/Seascape: protected area managed mainly for landscape/seascape protection and recreation.
- VI. 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 data<sup>1</sup>; 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.

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







**NATIONAL DIRECTORATE OF LANDS & FORESTRY  
MINISTRY OF AGRICULTURE  
AVENUE SAMORA MACHEL  
GOVERNMENT BUILDING NO.1, 6TH FLOOR  
MAPUTO  
MOZAMBIQUE**

**TEL: +258 21 312072  
FAX: +258 21 421804**

**WEBSITE: [WWW.DNFFB.MZ](http://WWW.DNFFB.MZ)**

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## Annex 4: Wood Production and Consumption, Employment

### Annex 4.1: Production, Trade and Consumption of Industrial Roundwood in Commonwealth Countries 000 m<sup>3</sup>, 2006 (2004)

Country/Region	Production	Imports	Exports	Consumption*
<b>Africa</b>				
Botswana	105	0	0	105
Cameroon	1,800	0	29	1,771
Gambia	113	0	0	112
Ghana	1,304	3	1	1,305
Kenya	1,813	8	1	1,820
Lesotho	0	0	0	0
Malawi	520	2	0	521
Mauritius	9	20	1	28
Mozambique	1,304	4	133	1,175
Namibia	0	0	0	0
Nigeria	9,418	1	42	9,377
Seychelles	0	0	0	0
Sierra Leone	124	0	1	123
South Africa	18,063	51	191	17,922
Swaziland	330	0	0	330
Uganda	3,175	0	0	3,175
Tanzania	2,314	2	57	2,259
Zambia	1,325	0	1	1,325
<b>Total Commonwealth Africa</b>	<b>41,717</b>	<b>(44,361)</b>	<b>41,348</b>	<b>(43,826)</b>
<b>Americas</b>				
Antigua & Barbuda	0	0	0	0
Bahamas	17	63	0	80
Barbados	6	5	0	11
Bermuda	0	n.a.	n.a.	0
Dominica	0	1	0	1
Grenada	0	0	0	0
Jamaica	278	3	0	281
St Kitts & Nevis	0	1	0	1
St Lucia	0	7	0	7
St Vincent & the Grenadines	0	2	0	2
Trinidad & Tobago	65	5	1	70
<b>Total Commonwealth Caribbean</b>	<b>366</b>	<b>(355)</b>	<b>453</b>	<b>(442)</b>
Belize	62	2	0	63
Canada	185,196	5,787	4,640	186,343
Guyana	574	0	150	424

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

Notes: \* consumption net of production, imports and exports may not agree because of rounding; n.a. = not available.

Country/Region	Production	Imports	Exports	Consumption*
<b>Total Commonwealth Central &amp; North America</b>				
<b>Total Commonwealth Americas</b>	<b>185,832</b>	<b>(198,120)</b>	<b>186,830</b>	<b>(200,048)</b>
<b>South Asia</b>				
Bangladesh	282	329	1	611
India	23,192	4,043	3	27,231
Maldives	0	0	0	0
Pakistan	2,870	259	0	3,129
Sri Lanka	694	1	3	693
<b>Total Commonwealth South Asia</b>	<b>27,038</b>	<b>(22,801)</b>	<b>31,664</b>	<b>(25,255)</b>
<b>South-east Asia &amp; Pacific</b>				
Australia	26,904	2	1,065	25,841
Brunei Darussalam	217	0	0	217
Fiji	472	2	6	468
Kiribati	0	0	0	0
Malaysia	22,000	116	5,459	16,657
Nauru	0	0	0	0
New Zealand	19,254	3	5,571	13,687
Papua New Guinea	2,908	0	2,638	270
Samoa	61	6	1	66
Singapore	0	40	39	1
Solomon Islands	1,130	0	1,011	119
Tonga	2	1	2	1
Tuvalu	0	0	0	0
Vanuatu	28	2	0	30
<b>Total Commonwealth South-east Asia &amp; Pacific</b>	<b>72,976</b>	<b>(71,281)</b>	<b>57,357</b>	<b>(56,659)</b>
<b>Europe</b>				
Cyprus	5	0	0	5
Malta	0	0	0	0
United Kingdom	8,100	415	644	7,871
<b>Total Commonwealth Europe</b>	<b>8,105</b>	<b>(8,049)</b>	<b>7,876</b>	<b>(8,065)</b>
<b>Total Commonwealth</b>	<b>336,034</b>	<b>(344,967)</b>	<b>325,528</b>	<b>(334,295)</b>
<b>Total World</b>	<b>1,635,069</b>	<b>131,336</b>	<b>130,549</b>	<b>1,635,857</b>
	<b>(1,644,318)</b>		<b>(1,646,667)</b>	


**Annex 4.2: Woodfuel Consumption in Commonwealth Countries 000 m<sup>3</sup>, 2006 (2004)**
**Africa**

Botswana	665
Cameroon	9,566
Gambia	656
Ghana	33,040
Kenya	20,749
Lesotho	2,061
Malawi	5,189
Mauritius	7
Mozambique	16,724
Namibia	n.a.
Nigeria	61,628
Seychelles	0
Sierra Leone	5,448
South Africa	12,000
Swaziland	996
Uganda	37,343
Tanzania	21,913
Zambia	8,798

**Total Commonwealth Africa 236,783 (218,804)**
**Americas**

Antigua & Barbuda -	0
Bahamas	1
Barbados	3
Dominica	0
Grenada	0
Jamaica	560
St Kitts & Nevis	0
St Lucia	0
St Vincent & the Grenadines	0
Trinidad & Tobago	34

**Total Commonwealth Caribbean 598 (608)**

Belize	126
Canada	2,869
Guyana	860

Source: State of the World's Forests 2009, FAO, Rome.  
n.a. = not available.

**Total Commonwealth Central**
**& North America 3,855 (3,815)**
**Total Commonwealth Americas 4,453 (4,423)**
**South Asia**

Bangladesh	27,584
India	306,332
Maldives	0
Pakistan	26,124
Sri Lanka	5,584

**Total Commonwealth South Asia 365,624 (362,788)**
**South-east Asia & Pacific**

Australia	6,969
Brunei Darussalam	12
Fiji	37
Kiribati	0
Malaysia	3,024
Nauru	0
New Zealand	n.a.
Papua New Guinea	5,533
Samoa	70
Singapore	1
Solomon Islands	138
Tonga	2
Tuvalu -	0
Vanuatu	90

**Total Commonwealth South-east Asia & Pacific 15,876 (12,096)**
**Europe**

Cyprus	3
Malta	0
United Kingdom	176

**Total Commonwealth Europe 179 (92)**
**Total Commonwealth 622,915 (599,203)**
**Total World 1,871,450 (1,766,278)**



### Annex 4.3: Employment in Selected Commonwealth Countries in the Forestry Sector

Country	Employment (000)/% total labour force			Breakdown by employment categories in 2006 (000)*
	1990	2000	2006	
<b>Africa</b>				
Cameroon	30/0.7	30/0.5	20/0.3	02 (12); 20 (8); 21(1)
Ghana	33/0.5	39/0.4	43/0.4	02 (12); 20 (30); 21 (1)
Kenya	18/0.2	20/0.1	19/0.1	02 (1); 20 (10); 21 (8)
Mozambique	12/0.2	14/0.1	15/0.1	02 (12); 20 (3)
Nigeria	41/0.1	48/0.1	45/0.1	02 (24); 20 (3); 21 (18)
South Africa	139/1.0	172/0.9	116/0.5	02 (45); 20 (37); 21 (34)
<b>Asia</b>				
Bangladesh	32/0.1	30/0.0	36/0.0	02 (1); 20 (11); 21 (24)
India	482/0.1	429/0.1	481/0.1	02 (246); 20 (55); 21 (180)
Malaysia	171/2.4	219/2.4	248/2.3	02 (88); 20 (126); 21 (35)
Pakistan	42/0.1	45/0.1	58/0.1	02 (30); 20 (5); 21 (22)
Sri Lanka	23/0.3	25/0.3	23/0.3	02 (17); 20 (4); 21 (3)
<b>Europe</b>				
United Kingdom	264/0.9	205/0.7	166/0.6	02 (11); 20 (86); 21 (69)
<b>Americas</b>				
Canada	318/2.2	330/2.0	275/1.6	02 (63); 20 (128); 21 (84)
<b>Asia &amp; Pacific</b>				
Australia	78/0.9	70/0.7	74/0.7	02 (11); 20 (42); 21 (21)
New Zealand	29/1.8	32/1.7	28/1.4	02 (7); 20 (16); 21 (5)
Papua New Guinea	17/0.9	12/0.5	12/0.4	02 (8); 20 (4)

**Source:** FAO (2008), Contribution of the forestry sector to national economies, 1990-2006, Forest Finance Working Paper FSFM/ACC/08, FAO, Rome.

Employment refers to actual or estimated formal employment related to the growing and extraction of raw materials, 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 more than 20,000 full-time jobs.

\* 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.



## 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 pro-

mote the exchange of information among professional foresters, but accrediting institutions have also been included (*Chapter 5*).

A full list of Commonwealth NGOs with an interest in forestry was prepared in 2009 and placed on the CFA website ([www.cfa-international.org](http://www.cfa-international.org)) where it is updated regularly.

#### Professional Forestry Associations in the Commonwealth

Country	Name	Website
Australia	Australian (and New Zealand) Pulp and Paper Industry Technical Association (APPITA).	<a href="http://www.appita.com.au">www.appita.com.au</a>
	Institute of Foresters of Australia (IFA).	<a href="http://www.forestry.org.au">www.forestry.org.au</a>
	Australian Forest Growers	<a href="http://www.afg.asn.au">www.afg.asn.au</a>
Botswana	Forestry Association of Botswana	<a href="http://www.envngo.co.bw">www.envngo.co.bw</a>
Canada	The Canadian Institute of Forestry/Institut forestier du Canada	<a href="http://www.cif-ifc.org">www.cif-ifc.org</a>
	Association des consultants en foresterie du Québec	<a href="http://www.acfquebec.com">www.acfquebec.com</a>
	Association of British Columbia Forest Professionals	<a href="http://www.abcfp.ca">www.abcfp.ca</a>
	Association of Registered Professional Foresters of New Brunswick	
	L'Association des forestiers agréés du Nouveau-Brunswick	<a href="http://www.arpfnb.ca">www.arpfnb.ca</a>
	Association of Saskatchewan Forestry Professionals	<a href="http://www.asfp.ca">www.asfp.ca</a>
	Canadian Forestry Accreditation Board	<a href="http://www.cfab.ca">www.cfab.ca</a>
	Canadian Federation of Professional Foresters Associations	<a href="http://www.cif-ifc.org">www.cif-ifc.org</a>
	College of Alberta Professional Foresters	<a href="http://www.professionalforesters.ab.ca">www.professionalforesters.ab.ca</a>
	Ontario Professional Foresters Association (OPFA)	<a href="http://www.opfa.ca">www.opfa.ca</a>
	Ordre des ingénieurs forestiers du Québec	<a href="http://www.oifq.com">www.oifq.com</a>
	Newfoundland and Labrador Registered Professional Foresters Association	<a href="http://cif-rpf-nlsection.com">http://cif-rpf-nlsection.com</a>
Registered Professional Foresters Association of Nova Scotia (RPFANS)	<a href="http://www.rpfans.ca">www.rpfans.ca</a>	
Ghana	Ghana Institute of Professional Foresters	
India	Society of Indian Foresters	
	Indian Institution of Foresters.	<a href="http://indianinstituteofforesters.blogspot.com">http://indianinstituteofforesters.blogspot.com</a>
	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	Forestry Society of Kenya (FSK)	
Nigeria	Forestry Association of Nigeria (FAN)	<a href="http://www.forestrynigeria.org">www.forestrynigeria.org</a>
Pakistan	"All Foresters" blog	<a href="mailto:allforesters@lead.org.pk">allforesters@lead.org.pk</a>
South Africa	Southern African Institute of Forestry (SAIF)	<a href="http://www.saif.org.za">www.saif.org.za</a>
Sri Lanka	Association of Ex-Professional Foresters	
Tanzania	Tanzanian Association of Foresters (TAF)	<a href="http://www.tafonline.20m.com">www.tafonline.20m.com</a>
United Kingdom	Institute of Chartered Foresters (ICF)	<a href="http://www.charteredforesters.org">www.charteredforesters.org</a>
	Royal Scottish Forestry Society (RSFS)	<a href="http://www.rsfs.org">www.rsfs.org</a>
	Royal Forestry Society of England, Wales and Northern Ireland (RFS)	<a href="http://www.rfs.org.uk">www.rfs.org.uk</a>
	The Arboricultural Association (AA)	<a href="http://www.trees.org.uk">www.trees.org.uk</a>



### 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.

Country	Title	Frequency*	Publisher/Contact	On-line version**
Commonwealth	<i>International Forestry Review</i>	Q	Commonwealth Forestry Association, Craven Arms, Salop SY7 9JJ	<a href="http://www.cfa-international.org">www.cfa-international.org</a> <a href="http://www.forestry.org.au">www.forestry.org.au</a>
Australia	<i>Australian Forestry</i>	Q	Institute of Foresters of Australia, PO Box 7002 Yarralumla ACT 2600	
	<i>Australian Forest Grower</i>	Q	Forest Industries House, 24 Napier Close, Deakin ACT 2600	<a href="http://www.afg.asn.au">www.afg.asn.au</a>
	<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	<a href="http://www.appita.com.au">www.appita.com.au</a>
	<i>International Journal of Wildland Fire</i>	Q	CSIRO, ACT	<a href="http://www.publish.csiro.au/nid/114.htm">www.publish.csiro.au/nid/114.htm</a>
	<i>Tasforests</i>	A	Forestry Tasmania	<a href="http://www.forestrytas.com.au/forestrytas">www.forestrytas.com.au/forestrytas</a>
Bangladesh	<i>Bangladesh Journal of Forest Science</i>	S	Bangladesh Forest Research Institute, Chittagong	<a href="http://www.bffri.gov.bd">www.bffri.gov.bd</a>
Canada	<i>Canadian Journal of Forest Research</i>	M	National Research Council of Canada, Ottawa, ON K1A 0R6	<a href="http://www.pubs.nrc-cnrc.gc.ca/cgi">www.pubs.nrc-cnrc.gc.ca/cgi</a>
	<i>Forestry Chronicle</i>	B	Canadian Institute of Forestry, 151 Slater Street, Suite 504 Ottawa, ON K1P 5H3	<a href="http://www.cif-ifc.org">www.cif-ifc.org</a>
Ghana	<i>Ghana TIDD Gazette</i>	variable, 1-3 p.a.	Timber Industry Development Division, Ghana Forestry Commission, Takoradi	<a href="http://www.ghanatimber.org">www.ghanatimber.org</a>
India	<i>Indian Forester</i>	M	Post Office New Forest, Dehradun (Uttaranchal) – 248 006	<a href="http://www.icfri.org/institutes2/FRI-Indian%20Forester">www.icfri.org/institutes2/FRI-Indian%20Forester</a>
	<i>Indian Journal of Forestry</i>	Q	23-A Connaught Place, PO Box no. 137, Dehra Dun 248001 Uttaranchal	<a href="http://www.scientific.thomson.com/contact/">www.scientific.thomson.com/contact/</a>
	<i>Journal of Timber Development Association of India</i>	Q	Timber Development Association of India, Dehra Dun	<a href="http://www.journalofforestproducts.com">www.journalofforestproducts.com</a>
	<i>Wood News***</i>	Q	Ganesh Publications Pvt.Ltd. 151-75/5, 20th A Main First R Block, Rajajinagar, Bangalore 560 010	
	<i>Journal of Tropical Forestry***</i>		Society of Tropical Forestry Scientists, Jabalpur	
	<i>MYFOREST***</i>		Karnataka Forest Dept.	



## Annex 5.2: Commonwealth Forestry Journals (continued)

Malaysia	<i>Journal of Tropical Forest Science</i>	Q	Forest Research Institute Malaysia, Kepong, 52109 Kuala Lumpur	<a href="http://www.frim.gov.my/epublication/">www.frim.gov.my/epublication/</a>
	<i>Journal of Tropical Forest Products</i>	B	Forest Research Institute Malaysia, Kepong, 52109 Kuala Lumpur	
New Zealand	<i>New Zealand Journal of Forestry Science</i>	T	Private Bag 3020 Rotorua	<a href="http://www.scionresearch.com/new+zealand+journal+of+forestry+science">www.scionresearch.com/new+zealand+journal+of+forestry+science</a> .
	<i>New Zealand Journal of Forestry</i>	Q	NZ Institute of Forestry, PO Box 19-840, Christchurch	<a href="http://www.forestry.org.nz">www.forestry.org.nz</a>
	<i>Southern Hemisphere Forest Industry Journal</i>	Q	PO Box 6215, Whakarewarewa, Rotorua 3220	<a href="http://www.southernhemisphereforestry.co.nz">www.southernhemisphereforestry.co.nz</a>
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	
South Africa	<i>Southern Forests – A Journal of Forest Science</i> (replaced <i>Southern African Forestry Journal</i> in 2007)	T	Postnet Suite 329 Private Bag X4 Menlo Park 0102 New journal will be published by NISC	<a href="http://www.saif.org.za">www.saif.org.za</a> <a href="http://www.nisc.co.za">www.nisc.co.za</a>
	<i>SA Forestry</i>	B	Artworks Communications, PO Box 47209, Greyville 4023	<a href="http://www.saforestrymagazine.co.za">www.saforestrymagazine.co.za</a>
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	<a href="http://www.suanet.ac.tz">www.suanet.ac.tz</a>
United Kingdom	<i>Forestry</i>	Q	Oxford University Press, Great Clarendon St. Oxford OX2 6DP	<a href="http://www.forestry.oupjournals.org">www.forestry.oupjournals.org</a>
	<i>Arboricultural Journal</i>	Q	Arboricultural Association, Ampfield House, Ampfield, Romsey SO51 9PA	<a href="http://www.trees.org.uk/journal.php">www.trees.org.uk/journal.php</a>
	<i>Forestry Journal</i> (formerly <i>Forest Machine Journal</i> which merged with <i>Forestry and British Timber</i> in 2008)	M	Benn Brothers, London	<a href="http://www.fbti.co.uk">www.fbti.co.uk</a>
	<i>Journal of the Institute of Wood Science</i>	S		<a href="http://www.iwsc.org.uk/pubs_journal.htm">www.iwsc.org.uk/pubs_journal.htm</a>
	<i>Forests, Trees and Livelihoods</i>	Q	AB Academic Publishers, The Old Vicarage, Church St. Bicester, Oxon OX26 6AY	<a href="http://www.foreststreesandlivelihoods.co.uk">www.foreststreesandlivelihoods.co.uk</a>
	<i>Quarterly Journal of Forestry</i>	Q	Royal Forestry Society, 102 High St. Tring, Herts. HP23 4AF	<a href="http://www.rfs.org.uk">www.rfs.org.uk</a>
	<i>Scottish Forestry</i>	Q	Royal Scottish Forestry Society, Hagg-on-Esk Canonbie Dumfries DG14 0XE	<a href="http://www.rsfs.org.uk">www.rsfs.org.uk</a>

**Notes:**

\* M = monthly, B = bi-monthly, Q = quarterly, T = three times yearly, S = half-yearly, A = annual;

\*\* usually available to members only;

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



## Annex 6: International Forestry-related Fora, Agreements, Conventions and Regulations

### Annex 6.1: Links to International Forestry-related Fora, Agreements, Conventions and Regulations

<i>Forum, Agreement, Convention or Regulations</i>	<i>Website</i>
IPCC	<a href="http://www.ipcc.ch">www.ipcc.ch</a>
UN Framework Convention on Climate Change (UNFCCC)	<a href="http://www.unfccc.int">www.unfccc.int</a>
Kyoto Protocol – KP (of the UNFCCC)	(see UNFCCC)
Adaptation Fund	<a href="http://www.adaptation-fund.org/home">www.adaptation-fund.org/home</a>
Clean Development Mechanism	(see UNFCCC)
UN Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (UN-REDD)	<a href="http://www.un-redd.org/UNREDDProgramme">www.un-redd.org/UNREDDProgramme</a>
Forest Carbon Partnership Facility (FCPF)	<a href="http://www.forestcarbonpartnership.org/fcp">www.forestcarbonpartnership.org/fcp</a>
The Prince's Rainforest Project (PRP)	<a href="http://www.rainforestsos.org/pages/about-us">www.rainforestsos.org/pages/about-us</a>
Ramsar Convention on Wetlands	<a href="http://www.ramsar.org">www.ramsar.org</a>
Convention on Biological Diversity (CBD)	<a href="http://www.cbd.int">www.cbd.int</a>
UN Convention to Combat Desertification – UNCCD (in countries experiencing serious drought and/or desertification, particularly in Africa)	<a href="http://www.unccd.int">www.unccd.int</a>
Convention on International Trade in Endangered Species (of wild fauna and flora) – CITES	<a href="http://www.cites.org">www.cites.org</a>
International Tropical Timber Organisation	<a href="http://www.itto.int">www.itto.int</a>
International Tropical Timber Agreement	(see ITTO)

### Annex 6.2: Ratification of International Forestry Conventions by Commonwealth Countries, 2009

<i>Country</i>	<i>CBD</i>	<i>UNFCCC</i>	<i>KP</i>	<i>UNCCD</i>	<i>ITTA</i>	<i>CITES</i>	<i>Ramsar</i>
<b>Africa</b>							
Botswana	x	x	x	x		x	x
Cameroon	x	x	x	x	x	x	x
Gambia	x	x	x	x		x	x
Ghana	x	x	x	x	x	x	x
Kenya	x	x	x	x		x	x
Lesotho	x	x	x	x		x	x
Malawi	x	x	x	x		x	x
Mauritius	x	x	x	x		x	x
Mozambique	x	x	x	x		x	x
Namibia	x	x	x	x		x	x
Nigeria	x	x	x	x	x	x	x
Seychelles	x	x	x	x		x	x
Sierra Leone	x	x	x	x		x	x
South Africa	x	x	x	x		x	x
Swaziland	x	x	x	x		x	
Tanzania	x	x	x	x		x	x
Uganda	x	x	x	x		x	x
Zambia	x	x	x	x		x	x
<b>Caribbean</b>							
Antigua & Barbuda	x	x	x	x		x	x
Bahamas	x	x	x	x		x	x
Barbados	x	x	x	x		x	x
Dominica	x	x	x	x		x	
Grenada	x	x	x	x		x	
Jamaica	x	x	x	x		x	x
St Kitts & Nevis	x	x	x	x		x	
St Lucia	x	x	x	x		x	x
St Vincent & the Grenadines	x	x	x	x		x	
Trinidad & Tobago	x	x	x	x	x	x	x
<b>Central &amp; North America</b>							
Belize	x	x	x	x		x	x
Canada	x	x	x	x	x	x	x
Guyana	x	x	x	x	x	x	
<b>South Asia</b>							
Bangladesh	x	x	x	x		x	x
India	x	x	x	x	x	x	x
Maldives	x	x	x	x		x	





**Annex 6.2: Ratification of International Forestry Conventions by Commonwealth Countries, 2009 (continued)**

Country	CBD	UNFCCC	KP	UNCCD	ITTA	CITES	Ramsar
Pakistan	x	x	x	x		x	x
Sri Lanka	x	x	x	x		x	x
<b>South-east Asia &amp; Pacific</b>							
Australia	x	x	x	x	x	x	x
Brunei Darussalam	x			x		x	
Fiji	x	x	x	x	x	x	x
Kiribati	x	x	x	x		x	x
Malaysia	x	x	x	x	x	x	x
Nauru	x	x	x	x			
New Zealand	x	x	x	x	x	x	x
Papua New Guinea	x	x	x	x	x	x	x
Samoa	x	x	x	x		x	x

Source: State of the World's Forests 2009, FAO, Rome.

Country	CBD	UNFCCC	KP	UNCCD	ITTA	CITES	Ramsar
Singapore	x	x	x	x		x	
Solomon Islands	x	x	x	x			x
Tonga	x	x	x	x			
Tuvalu	x	x	x	x			
Vanuatu	x	x	x	x	x	x	x
<b>Europe</b>							
Cyprus	x	x	x	x		x	x
Malta	x	x	x	x		x	x
United Kingdom	x	x	x	x	x	x	x
<b>Total Commonwealth</b>	<b>53</b>	<b>52</b>	<b>52</b>	<b>53</b>	<b>14</b>	<b>50</b>	<b>39</b>
<b>Total World</b>	<b>190</b>	<b>190</b>	<b>184</b>	<b>192</b>	<b>60</b>	<b>175</b>	<b>159</b>

**Annex 6.3: Tree Species in CITES Appendices I, II and III**

Appendix I	Appendix II	Appendix III	Appendix I	Appendix II	Appendix III
ARAUCARIACEAE (Monkey Puzzle) <i>Araucaria araucana</i>			PINACEAE (Guatemala fir) <i>Abies guatemalensis</i>		
CUPRESSACEAE (Cypresses) <i>Fitzroya cupressoides</i>			PODOCARPACEAE (Podocarps) <i>Podocarpus neriifolius</i>		
<i>Pilgerodendron uviferum</i>			ROSACEAE (African cherry, stinkwood) <i>Prunus africana</i>		
CYATHEACEAE (Tree ferns) <i>Cyathea spp</i>			TAXACEAE (Himalayan yew) <i>Taxus chinensis</i> <i>Taxus cuspidate</i> <i>Taxus fauna</i> <i>Taxus sumatrana</i> <i>Taxus wallichiana</i>		
JUGLANDACEAE (Gavilan) <i>Oreomunnea pterocarpa</i>			THYMELAEACEAE (Agarwood, ramin) <i>Aquilaria spp</i> <i>Gonystylus spp</i> <i>Gyrinops spp</i>		
LEGUMINOSEAE (Afromosia, cristobal, rosewood, sandalwood) <i>Caesalpinia echinata</i>			TROCHODENDRACEAE (Tetracentron) <i>Tetracentron sinense</i>		
<i>Dalbergia nigra</i>		<i>Dalbergia retusa</i> <i>Dalbergia stevensonii</i> <i>Dalbergia panamensis</i>	ZYGOPHYLLACEAE (Lignum-vitae) <i>Guaiacum spp</i>		<i>Bulnesia sarmientoi</i>
<i>Pericopsis elata</i> <i>Platymiscium pleiostachyum</i> <i>Pterocarpus santalinus</i>					
MAGNOLIACEAE (Magnolia) <i>Magnolia liliifera</i> <i>var obovata</i>					
MELIACEAE (Mahoganies, Spanish cedar) <i>Swietenia humilis</i> <i>Swietenia macrophylla</i> <i>Swietenia mahogany</i>		<i>Cedrela odorata</i>			

Source: CITES website [www.cites.org/eng/app/appendices](http://www.cites.org/eng/app/appendices).

Appendix 1 species are endangered due to international trade, and their trade is only permitted in exceptional circumstances.

Appendix 2 species may become endangered if trade is not regulated through controls to prevent unsustainable use.

Appendix 3 species are those that are subject to domestic regulation.

Note that many of these entries are qualified by notes, which have not been reproduced here. Users are advised to check the CITES website.





Website:  
[www.privateforests.tas.gov.au](http://www.privateforests.tas.gov.au)

**Forest Practices Authority**  
(An independent statutory body that administers the forest practices system in Tasmania)  
30 Patrick St  
Hobart TAS 7000  
Tel: +61 3 6233 7966  
Fax: +61 3 6233 7954  
Website: [www.fpa.tas.gov.au](http://www.fpa.tas.gov.au)

#### Victoria

**Department of Sustainability and Environment**  
(Responsible for managing Victoria's forests, provides policy guidance for forested parks and reserves, conservation and incentives to private landholders with native forest or plantations)  
8 Nicholson Street  
East Melbourne Vic 3002  
Tel: +61 3 5332 5000  
E-mail:  
[customer.service@dse.vic.gov.au](mailto:customer.service@dse.vic.gov.au)  
Website: [www.dse.vic.gov.au](http://www.dse.vic.gov.au)

**VicForests**  
(Native forest timber harvesting and sales, commercial management of State forests)  
GPO Box 191  
Melbourne Vic 3001  
Tel: +61 3 9608 9500  
Fax: +61 3 9608 9566  
E-mail: [vfs.admin@vicforests.com.au](mailto:vfs.admin@vicforests.com.au)  
Website: [www.vicforests.com.au](http://www.vicforests.com.au)

**(Research) Department of Primary Industries**  
GPO Box 4440  
Melbourne Vic 3001  
Tel: +61 3 9658 4440  
Fax: +61 3 9658 4760  
E-mail:  
[information.centre@dpi.vic.gov.au](mailto:information.centre@dpi.vic.gov.au)  
Website: [www.dpi.vic.gov.au](http://www.dpi.vic.gov.au)

#### Western Australia

**Department of Environment and Conservation**  
The Atrium, Level 4  
168 St Georges Terrace  
Perth WA 6000  
Tel: +61 8 6467 6500  
Fax: +61 8 6467 5562  
Website: [www.dec.wa.gov.au](http://www.dec.wa.gov.au)

**Forest Products Commission**  
(Statutory authority and lead government agency for managing WA's forest resources; also oversees the comprehensive framework for regional forest-related industry development)  
Level 1, 117 Great Eastern Highway  
Rivervale WA 6103  
Tel: +61 8 9475 8888  
Fax: +61 8 9475 8899  
E-mail: [info@fpc.wa.gov.au](mailto:info@fpc.wa.gov.au)  
Website: [www.fpc.wa.gov.au](http://www.fpc.wa.gov.au)

#### BAHAMAS

**NATIONAL FOREST SERVICE**  
**Department of Lands and Surveys (Forestry Section)**  
Office of the Prime Minister  
PO Box 592  
Nassau, N.P.  
Fax: +1 242 322 5830  
E-mail (organisation):  
[forestry@batelnet.bs](mailto:forestry@batelnet.bs)  
Website: [www.bahamas.gov.bs](http://www.bahamas.gov.bs)

**Department of Agriculture (Conservation Unit)**  
**Ministry of Agriculture and Marine Resources**  
Levy Building  
PO Box N 3028  
Nassau, N.P.  
Tel: +1 242 325 7502 / 9  
Fax: +1 242 325 3960

**Department of Physical Planning**  
**Ministry of Works and Utilities**  
John F. Kennedy Drive  
PO Box N 1611  
Nassau, N.P.  
Bahamas  
Tel: +1 242 322 7220 / 1  
Fax: +1 242 328 3206  
E-mail: [admin@mowt.bs](mailto:admin@mowt.bs)  
Website: [www.bahamas.gov](http://www.bahamas.gov)

**Water and Sewerage Corporation**  
**Department of Public Works**  
**Ministry of Works and Utilities**  
PO Box N 3905  
Nassau, N.P.  
Tel: +1 242 302 5500  
Fax: +1 242 328 3896  
E-mail: [admin@mowt.bs](mailto:admin@mowt.bs)  
Website: [www.wsc.com.bs/](http://www.wsc.com.bs/)

**Bahamas Environment Science and Technology Commission (BEST)**  
**Ministry of Energy and the Environment**

Cecil Wallace-Whitfield Centre  
Cable Beach  
PO Box N 3217  
Nassau, N.P.  
Tel: +1 242 325 7502 / 9  
Fax: +1 242 322 1767  
E-mail: [bestnbs@hotmail.com](mailto:bestnbs@hotmail.com)  
Website: [www.best.bs](http://www.best.bs)

#### RESEARCH INSTITUTIONS

**Bahamas Environmental Research Centre (BERC)**  
**The College of the Bahamas**  
Oakes Field Campus  
Thompson Boulevard  
PO Box N4912  
Nassau, N.P.  
Tel: +1 242 302 4300  
Fax: +1 242 326 7834  
Website: [www.cob.edu.bs/BERC.php](http://www.cob.edu.bs/BERC.php)

**Gerace Research Center**  
c/o Twin Air  
498 SW 34th St.  
Ft Lauderdale, FL 33315  
USA  
Tel: +1 242 331 2520  
Fax: +1 242 331 2524  
Website:  
[www.geraceresearchcenter.com](http://www.geraceresearchcenter.com)

**Marine and Environmental Studies Institute (MESI)**  
T Block, Oakes Field Campus  
Thompson Boulevard  
PO Box N4912  
Nassau, N.P.  
Tel: +1 242 302 4400  
Fax: +1 242 326 7834  
Website: [www.cob.edu.bs/MESI.php](http://www.cob.edu.bs/MESI.php)

#### UNIVERSITIES AND COLLEGES

**The College of the Bahamas**  
Oakes Field Campus  
Thompson Boulevard  
PO Box N4912  
Nassau, N.P.  
Tel: +1 242 302 4400  
Fax: +1 242 326 7834  
Website: [www.cob.edu.bs](http://www.cob.edu.bs)

#### BANGLADESH

##### NATIONAL FOREST SERVICE

**Forest Department**  
Bana Bhaban  
1207 Dhaka  
Tel: +880 2 882 8364  
Fax: +880 2 881 0704  
E-mail: [accf-dp@bforest.gov.bd](mailto:accf-dp@bforest.gov.bd)  
Website: [www.moef.gov.bd](http://www.moef.gov.bd)

#### BARBADOS

##### NATIONAL FOREST SERVICE

**Ministry of Agriculture and Rural Development**  
**Government of Barbados**  
Graeme Hall  
Christ Church  
Fax: +1 246 420 8444  
E-mail: [minagric@caribsurf.com](mailto:minagric@caribsurf.com)  
Website: [www.agriculture.gov.bb](http://www.agriculture.gov.bb)

**National Conservation Commission (NCC)**  
Codrington House  
St Michael  
Tel: +1 246 425 1200/1212  
E-mail: [ncc@caribsurf.com](mailto:ncc@caribsurf.com)  
Website: [www.nccbarbados.gov.bb](http://www.nccbarbados.gov.bb)

##### RESEARCH INSTITUTIONS

**Bellairs Research Institute**  
Holetown  
St James  
Tel: +1 246 422 2087  
Fax: +1 246 422 0692  
E-mail: [bellairs@caribsurf.com](mailto:bellairs@caribsurf.com)  
Website: [www.mcgill.ca/bellairs](http://www.mcgill.ca/bellairs)

**National Council for Science and Technology (NCST)**  
Reef Road  
Fontabelle  
St Michael  
Tel: +1 246 427 1820 / 5270 / 5276  
Fax: +1 246 228 5765  
E-mail: [ncst@commerce.gov.bb](mailto:ncst@commerce.gov.bb)  
Website:  
[www.commerce.gov.bb/agency/ncst](http://www.commerce.gov.bb/agency/ncst)

##### UNIVERSITIES AND COLLEGES

**Barbados Community College (BCC)**  
The Eyrie, Howells Cross Road  
St Michael  
Tel: +1 246 426 2858  
Fax: +1 246 429 5935  
Website: <http://bcc.edu.bb>

**University of the West Indies**  
Cave Hill Campus  
PO Box 64  
Bridgetown  
Tel: +1 246 417 4000  
Fax: +1 246 4251327  
Website: [www.cavehill.uwi.edu](http://www.cavehill.uwi.edu)

**BELIZE****NATIONAL FOREST SERVICE**
**Forest Department  
Ministry of Natural Resources,  
Local Government and the  
Environment**

23/25 Unity Boulevard  
Belmopan City  
Tel: +501 822 2079 / 1524  
Fax: +501 822 1523  
E-mail: [forestry@mnrei.gov.bz](mailto:forestry@mnrei.gov.bz)  
Website: [www.mnrei.gov.bz](http://www.mnrei.gov.bz)  
[www.chm.org.bz/forestdepartment/belizeFD/](http://www.chm.org.bz/forestdepartment/belizeFD/)

**RESEARCH INSTITUTIONS****Hill Bank Field Station**

PO Box 749  
# 1 Eyre Street  
Belize City  
Tel: +501 227 5616 / 5617 / 1020  
Fax: +501 227 5635  
E-mail: [pfbel@btl.net](mailto:pfbel@btl.net)  
Website: [www.pfbelize.org/hillbank.html](http://www.pfbelize.org/hillbank.html)

**Las Cuevas Research Station and  
Explorers Lodge**

PO Box 410  
Belmopan  
E-mail: [enquiries@mayaforest.com](mailto:enquiries@mayaforest.com)  
Website: [www.mayaforest.com](http://www.mayaforest.com)

**UNIVERSITIES AND COLLEGES****Galen University**

P.O. Box 177  
San Ignacio  
Cayo District  
Tel: +501 824 3226  
Fax: +501 824 3723  
E-mail: [galenu@btl.net](mailto:galenu@btl.net)  
Website: [www.galen.edu.bz](http://www.galen.edu.bz)

**Sacred Heart Junior College (SHJC)**

PO Box 163  
San Ignacio  
Cayo District  
Website: [www.shc.edu.bz/shjc](http://www.shc.edu.bz/shjc)

**University of Belize  
Natural Resources Management  
Programme**

**Faculty of Science and Technology**  
PO Box 340  
Belmopan  
Tel: +501 822 3680  
Fax: +501 822 3930  
E-mail: [aperez@ub.edu.bz](mailto:aperez@ub.edu.bz);  
[ubboles@yahoo.com](mailto:ubboles@yahoo.com)  
Website: [www.ub.edu.bz](http://www.ub.edu.bz)

**BERMUDA****NATIONAL FOREST SERVICE**
**Department of Conservation  
Services**

40 North Shore Road  
Flatts FL 04  
Tel: +1 441 293 2727  
Website: [www.gov.bm](http://www.gov.bm)

**Department of Environmental  
Protection**

PO Box HM 834  
Hamilton HM CX  
Tel: +1 441 236 4201  
Fax: +1 441 236 7582  
Website: [www.gov.bm](http://www.gov.bm)

**Department of Parks**

PO Box HM 20  
Hamilton HM AX  
Tel: +1 441 236 4201  
Fax: +1 441 236 3711  
Website: [www.gov.bm](http://www.gov.bm)

**RESEARCH INSTITUTIONS**
**Bermuda Aquarium, Museum and  
Zoo (BAMZ)**

PO Box FL 145  
Flatts FL BX  
Tel: +1 441 293 2727  
Fax: +1 441 293 4014  
E-mail: [info.bzs@gov.bm](mailto:info.bzs@gov.bm)  
Website: [www.bamz.org](http://www.bamz.org)

**UNIVERSITIES AND COLLEGES****Bermuda College**

PO Box PG 297  
Paget PG BX  
Tel: +1 441 236 9000  
Fax: +1 441 239 4008  
E-mail: [info@bercol.bm](mailto:info@bercol.bm)  
Website: [www.bercol.bm](http://www.bercol.bm)

**BOTSWANA****NATIONAL FOREST SERVICE**
**Department of Forestry and Range  
Resources**
**Ministry of Environment, Wildlife  
and Tourism**

Private Bag 00424  
Gaborone  
Tel: +267 395 4050 / 318 8554  
Fax: +267 395 4051

**UNIVERSITIES AND COLLEGES****The University of Botswana**

Private Bag UB 0022  
Gaborone

Tel: +267 355 0000  
Fax: +267 395 6591  
Website: [www.ub.bw](http://www.ub.bw)

**BRUNEI DARUSSALAM****NATIONAL FOREST SERVICE****Forestry Department**

Ministry of Industry and Primary  
Resources  
Jalan Menteri Besar,  
Bandar Seri Begawan BB3910  
Website: [www.forestry.gov.bn](http://www.forestry.gov.bn)

**CAMEROON****NATIONAL FOREST SERVICE**
**Ministère des forêts et de la faune  
Yaoundé**

Tel: +237 22 22 94 83 or 22 22 94 86  
Fax: +237 22 22 94 84  
Websites: [www.minfof-cm.org/](http://www.minfof-cm.org/)  
[www.minfof.gov.cm](http://www.minfof.gov.cm)

**RESEARCH INSTITUTIONS**
**Institute of Agricultural Research  
for Development (IRAD)**

PO Box 2067 or 2123  
Yaoundé  
Tel/Fax: +237 22 22 59 24 / 22 33 62 / 23 26 44  
Website: [www.irad-cameroon.org](http://www.irad-cameroon.org)

**UNIVERSITY FACULTIES/  
DEPARTMENTS**
**Bamenda University of Science &  
Technology**

PO Box 277  
Bamenda NW Province  
Tel/Fax: +237 36 33 66

**Université des Montagnes (UdM)**

BP 208  
Bangante  
Tel: +234 48 90 89 / 20 65 89 / 20 72 21

**CANADA****NATIONAL FOREST SERVICE****Canadian Forest Service (CFS)**

Headquarters  
580 Booth Street  
Ottawa  
Ontario K1A 0E4  
Tel: +1 613 947 7341  
Fax: +1 613 947 7397  
Website: [www.nrcan-rcnca.gc.ca/com](http://www.nrcan-rcnca.gc.ca/com)

**Canadian Forest Service Centres:****Pacific Forestry Centre**

506 West Burnside Road  
Victoria, British Columbia V8Z 1M5  
Tel: +1 250 363 0600 / 0608  
Fax: +1 250 363 0775  
Website: [www.pfc.cfs.nrcan.gc.ca/index\\_e.html](http://www.pfc.cfs.nrcan.gc.ca/index_e.html)

**Northern Forestry Centre**

5320 – 122nd Street  
Edmonton  
Alberta T6H 3S5  
Tel: +1 780 435 7210 / 7202  
Fax: +1 780 435 7359  
Website: <http://nofc.cfs.nrcan.gc.ca>

**Saskatchewan Liaison Office**

#250, 1288 Central Avenue  
Prince Albert  
Saskatchewan S6V 4V8  
Tel: +1 306 953 8548  
Fax: +1 306 953 8649

**Great Lakes Forestry Centre**

1219 Queen Street East  
Sault Ste Marie  
Ontario P6A 2E5  
Tel: +1 705 949 9461  
Fax: +1 705 541 5700  
Website: [www.glfc.cfs.nrcan.gc.ca](http://www.glfc.cfs.nrcan.gc.ca)

**Petawawa Research Forest**

PO Box 2000  
Chalk River  
Ontario K0J 1J0  
Tel: +1 613 589 3009  
Fax: +1 613 589 2275  
Website: [www.glfc.cfs.nrcan.gc.ca/petawawa](http://www.glfc.cfs.nrcan.gc.ca/petawawa)

**Laurentian Forestry Centre**

1055 du P.E.P.S., PO Box 10380  
Quebec  
Quebec G1V 4C7  
Tel: +1 418 648 5788  
Fax: +1 418 648 5849  
Website: <http://cfs.nrcan.gc.ca/regions/lfc>

**Atlantic Forestry Centre**

PO Box 4000  
Regent Street  
Fredericton  
New Brunswick E3B 5P7  
Tel: +1 506 452 3500  
Fax: +1 506 452 3525  
Website: <http://cfs.nrcan.gc.ca/regions/afc>

**Corner Brook Office**

University Drive  
Corner Brook  
Newfoundland and Labrador A2H 6P9



Tel: +1 709 637 4900  
 Fax: +1 709 637 4910  
 Website:  
<http://cfs.nrcan.gc.ca/regions/afc>

**Acadia Research Forest**  
 PO Box 4000  
 Fredericton  
 New Brunswick E3B 5P7  
 Tel: +1 506 472 6928  
 Fax: +1 506 472 7916  
 Website:  
<http://cfs.nrcan.gc.ca/subsite/ferns/acadia>

#### CANADA'S MODEL FORESTS

**International Model Forest Network Secretariat**  
 250 Albert Street  
 PO Box 8500  
 Ottawa  
 Ontario K1G 3H9  
 Tel: +1 613 236 6163  
 Fax: +1 613 234 7457  
 Website: [www.idrc.ca/imfn](http://www.idrc.ca/imfn)

**Bas-Saint-Laurent Model Forest**  
 Université du Québec à Rimouski  
 300 allée des Ursulines, Room J-463  
 Rimouski  
 Quebec G5L 3A1  
 Tel: +1 418 722 7211  
 Fax: +1 418 721 5630  
 E-mail: [foretmodele@fmodbsl.qc.ca](mailto:foretmodele@fmodbsl.qc.ca)  
 Website: [www.foret.fmodbsl.qc.ca](http://www.foret.fmodbsl.qc.ca)

**Eastern Ontario Model Forest**  
 PO Bag 2111  
 Kemptville  
 Ontario K0G 1J0  
 Tel: +1 613 258 8241  
 Fax: +1 613 258 8363  
 E-mail: [modelforest@eomf.on.ca](mailto:modelforest@eomf.on.ca)  
 Website: [www.eomf.on.ca](http://www.eomf.on.ca)

**Foothills Model Forest**  
 Box 6330  
 Hinton  
 Alberta T7V 1X6  
 Tel: +1 780 865 8330  
 Fax: +1 780 865 8331  
 Website: [www.fmf.ca](http://www.fmf.ca)

**Fundy Model Forest**  
 701 Main Street, Suite 2  
 Sussex  
 New Brunswick E4E 7H7  
 Tel: +1 506 432 7575 Toll free: 1 800 546 4838  
 Fax: +1 506 432 7562  
 E-mail: [info@FundyModelForest.net](mailto:info@FundyModelForest.net)  
 Website: [www.fundymodelforest.net](http://www.fundymodelforest.net)

**Lake Abitibi Model Forest**  
 PO Box 129  
 Cochrane  
 Ontario P0L 1C0  
 Tel: +1 705 272 7800  
 Fax: +1 705 272 2744  
 E-mail: [office@lamf.net](mailto:office@lamf.net)  
 Website: [www.lamf.net](http://www.lamf.net)

**Manitoba Model Forest**  
 PO Box 6500  
 Pine Falls  
 Manitoba R0E 1M0  
 Tel: +1 204 367 5232  
 Fax: +1 204 367 8897  
 Website:  
[www.manitobamodelforest.net](http://www.manitobamodelforest.net)

**McGregor Model Forest**  
 PO Box 2640  
 Prince George  
 British Columbia V2N 4T5  
 Tel: +1 250 612 5840  
 Fax: +1 250 612 5848  
 Website: [www.mcgregor.bc.ca](http://www.mcgregor.bc.ca)

**Nova Forest Alliance**  
 PO Box 208  
 Stewiacke  
 Nova Scotia B0N 2J0  
 Tel: +1 902 639 2921  
 Fax: +1 902 639 2981  
 E-mail: [info@novaforestalliance.com](mailto:info@novaforestalliance.com)  
 Website:  
[www.novaforestalliance.com](http://www.novaforestalliance.com)

**Prince Albert Model Forest**  
 PO Box 2406  
 Prince Albert  
 Saskatchewan S6V 7G3  
 Tel: +1 306 922 1944  
 Fax: +1 306 763 6456  
 E-mail: [pamf@sasktel.net](mailto:pamf@sasktel.net)  
 Website: [www.pamodelforest.sk.ca](http://www.pamodelforest.sk.ca)

**Waswanipi Cree Model Forest**  
 Waswanipi  
 Quebec J0Y 3C0  
 Tel: +1 819 753 2900  
 Fax: +1 819 753 2904  
 Website: [www.wcmf.ca](http://www.wcmf.ca)

**Western Newfoundland Model Forest**  
 Forest Centre  
 University Drive  
 PO Box 68  
 Corner Brook  
 Newfoundland and Labrador A2H 6C3  
 Tel: +1 709 637 7300  
 Fax: +1 709 634 0255  
 E-mail: [wnmf@wnmf.com](mailto:wnmf@wnmf.com)  
 Website: [www.wnmf.com](http://www.wnmf.com)

#### NATIONAL FOREST STRATEGY

**National Forest Strategy Coalition Secretariat**  
 580 Booth Street, 8th Floor  
 Ottawa  
 Ontario K1A 0E4  
 Tel: +1 613 947 9031  
 Fax: +1 613 947 9033  
 E-mail: [info@foreststrategy.ca](mailto:info@foreststrategy.ca)  
 Website:  
[http://npsc.forest.ca/index\\_e.htm](http://npsc.forest.ca/index_e.htm)

#### 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  
 Tel: +1 780 944 0313  
 Fax: +1 780 427 4407  
 Website: [www.srd.gov.ab.ca](http://www.srd.gov.ab.ca)

**Alberta Forest Service, Program Support Branch**  
 9920-108 Street, 10th Floor Bramalea Building  
 Edmonton  
 Alberta T5K 2M4  
 Tel: +1 780 422 6535

**Alberta Land and Forest Service, Forest Protection Division, Forest Health Branch**  
 9920 – 108 Street, 10th Floor GWL Building  
 Edmonton  
 Alberta T5K 2M4  
 Website: [www.arc.ab.ca](http://www.arc.ab.ca)

##### British Columbia

**Ministry of Forests and Range**  
 PO Box 9529, Stn Prov Govt  
 Victoria  
 British Columbia V8W 9C3  
 Tel: +1 250 387 1040  
 Fax: +1 250 387 6240  
 Website: [www.gov.bc.ca/for](http://www.gov.bc.ca/for)

**British Columbia, Ministry of Forests, Research Branch**  
 31 Bastion Square  
 Victoria  
 British Columbia V8W 3E7  
 Tel: +1 250 387 6642

##### Manitoba

**Manitoba Conservation Forestry Branch**  
 200 Saulteaux Crescent  
 Winnipeg  
 Manitoba R3J 3W3  
 Tel: +1 204 945 7989  
 Website:  
[www.gov.mb.ca/conservation/forestry](http://www.gov.mb.ca/conservation/forestry)

##### New Brunswick

**Natural Resources and Energy Hugh John Flemming Forestry Centre**  
 PO Box 6000  
 Fredericton  
 New Brunswick E3B 5H1  
 Tel: +1 506 453 2516  
 Fax: +1 506 453 6689  
 Website: [www.gnb.ca](http://www.gnb.ca)

##### Newfoundland and Labrador

**Forest Resources**  
 Fortis Building  
 PO Box 2006  
 Corner Brook  
 Newfoundland and Labrador A2H 6J8  
 Tel: +1 709 637 2349 / 2284  
 Fax: +1 709 637 2403 / 634 4378  
 Website: [www.nr.gov.nl.ca/forestry](http://www.nr.gov.nl.ca/forestry)

##### Northwest Territories

**Forest Management Division**  
**Department of Environment and Natural Resources**  
**Government of the Northwest Territories**  
 PO Box 7  
 Fort Smith  
 Northwest Territories X0E 0P0  
 Tel: +1 867 872 7700  
 Fax: +1 867 872 2077  
 Website:  
<http://forestmanagement.enr.gov.nt.ca>

##### Nova Scotia

**Natural Resources – Forestry Division**  
 PO Box 698  
 Halifax  
 Nova Scotia B3J 2T9  
 Tel: +1 902 424 5935  
 Fax: +1 902 424 7735  
 Website: [www.gov.ns.ca/natr](http://www.gov.ns.ca/natr)



#### Nunavut Territory

**Department of the Environment**  
PO Box 1000 Station 1300  
Iqaluit  
Nunavut Territory X0A 0H0  
Tel: +1 867 975 7700 Toll free: 1 866 222 9063  
Fax: +1 867 975 7742  
Website:  
[www.gov.nu.ca/Nunavut/environment](http://www.gov.nu.ca/Nunavut/environment)

#### Ontario

**Forests Division**  
**Ministry of Natural Resources, Forests Division**  
Roberta Bondar Place  
Suite 400, 70 Foster Drive  
Sault Ste Marie  
Ontario P6A6V5  
Tel: +1 705 945 6661  
Fax: +1 705 945 6667  
Website: [www.mnr.gov.on.ca/MNR](http://www.mnr.gov.on.ca/MNR)

**Ontario Forest Research Institute**  
**Ontario Ministry of Natural Resources**  
1235 Queen St. E.  
Sault Ste Marie  
Ontario P6A 2E5  
Tel: +1 705 946 2981  
Fax: +1 705 946 2030  
E-mail:  
[information.ofri@mnr.gov.on.ca](mailto:information.ofri@mnr.gov.on.ca)

#### Prince Edward Island

**Environment, Energy and Forestry**  
Jones Building, 4th and 5th Floors  
11 Kent Street  
PO Box 2000  
Charlottetown  
Prince Edward Island C1A 7N8  
Tel: +1 902 368 5000  
Fax: +1 902 368 5830  
Website: [www.gov.pe.ca/enveng](http://www.gov.pe.ca/enveng)

#### Quebec

**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  
Quebec G1P 3W8  
Tel: +1 418 627 8652  
Fax: +1 418 528 1278

E-mail: [foretquebec@mnrq.gouv.qc.ca](mailto:foretquebec@mnrq.gouv.qc.ca)  
Website: [www.mrn.gouv.qc.ca](http://www.mrn.gouv.qc.ca)

**Quebec Forest Research Council**  
**Conseil de la Recherche Forestière du Québec**  
1200 avenue Germain des Prés,  
Bureau 103  
Sainte Foy  
Quebec GIV 3M7  
E-mail: [crfq@qbc.clic.net](mailto:crfq@qbc.clic.net)  
Website: [www.qbc.clic.net/crfq](http://www.qbc.clic.net/crfq)

#### Saskatchewan

**Saskatchewan Environment – Forest Service Branch**  
Box 3003, 1061 Central Avenue  
Prince Albert  
Saskatchewan S6V 6G1  
Tel: +1 306 953 2437  
Fax: +1 306 953 2360  
Website: [www.se.gov.sk.ca/forests](http://www.se.gov.sk.ca/forests)

**Saskatchewan Environment and Resource Management, Forest Ecosystem Branch, Forest Science Section**  
Box 3003 (800 Central Avenue)  
Prince Alberta  
Saskatchewan S6V 6G1  
Website: [www.gov.sk.ca](http://www.gov.sk.ca)

#### Yukon Territory

**Energy, Mines and Resources – Forestry Branch**  
**Forest Management Branch**  
Mile 918 Alaska Highway  
Box 2703 (K-918)  
Whitehorse  
Yukon Y1A 2C6  
Tel: +1 867 456 3999 Toll free: 1 800 661 0408 ext. 3999  
Fax: +1 867 667 3138  
E-mail: [forestry@gov.yk.ca](mailto:forestry@gov.yk.ca)  
Website: [www.emr.gov.yk.ca/forestry/index.html](http://www.emr.gov.yk.ca/forestry/index.html)

#### NATIONAL RESEARCH INSTITUTIONS

**Acadia Research Forest (ARF)**  
PO Box 4000  
Fredericton  
New Brunswick E3B 5P7  
Tel: +1 506 472 6928  
Fax: +1 506 472 7916  
Website: <http://cfs.nrcan.gc.ca/site/ferns/acadia>

**Alberta Research Council (ARC)**  
250 Karl Clark Road  
Edmonton  
Alberta T6N 1E4

Tel: +1 780 450 5111  
Fax: +1 780 450 5333  
Website: [www.arc.ab.ca](http://www.arc.ab.ca)

#### Canadian Forest Service (CFS)

Headquarters  
580 Booth Street  
Ottawa  
Ontario K1A 0E4  
Tel: +1 613 947 7341  
Fax: +1 613 947 7397  
Website:  
[www.nrcan-rncan.gc.ca/com](http://www.nrcan-rncan.gc.ca/com)

#### Canadian Interagency Forest Fire Centre (CIFFC)

210-301 Weston Street  
Winnipeg  
Manitoba R3E 3H4  
Tel: +1 204 784 2030  
Fax: +1 204 956 2398  
Website: [www.ciffc.ca](http://www.ciffc.ca)

#### FORAC Research Consortium

Pavillon Adrien-Pouliot  
Université Laval  
Quebec City  
Quebec G1K 7P4  
Tel: +1 418 656 2131 ext. 12345  
Fax: +1 418 656 7415  
E-mail: [info@forac.ulaval.ca](mailto:info@forac.ulaval.ca)  
Website: [www.forac.ulaval.ca](http://www.forac.ulaval.ca)

#### Forest Ecosystem Science Co-operative Inc.

977 Alloy Drive, Suite 18  
Thunder Bay  
Ontario P7B 5Z8  
Tel: +1 807 346 2860  
Fax: +1 807 346 2299  
Website: [www.forestco-op.ca](http://www.forestco-op.ca)

#### Forest Engineering Research Institute of Canada (FERIC)

Head Office  
580 blvd St-Jean  
Pointe-Claire  
Quebec H9R 3J9  
Tel: +1 514 694 1140  
Fax: +1 514 694 4351  
Website:  
[www.feric.ca/splashindex.htm](http://www.feric.ca/splashindex.htm)

#### Forestry Research Partnership

c/o The Canadian Ecology Centre  
PO Box 430, Hwy 17 West  
Mattawa  
Ontario P0H 1V0  
Tel: +1 705 744 1715 ext. 585  
E-mail: [forest@canadianecology.ca](mailto:forest@canadianecology.ca)  
Website: [www.forestresearch.ca](http://www.forestresearch.ca)

#### Forintek Canada Corp.

2665 East Mall  
Vancouver

British Columbia V6T 1W5  
Tel: +1 604 224 3221  
Fax: +1 604 222 5690  
Website: [www.forintek.ca](http://www.forintek.ca)

#### International Development Research Centre (IDRC)

PO Box 8500  
Ottawa  
Ontario K1G 3H9  
Tel: +1 613 236 6163  
Fax: +1 613 238 7230  
E-mail: [info@idrc.ca](mailto:info@idrc.ca)  
Website: [www.idrc.ca](http://www.idrc.ca)

#### International Model Forest Network (IMFN)

Secretariat  
580 Booth Street  
Ottawa  
Ontario K1A 0E4  
Tel: +1 613 947 7350  
Fax: +1 613 947 9020  
Website: [www.imfn.net](http://www.imfn.net)

#### Petawawa Research Forest

PO Box 2000  
Chalk River  
Ontario K0J 1J0  
Tel: +1 613 589 3009  
Fax: +1 613 589 2275  
Website:  
[www.gjfc.cfs.nrcan.gc.ca/petawawa/](http://www.gjfc.cfs.nrcan.gc.ca/petawawa/)

#### Pulp and Paper Research Institute of Canada (Paprican)

Pointe-Claire  
570 blvd St-Jean  
Pointe-Claire  
Quebec H9R 3J9  
Tel: +1 514 630 4101  
Fax: +1 514 630 4134  
Website: [www.paprican.ca](http://www.paprican.ca)

#### Sustainable Forest Management Network/Réseau de gestion durable des forêts

3-03, Civil Electrical Building  
University of Alberta  
Edmonton  
Alberta T6G 2G7  
Tel: +1 780 492 6659  
Fax: +1 780 492 8160  
Website: [www.sfmnetwork.ca](http://www.sfmnetwork.ca)

#### UNIVERSITIES AND COLLEGES

**British Columbia Institute of Technology (BCIT)**  
**School of Construction and the Environment**  
3700 Willingdon Avenue  
Burnaby  
British Columbia V5G 3H2



Tel: + 1 604 432 8234  
 Fax: +1 604 435 4219  
 E-mail: [construction@bcit.ca](mailto:construction@bcit.ca)  
 Website: [www.bcit.ca/construction](http://www.bcit.ca/construction)

**Cégep de Sainte-Foy –  
 Département des Technologies du  
 Bois et de la Forêt**  
 2410, chemin Sainte-Foy  
 Sainte-Foy  
 Quebec G1V 1T3  
 Tel: +1 418 659 6600 Ext. 3625  
 Fax: +1 418 659 4563  
 Website: [www.cegep-ste-foy.qc.ca](http://www.cegep-ste-foy.qc.ca)

**Collège de Baie-Comeau –  
 Département de Technologie  
 Forestière**  
 537 blvd Blanche  
 Baie-Comeau  
 Quebec G5C 2B2  
 Tel: +1 418 589 5707  
 Fax: +1 418 589 9842  
 Website:  
[www.cegep-baie-comeau.qc.ca](http://www.cegep-baie-comeau.qc.ca)

**College of New Caledonia**  
 3330 – 22nd Avenue  
 Prince George  
 British Columbia V2N 1P8  
 Tel: +1 250 561 5867 Toll free: 1 800  
 371 8111  
 Website:  
[www.cnc.bc.ca/CNC\\_Programs/](http://www.cnc.bc.ca/CNC_Programs/)

**College of the North Atlantic (CNA)**  
 Corner Brook Campus  
 141 O'Connell Drive  
 Corner Brook  
 Newfoundland and Labrador A2H  
 6H6  
 Tel: +1 709 637 8530  
 Fax: +1 709 634 2126  
 Website:  
[www.cna.nl.ca/programscourses/](http://www.cna.nl.ca/programscourses/)

**Confederation College**  
 1450 Nakina Drive  
 PO Box 398  
 Thunder Bay  
 Ontario P7C 4W1  
 Tel: +1 807 475 6110  
 Website:  
[www.confederationc.on.ca/programs/](http://www.confederationc.on.ca/programs/)

**Hinton Training Centre**  
 1176 Switzer Drive  
 Hinton  
 Alberta T7V 1V3  
 Tel: +1 780 865 8200  
 Fax: +1 780 865 8266  
 E-mail: [Hinton.Training@gov.ab.ca](mailto:Hinton.Training@gov.ab.ca)  
 Website:  
[www.srd.gov.ab.ca/forests/resedu/etc/](http://www.srd.gov.ab.ca/forests/resedu/etc/)

**Lakehead University – Faculty of  
 Forestry and the Forest  
 Environment**  
 955 Oliver Road  
 Thunder Bay  
 Ontario P7B 5E1  
 Tel: +1 807 343 8507  
 Fax: +1 807 343 8116  
 Website: [www.lakeheadforestry.ca](http://www.lakeheadforestry.ca)

**Malaspina University-College**  
 900 Fifth Street  
 Nanaimo  
 British Columbia V9R 5S5  
 Tel: +1 250 753 3245  
 E-mail: [info@mala.bc.ca](mailto:info@mala.bc.ca)  
 Website: [www.mala.ca/calendar/  
 Technology/forestresources.asp](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  
 Tel: +1 506 458 0653  
 Fax: +1 506 458 0652  
 E-mail: [info@mcft.ca](mailto:info@mcft.ca)  
 Website: [www.mfrs.nb.ca](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  
 Website: [www.mcgill.ca/macdonald](http://www.mcgill.ca/macdonald)

**Nicola Valley Institute of  
 Technology**  
 4155 Belshaw Street  
 Merritt  
 British Columbia V1K 1R1  
 Tel: +1 250 378 3300  
 Fax: +1 250 378 3332  
 E-mail: [info@nvit.bc.ca](mailto:info@nvit.bc.ca)  
 Website: [www.nvit.bc.ca](http://www.nvit.bc.ca)

**The Northern Alberta Institute of  
 Technology**  
 11762 – 106 Street  
 Edmonton  
 Alberta T5G 2R1  
 Tel: +1 780 471 7400  
 Website: [www.nait.ca/programs/FOT/](http://www.nait.ca/programs/FOT/)

**Northern Lights College**  
 11401 – 8th Street  
 Dawson Creek  
 British Columbia V1G 4G2  
 Tel: +1 250 782 5251  
 Fax: +1 250 782 5233

E-mail: [appinfo@nlc.bc.ca](mailto:appinfo@nlc.bc.ca)  
 Website:  
[http://nlc.bc.ca/public\\_program](http://nlc.bc.ca/public_program)

**Saskatchewan Institute of Applied  
 Science and Technology (SIAST)**  
 SIAST Woodland Campus  
 1100 – 15th Street East  
 PO Box 3003  
 Prince Albert  
 Saskatchewan S6V 6G1  
 Website: [www.siastr.sk.ca/siastr/  
 education/training/](http://www.siastr.sk.ca/siastr/education/training/)

**Selkirk College – School of  
 Renewable Resources**  
 Castlegar Campus  
 301 Frank Beinder Way  
 Castlegar  
 British Columbia V1N 3J1  
 Tel: +1 250 365 7292  
 E-mail: [info@selkirk.ca](mailto:info@selkirk.ca)  
 Website: [http://selkirk.ca/programs/rr/  
 academicprograms/foresttechnology](http://selkirk.ca/programs/rr/academicprograms/foresttechnology)

**Simon Fraser University – School of  
 Resource and Environmental  
 Management**  
 8888 University Drive  
 Burnaby  
 British Columbia V5A 1S6  
 Tel: +1 604 291 4659  
 Fax: +1 604 291 4968  
 Email: [reminfo@sfu.ca](mailto:reminfo@sfu.ca)  
 Website: [www.rem.sfu.ca](http://www.rem.sfu.ca)

**Sir Sandford Fleming College –  
 School of Environmental and  
 Natural Resource Sciences**  
 PO Box 8000  
 Albert Street South  
 Lindsay  
 Ontario K9V 5E6  
 Tel: +1 705 324 9144  
 Fax: +1 705 878 9312  
 Website:  
[www.flemingc.on.ca/index.cfm/go/  
 school/sub/senrs.cfm](http://www.flemingc.on.ca/index.cfm/go/school/sub/senrs.cfm)

**University College of the Cariboo  
 Department of Natural Resource  
 Sciences**  
 Thompson Rivers University  
 Main Campus  
 Box 3010, 900 McGill Road  
 Kamloops  
 British Columbia V2C 5N3  
 Website:  
[www.cariboo.bc.ca/schs/nrsc/index.htm](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  
 Alberta T6G 2P5  
 Tel: +1 780 492 4931  
 Fax: +1 780 492 0097  
 E-mail: [questions@afhe.ualberta.ca](mailto:questions@afhe.ualberta.ca)

**University of British Columbia –  
 Faculty of Forestry Forest Sciences  
 Centre**  
 2424 Main Mall  
 Vancouver  
 British Columbia V6T 1Z4  
 Tel: +1 604 822 2727  
 Fax: +1 604 822 8645  
 E-mail: [forrecep@interchg.ubc.ca](mailto:forrecep@interchg.ubc.ca)  
 Website: [www.forestry.ubc.ca](http://www.forestry.ubc.ca)

**University of British Columbia –  
 Centre for Applied Conservation  
 Research**  
 Forest Sciences Centre  
 2424 Main Mall  
 Vancouver  
 British Columbia V6T 1Z4  
 Tel: +1 604 822 1886  
 E-mail: [arcese@interchange.ubc.ca](mailto:arcese@interchange.ubc.ca)  
 Website: [http://farpoint.forestry.ubc.  
 ca/fp/?parcese](http://farpoint.forestry.ubc.ca/fp/?parcese)

**Université Laval – Département des  
 sciences du bois et de la forêt**  
 Pavillon Abitibi-Price, bureau 3137  
 Faculté de foresterie et de  
 géomatique  
 Université Laval  
 Quebec  
 Quebec G1K 7P4  
 Tel: +1 418 656 3025  
 Fax: +1 418 656 5262  
 E-mail: [sbf@sbf.ulaval.ca](mailto:sbf@sbf.ulaval.ca)  
 Website: <http://www2.sbf.ulaval.ca/>

**Université de Moncton à  
 Edmundston – Faculté de foresterie**  
 165 blvd Hébert  
 Edmundston  
 New Brunswick E3V 2S8  
 Tel: +1 506 737 5068  
 Fax: +1 506 737 5373  
 E-mail: [foresterie@umce.ca](mailto:foresterie@umce.ca)  
 Website: [www.umce.ca/foresterie/](http://www.umce.ca/foresterie/)

**University of New Brunswick –  
 Faculty of Forestry and  
 Environmental Management**  
 PO Box 44555  
 Fredericton  
 New Brunswick E3B 6C2  
 Tel: +1 506 453 4501  
 Fax: +1 506 453 3538  
 E-mail: [forem@unb.ca](mailto:forem@unb.ca)  
 Website: [www.unbf.ca/forestry/](http://www.unbf.ca/forestry/)



**University of New Brunswick – Wood Science and Technology Centre**  
1350 Regent Street  
Fredericton  
New Brunswick E3C 2G6  
E-mail: [woodsci@unb.ca](mailto:woodsci@unb.ca)  
Website: [www.unb.ca/forestry/centrs/wstc.htm](http://www.unb.ca/forestry/centrs/wstc.htm)

**University of Northern British Columbia – Forestry Programme**  
3333 University Way  
Prince George  
British Columbia V2N 4Z9  
Tel: +1 250 960 6664  
Fax: +1 250 960 5539  
Website: [www.unbc.ca/forestry/](http://www.unbc.ca/forestry/)

**University of Quebec in Abitibi-Témiscamingue – Forest Research and Development Unit (URDFAT)**  
445 blvd de l'Université  
Rouyn-Noranda  
Quebec J9X5E4  
Website: [www.uqat.quebec.ca](http://www.uqat.quebec.ca)

**Université du Québec à Montréal – Groupe de Recherche en Ecologie Forestière**  
C.P. 8888 Succ. A  
Montréal  
Québec H3C 398  
Tel: +1 514 987 3000  
Fax: +1 514 987 4647  
E-mail: [R20724@ER.UQAM.CA](mailto:R20724@ER.UQAM.CA)

**Université du Québec à Trois-Rivières – Centre de Recherche en Pâte et Papiers**  
3351 blvd des Forges  
Trois-Rivières  
Québec G9A 5H7  
E-mail:  
[H-Claude-Lavallee@uqtr.quebec.ca](mailto:H-Claude-Lavallee@uqtr.quebec.ca)

**Université du Québec – Centre Multirégional de Recherche en Foresterie**  
531 blvd des Prairies  
CP 100 Laval  
Québec H7N 4Z3  
Tel: +1 819 762 0971 Ext. 2397  
Fax: +1 819 797 4727

**University of Toronto – Faculty of Forestry Earth Sciences Centre**  
33 Willcocks Street  
Toronto  
Ontario M5S 3B3  
Tel: +1 416 978 5751  
Fax: +1 416 978 3834  
Website: [www.forestry.utoronto.ca](http://www.forestry.utoronto.ca)

## CYPRUS

NATIONAL FOREST SERVICE

**Forestry Department  
Ministry of Agriculture, Natural Resources and Environment**  
Loukis Akritas Avenue 26  
1414 Nicosia  
Tel: +357 22 805517  
Fax: +357 22 805542  
Website: [www.moa.gov.cy/moa/Agriculture.nsf/index\\_en](http://www.moa.gov.cy/moa/Agriculture.nsf/index_en)

NATIONAL RESEARCH AND TRAINING INSTITUTION

**The Cyprus Forestry College**  
E-mail: [forcollege@cytanet.com.cy](mailto:forcollege@cytanet.com.cy)

## DOMINICA (COMMONWEALTH OF)

NATIONAL FOREST SERVICE

**Forestry, Wildlife and Parks Division  
Ministry of Agriculture and the Environment**  
Botanical Gardens  
Roseau 00109-8000  
Tel: +1 767 448 2733  
E-mail: [forestry@cwdom.dm](mailto:forestry@cwdom.dm)  
Website: [www.avirtualdominica.com/forestry](http://www.avirtualdominica.com/forestry)

RESEARCH INSTITUTIONS

**Archbold Tropical Research and Education Center (ATREC)**  
Website:  
[www.springfield-dominica.org](http://www.springfield-dominica.org)

## FIJI

NATIONAL FOREST SERVICE

**Department of Forestry  
Ministry of Forest and Fisheries**  
Government Buildings  
46 Knolly St  
PO Box 2218  
Suva  
Website: [www.fiji.gov.fj/publishm\\_fish\\_forest](http://www.fiji.gov.fj/publishm_fish_forest)

## GAMBIA

NATIONAL FOREST SERVICE

**Forestry Department of the Gambia**  
Forestry Department  
5C, Marina Parade  
Banjul  
Tel: +220 422 7307  
Fax: +220 422 4765

Email: [forestry.dept@gamtel.gm](mailto:forestry.dept@gamtel.gm)  
Website: [www.crdfp.org/fd.htm](http://www.crdfp.org/fd.htm)

## GHANA

NATIONAL FOREST SERVICE

**The Forestry Commission of Ghana,**  
PMB 434  
Accra  
Tel: +233 21 401210 / 401227 / 401216 / 401231 / 3 / 9  
Fax: +233 21 401197  
Website: [www.fcghana.com/forestry\\_commission](http://www.fcghana.com/forestry_commission)

NATIONAL RESEARCH AND TRAINING INSTITUTION

**Forestry Research Institute of Ghana**  
PO Box 63  
Kumasi  
Tel: +233 51 60122 / 60123 / 60373  
Fax: +233 51 60121  
[www.forig.org/forig/history.html](http://www.forig.org/forig/history.html)

UNIVERSITY FACULTIES/  
DEPARTMENTS

**Kwame Nkrumah University of Science and Technology**  
Private Mail Bag  
Kumasi  
Tel: +233 51 60334 / 60137  
Fax: +233 51 60137  
Website: [www.knust.edu.gh/academics/colleges.htm](http://www.knust.edu.gh/academics/colleges.htm)

## 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  
Tel: +1 473 440 2708 / 3078 / 3083  
Fax: +1 473 440 4191  
E-mail: [fnpd@caribsurf.com](mailto:fnpd@caribsurf.com)  
Website (Ministry):  
<http://agriculture.gov.gd>

UNIVERSITIES AND COLLEGES

**St. George's University (SGU)**  
University Centre  
E-mail: [squinfo@sgu.edu](mailto:squinfo@sgu.edu)  
Website: [www.sgu.edu](http://www.sgu.edu)

**TA Marryshow Community College (TAMCC)**  
Tanteen  
St George's  
Tel: +1 473 440 1389  
Fax: +1 473 440 3079  
E-mail: [tamcc@caribsurf.com](mailto:tamcc@caribsurf.com)  
Website: [www.tamcc.edu.gd](http://www.tamcc.edu.gd)

**University of the West Indies Centre (UWI Centre)**  
University Centre  
Marryshow House  
PO Box 439  
St George's  
Tel: +1 473 440 2451  
Fax: +1 473 440 4985  
E-mail: [rtscsuwi@caribsurf.com](mailto:rtscsuwi@caribsurf.com)  
Website: [www.uwi.edu](http://www.uwi.edu)

## GUYANA

NATIONAL FOREST SERVICE

**Guyana Forestry Commission (GFC)  
Ministry of Agriculture**  
PO Box 1029  
1 Water Street Kingston  
Georgetown  
Tel: +592 226 7271 / 4  
Fax: +592 226 8956  
E-mail:  
[forestry.cof@solutions2000.net](mailto:forestry.cof@solutions2000.net)  
Website: [www.forestry.gov.gy](http://www.forestry.gov.gy)

RESEARCH INSTITUTIONS

**Institute of Applied Science & Technology (IAST)**  
IAST Building  
Turkeyen  
Greater Georgetown  
Tel: +592 222 4214  
Fax: +592 222 4229  
E-mail: [iast@networksgy.com](mailto:iast@networksgy.com)  
Website: [www.iastguyana.org](http://www.iastguyana.org)

**Iwokrama International Centre for Rain Forest Conservation and Development**  
PO Box 10630  
77 High Street, Kingston  
Georgetown  
Tel: +592 225 1504  
Fax: +592 225 9199  
E-mail:  
[iwokrama-general@iwokrama.org](mailto:iwokrama-general@iwokrama.org)  
Website: [www.iwokrama.org](http://www.iwokrama.org)

**Tropenbos-Guyana programme (TGP)**  
Lot 12E Garnett Street  
Campbellville  
Georgetown





Tel/Fax: +592 226 2846  
Website: [www.bio.uu.nl/tropenbos/index.htm](http://www.bio.uu.nl/tropenbos/index.htm)

UNIVERSITIES, COLLEGES AND OTHER TRAINING CENTRES

UNIVERSITIES AND COLLEGES

**Guyana School of Agriculture**  
Mon Repos

East Coast Demerara, Guyana  
Website: [www.sdn.org.gy/minagri/gsa/index](http://www.sdn.org.gy/minagri/gsa/index)

**University of Guyana**  
Turkeyen Campus  
PO Box 10-1110

Greater Georgetown  
Tel: +592 222 5402  
Fax: +592 222 2490  
E-mail: [pro@uog.edu.gy](mailto:pro@uog.edu.gy)  
Website: [www.uog.edu.gy](http://www.uog.edu.gy)

OTHER TRAINING CENTRES

**Bina Hill Institute**

Annai Amerindian District, North Rupununi  
Region 9

E-mail: [binahill@yahoo.co.uk](mailto:binahill@yahoo.co.uk)  
Website: [www.iwokrama.org/people/binahill.htm](http://www.iwokrama.org/people/binahill.htm)

**Forestry Training Centre (FTC)**  
Website: [www.forestry.gov.gy/ftc.htm](http://www.forestry.gov.gy/ftc.htm)

**Iwokrama International Centre for Rain Forest Conservation and Development**  
(as above)

## INDIA

NATIONAL FOREST SERVICE

**Director General of Forests**  
**Ministry of Environment and Forests**

**Government of India**  
CGO Complex, Lodi Road  
New Delhi 110003  
Tel: +91 11 2436 1509  
Fax: +91 11 2436 3232  
E-mail: [dgfindia@nic.in](mailto:dgfindia@nic.in)  
Website: [www.envfor.nic.in](http://www.envfor.nic.in)

**Principal Chief Conservator of Forests**  
**Department of Forests**  
**Govt of Andaman and Nicobar Islands**  
Van Sadan, Haddo  
Port Blair – 744 101  
Tel: +91 3192 233233

Fax: +91 3192 30113  
E-mail: [pccf@and.nic.in](mailto:pccf@and.nic.in)

**Principal Chief Conservator of Forests**  
**Department of Forests**  
**Govt of Arunachal Pradesh**  
Zero Point, Itanagar – 791111  
Tel: +91 360 221 2310  
Fax: +91 360 2214020 / 2243

**Principal Chief Conservator of Forests**  
**Department of Forests**  
**Govt of Bihar, Sachivalaya**  
Patna – 800 001  
Tel: +91 612 228672 / 202365  
Fax: +91 612 210920

**Principal Chief Conservator of Forests**  
**Department of Forests**  
**Govt of Andhra Pradesh**  
**Aranya Bhawan**  
Tuljaguda Complex APHP Building  
M.J. Market, Hyderabad – 500 001  
Tel: +91 40 2323 1404  
Fax: +91 40 2465 0028

**Principal Chief Conservator of Forests**  
**Department of Forests**  
**Govt of Assam, Rehabari**  
Rajgarh Road Guwahati – 781008  
Tel: +91 361 254 1319  
Fax: +91 361 254 7386

**Principal Chief Conservator of Forests**  
**Department of Forests**  
**Govt of Chhattisgarh**  
Raipur – 402001  
Tel: +91 771 233 1121  
Fax: +91 771 331110

**Principal Chief Conservator of Forests**  
**Department of Forests**  
**Govt of Gujarat**  
Dr Jivraj Mehta Bhawan  
Block No. – 14, 1st Floor  
Gandhi Nagar – 382 010  
Tel: +91 2712 300007 / 30009 / 30031  
Fax: +91 2712 21097 / 20166

**Principal Chief Conservator of Forests**  
**Department of Forests**  
**Govt of Haryana**  
C-18 Van Bhawan, Sector-6  
Panchkula – 134 109  
Tel: +91 172 256 3988  
Fax: +91 172 564782

**Principal Chief Conservator of Forests**  
**Department of Forests**  
**Govt of Himachal Pradesh**  
Talland, Shimla – 171002  
Tel: +91 177 262 3155 / 4192  
Fax: +91 177 224192

**Principal Chief Conservator of Forests**  
**Department of Forests**  
**Govt of Jammu & Kashmir**  
Seikhabagh, Srinagar – 190 001  
Tel: +91 194 452221 / 455027  
For winter  
PCCF, Jammu & Kashmir  
Van Bahwan Gumat  
Jammu – 180 001  
Tel: +91 191 2547276 / 455753

**Principal Chief Conservator of Forests**  
**Department of Forests**  
**Govt of Jharkhand**  
PO Hinoo  
Ranchi – 834 003  
Tel: +91 651 248 1909  
Fax: +91 651 258 0413

**Principal Chief Conservator of Forests**  
**Department of Forests**  
**Govt of Karnataka**  
Ananya Bhawan, 2nd Floor  
18th Cross, Malleswaram  
Bangalore – 560003  
Tel: +91 80 2334 3770  
Fax: +91 80 2334 14484 / 2225893

**Principal Chief Conservator of Forests**  
**Department of Forests**  
**Vashuthacaud**  
Thiruvananthapuram – 695014  
Tel: +91 471 232 1610 / 321798  
Fax: +91 471 232 0554 / 322217

**Principal Chief Conservator of Forests**  
**Department of Forests**  
**Govt of Madhya Pradesh**  
Satpura Bhawan  
Bhopal – 462004  
Tel: +91 755 267 4200  
Fax: +91 755 267 4334

**Principal Chief Conservator of Forests**  
**Department of Forests**  
**Govt of Maharashtra**  
Ramgiri Road, Civil Lines Near  
Government Press  
Nagpur – 440 001

Tel: +91 712 255 6909 / 0670  
Fax: +91 712 255 0675  
E-mail: [pccf@nagpur.dot.net.in](mailto:pccf@nagpur.dot.net.in)

**Principal Chief Conservator of Forests**  
**Department of Forests**  
**Govt of Manipur**  
Sanjinthong, Imphal – 795 001  
Tel: +91 3852 222 0414  
Fax: +91 3852 222 0934

**Principal Chief Conservator of Forests**  
**Department of Forests**  
**Govt of Meghalaya**  
Shillong – 793 001  
Tel: +91 364 222014  
Fax: +91 364 222563

**Principal Chief Conservator of Forests**  
**Department of Forests**  
**Govt of Mizoram**  
Aizawl – 796001  
Tel: +91 389 232 5727  
Fax: +91 389 232 7733 / 3420

**Principal Chief Conservator of Forests**  
**Department of Forests**  
**Govt of Nagaland**  
Kohima – 797 001  
Tel: +91 370 223 1149 / 222 7017  
Fax: +91 370 221472

**Principal Chief Conservator of Forests**  
**Department of Forests**  
**Govt of Orissa**  
Janpath, Shaheed Nagar  
Bubhaneswar – 751007  
Tel: +91 674 230 0853  
Fax: +91 674 300049

**Principal Chief Conservator of Forests**  
**Department of Forests**  
**Govt of Punjab**  
17, Bays Building, Sector – 17  
Chandigarh – 160 017  
Tel: +91 172 270 1325  
Fax: +91 172 270 2919

**Principal Chief Conservator of Forests**  
**Department of Forests**  
**Govt of Rajasthan**  
Van Bhawan, Vaniki Path, Bhagwan  
Das Road  
Jaipur – 302 005  
Tel: +91 141 222 7391  
Fax: +91 141 222 7836



**Principal Chief Conservator of Forests**  
**Department of Forests, Environment & Wildlife Management,**  
**Forest Secretariat Building, Deoralli Govt of Sikkim**  
 Gangtok – 737 102  
 Tel: +91 3592 281385  
 Fax: +91 3592 281778

**Principal Chief Conservator of Forests**  
**Department of Forests Govt of Tamil Nadu**  
 No. 1, Jeenis Road, Panagal, Maligai, Saidapet  
 Chennai – 600 015  
 Tel: +91 44 434 8059 / 2567 1511  
 Fax: +91 44 2433 7307

**Principal Chief Conservator of Forests**  
**Department of Forests Govt of Tripura**  
 PO Kunjvan  
 Agartala – 799 001  
 Tel: +91 381 232 3779  
 Fax: +91 381 222 5253

**Principal Chief Conservator of Forests**  
**Department of Forests Govt of Uttar Pradesh**  
 Ranapratap Marg  
 Lucknow – 226 001  
 Tel: +91 522 220 6168  
 Fax: +91 522 220 6053

**Principal Chief Conservator of Forests**  
**Department of Forests Govt of Uttarakhand**  
 85 Rajpur Road  
 Dehradun – 248001  
 Tel/fax: +91 135 274 6934

**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  
 Tel: +91 33 2335 8580  
 Fax: +91 33 2335 8756

**Conservator of Forests Bhubaneswar**  
 Shri Richard D'Souza  
 Managing Director  
 Goa Forest Development Corporation  
 Goa

#### RESEARCH AND TRAINING INSTITUTIONS

**Indian Council of Forestry Research and Education (ICFRE)**  
 PO New Forest  
 Dehra Dun 248006  
 Uttrakhand  
 Tel: +91 135 275 9382  
 Fax: +91 135 275 5353  
 E-mail: [dg@icfre.org](mailto:dg@icfre.org)  
 Website: [www.icfre.org](http://www.icfre.org)

**Forest Research Institute, Dehra Dun**  
 PO New Forest  
 Dehra Dun 248006  
 Uttrakhand  
 Tel: +91 135 275 5277  
 E-mail: [dir.fri@icfre.org](mailto:dir.fri@icfre.org)  
 Website: [www.fri.res.in](http://www.fri.res.in)

**Arid Forest Research Institute, Jodhpur**  
 PO Krishi Upaz Mandi  
 New Pali Road  
 Jodhpur – 342005  
 Tel: +91 291 272 2549  
 E-mail: [dir.afri@icfre.org](mailto:dir.afri@icfre.org)  
 Website: [www.afri.res.in](http://www.afri.res.in)

**Himalayan Forest Research Institute, Shimla**  
 Panihaghathi  
 New Shimla 171009  
 Himachal Pradesh  
 Tel: +91 177 262 6778  
 Fax: +91 177 262 6779  
 E-mail: [dir.hfri@icfre.org](mailto:dir.hfri@icfre.org)  
 Website: [www.hfri.icfre.gov.in](http://www.hfri.icfre.gov.in)

**Institute of Forest Genetics and Tree Breeding, Coimbatore**  
 PO Box No. 1061, HPO R. S. Puram  
 Coimbatore 641002  
 Tel: +91 422 243 1540  
 E-mail: [dir.ifgtb@icfre.org](mailto:dir.ifgtb@icfre.org)  
 Website: [www.ifgtb.icfre.gov.in](http://www.ifgtb.icfre.gov.in)

**Institute of Forest Productivity, Ranchi**  
 AT & PO Lalgulwa (Via Pika Nagari)  
 Ranchi 835303  
 Jharkhand  
 Tel: +91 651 294 8505  
 E-mail: [dir.ipf@icfre.org](mailto:dir.ipf@icfre.org)  
 Website: [www.ifpranchi.org](http://www.ifpranchi.org)

**Institute of Wood Science and Technology, Bangalore**  
 PO Maleswaram  
 Bangalore 560003  
 Karnataka  
 Tel: +91 651 294 8505  
 E-mail: [dir.iwst@icfre.org](mailto:dir.iwst@icfre.org)  
 Website: <http://iwst.icfre.gov.in>

**Rain Forest Research Institute, Jorhat**  
 Jorhat, Assam  
 Tel: +91 376 235 0273  
 E-mail: [dir.rfri@icfre.org](mailto:dir.rfri@icfre.org)  
 Website: [www.ifri.icfre.gov.in](http://www.ifri.icfre.gov.in)

**Tropical Forest Research Institute, Jabalpur**  
 PO: R.F.R.C., Mandla Road  
 Jabalpur (M.P.) – 482 021  
 Tel: +91 761 284 0483  
 Fax: +91 761 284 0484  
 E-mail: [dir.tfri@icfre.org](mailto:dir.tfri@icfre.org)  
 Website: [www.tfri.res.in](http://www.tfri.res.in)

**Centre for Social Forestry and Eco-rehabilitation, Allahabad**  
 337 Ngoth Kothi, Ashoknagar  
 Allahabad 211001, U. P.  
 Tel: +91 532 244 0797  
 E-mail: [head.csfer@icfre.org](mailto:head.csfer@icfre.org)

**Forest Research Centre**  
 PO Box No. 2129  
 Secunderabad 500003  
 Andhra Pradesh  
 Tel: +91 40 2309 5921  
 E-mail: [head.frc@icfre.org](mailto:head.frc@icfre.org)  
 Website: [www.frc.icfre.org](http://www.frc.icfre.org)

**Centre for Forestry Research and Human Resource Development**  
 PO Poama  
 Kundankala  
 Chhindwara 480001 M. P.  
 Tel: +91 7162 282444  
 E-mail: [head\\_cfrhd@icfre.org](mailto:head_cfrhd@icfre.org)  
 Website: <http://chhindwara.nic.in/TFRI/cfrhd.htm>

**Indian Institute of Forest Management**  
 Nehrunagar  
 Bhopal, Madhya Pradesh 462003  
 Tel: +91 755 277 5998  
 E-mail: [director@iifm.ac.in](mailto:director@iifm.ac.in)  
 Website: [www.iifm.ac.in](http://www.iifm.ac.in)

**Indian Institute of Wildlife**  
 Post Box #18, Chandrabani  
 Dehradun – 248001  
 Uttarakhand  
 Tel: +91 135 264 0111 – 15  
 Fax: +91 135 264 0117  
 E-mail: [wii@wii.gov.in](mailto:wii@wii.gov.in)  
 Website: [www.wii.gov.in](http://www.wii.gov.in)

**Forest Survey of India**  
 Kaulagarh Road  
 PO IPE Dehradun – 248195  
 Uttarakhand  
 Tel: +91 135 275 6139  
 Website: [www.fsi.nic.in](http://www.fsi.nic.in)

**Indian Plywood Industries Research and Training Institute**  
 P.B. #2273, Tumkur Road  
 Yeshwanthpur  
 Bangalore – 560022  
 Karnataka  
 Tel: +91 80 2839 4341  
 Fax: +91 80 2839 6361  
 E-mail: [dir.ipirti@gov.in](mailto:dir.ipirti@gov.in)  
 Website: [www.ipirti.gov.in](http://www.ipirti.gov.in)

**Kerala Forest Research Institute**  
 Peechi PO, Thrissur District  
 Kerala – 680653  
 E-mail: [director@kfri.org](mailto:director@kfri.org)  
 Tel: +91 487 269 0100

**Gujarat Forest Research Institute, Rajpipla**  
 393145, Gujarat  
 Tel: +91 2640 20011  
 Fax: +91 2640 20259

#### UNIVERSITIES/FOREST DEPARTMENTS

**H.N.B. Garhwal University Faculty of Agriculture, Department of Forestry**  
 PO Box 59, Srinagar-Garhwal, U.P.  
 246174  
 Tel: +91 1388 56529  
 Fax: +91 1388 56529

**Tamil Nadu Agricultural University**  
 Coimbatore-641 003, Tamil Nadu  
 Tel: +91 422 243 1222 / 1788  
 Fax: +91 422 243 1672  
 E-mail (Dean of Forestry):  
[deanformtp@tnau.ac.in](mailto:deanformtp@tnau.ac.in)

**Dr Y.S. Parmar University of Horticulture & Forestry**  
 Solan-173 230, Himachal Pradesh  
 Tel: +91 1792 252363  
 Fax: +91 1792 252242  
 E-mail: [vc@yvspuniversity.ac.in](mailto:vc@yvspuniversity.ac.in)

**Birsa Agricultural University**  
 Ranchi-834 006 (Jharkhand)  
 Tel: +91 651 245 0500  
 Fax: +91 651 245 1139  
 E-mail (Dean of Forestry):  
[deanftybau@yahoo.com](mailto:deanftybau@yahoo.com) /  
[deanftybau@rediffmail.com](mailto:deanftybau@rediffmail.com)

**Maharana Pratap University of Agriculture & Technology**  
 Udaipur – 313 001  
 Rajasthan  
 Tel: +91 294 247 1101  
 Fax: +91 294 247 0682  
 E-mail (Dean of Forestry):  
[deanchf@sancharnet.in](mailto:deanchf@sancharnet.in)




**School of Building & Land Management (SBLM)**

Tel: +1 876 927 1613 ext. 2333  
E-mail: [athomas@utech.edu.jm](mailto:athomas@utech.edu.jm)  
Website: [www.utech.edu.jm/Faculties/Built/SBLM](http://www.utech.edu.jm/Faculties/Built/SBLM)

**The University of the West Indies (UWI)**

Mona Campus  
Kingston 7  
Tel: +1 876 927 1660 – 9  
Fax: +1 876 927 0997  
Website: [www.mona.uwi.edu](http://www.mona.uwi.edu)

**Environment Watch Organisation (EWO)**

PO Box 815  
Montego Bay  
St James  
Tel/fax: +1 876 940 2149  
E-mail: [edob@toj.com](mailto:edob@toj.com)

**ICT4D Jamaica**

6b Oxford Road  
Kingston 10  
Tel: +1 876 946 2998 / 2999  
Fax: +1 876 978 3579  
E-mail: [info@ict4djamaica.org](mailto:info@ict4djamaica.org)  
Website: [www.ict4djamaica.org](http://www.ict4djamaica.org)

**International School of Jamaica**

Oracabessa PO 36  
Saint Mary  
Tel: +1 876 725 0185 / 0060  
Fax: +1 876 725 0933

**KENYA**
**NATIONAL FOREST SERVICE**

Forest Department  
PO Box 30513  
Nairobi  
Website: [www.environment.go.ke](http://www.environment.go.ke)

**RESEARCH**
**Kenya Agricultural Research Institute (KARI)**

(Agroforestry)  
PO Box 57811  
00200 Nairobi  
E-mail: [resource.centre@kari.org](mailto:resource.centre@kari.org)  
Website: [www.kari.org](http://www.kari.org)

**Kenya Forestry Research Institute (KEFRI)**

(Forest products and resources)  
PO Box 30241  
00200 Nairobi  
Website: [www.kefri.org/natural.htm](http://www.kefri.org/natural.htm)

**Kenya Medical Research Institute (KEMRI)**

(Traditional medicine and drug research)  
PO Box 54840  
Nairobi  
E-mail: [kemrilib@ken.healthnet.org](mailto:kemrilib@ken.healthnet.org)  
Website: [www.kemri.org](http://www.kemri.org)

**ACADEMIC/ TRAINING**
**Kenyatta University (KU)  
School of Environmental & Human Sciences**

PO Box 43844  
00100 Nairobi  
Website: [www.ku.ac.ke/academic](http://www.ku.ac.ke/academic)

**Egerton University**

Faculty of Environmental Studies & Natural Resources  
PO Box 536  
Njoro  
E-mail: [ferd@egerton.ac.ke](mailto:ferd@egerton.ac.ke)  
Website: [www.egerton.ac.ke/academic/ferd/](http://www.egerton.ac.ke/academic/ferd/)

**Jomo Kenyatta University of Agriculture & Technology (JKUAT)**

Department of Botany  
PO Box 62000  
00200 Nairobi.  
Website: [www.jkuat.ac.ke/f\\_science\\_botany.php](http://www.jkuat.ac.ke/f_science_botany.php)

**Maseno University**

Department of Botany  
PO Box 333  
Maseno  
E-mail: [baps@maseno.ac.ke](mailto:baps@maseno.ac.ke)

**Moi University**

Department of Forestry & Wood Science  
PO Box 1125  
30100 Eldoret  
Website: [www.mu.ac.ke/academic/school/nrm/](http://www.mu.ac.ke/academic/school/nrm/)

**Londiani Forestry College**

PO Box 8  
Londiani

**Baraka Agricultural College**

PO Box 52  
Molo – 20106  
E-mail: [baraka@africaonline.co.ke](mailto:baraka@africaonline.co.ke)

**KIRIBATI**
**NATIONAL FOREST SERVICE**

Agroforestry Section of the Ministry of Natural Resource Development and Ministry of Environment & Social Development. Both government

bodies are responsible for reforestation, conservation and education programmes for trees and forests although the latter focuses mainly on conservation and management activities.

**LESOTHO**
**NATIONAL FOREST SERVICE**
**Director of Forestry  
Ministry of Forestry & Land Reclamation**

PO Box 92  
Thaba – Bosiu, Industrial Area  
Maseru – 100  
Tel: +266 22 312826 / 323600  
E-mail: [forestrydepartment@leo.co.ls](mailto:forestrydepartment@leo.co.ls)  
Website: [www.lesotho.gov.ls/mnforestry.htm](http://www.lesotho.gov.ls/mnforestry.htm)

**MALAWI**
**NATIONAL FOREST SERVICE**

**The Ministry of Mines, Natural Resources & Environment**  
Environmental Affairs Department  
Private Bag 350  
Lilongwe 3

**NATIONAL RESEARCH INSTITUTION**
**National Herbarium & Botanical Gardens of Malawi (NHBGM)**

PO Box 528  
Zomba  
Tel: +265 1 527783 / 524108  
E-mail: [nhbgm@sdp.org.mw](mailto:nhbgm@sdp.org.mw)

**UNIVERSITY FACULTIES/  
DEPARTMENTS**
**The University of Malawi Bunda College of Agriculture**

The College Registrar  
Bunda College of Agriculture  
PO Box 219  
Lilongwe

**MALAYSIA**
**NATIONAL FOREST SERVICE**
**Ministry of Natural Resources & Environment Malaysia  
Forestry Development Division**

Wisma Sumber Asli  
No. 25, Persiaran Perdana, Presint 4  
62574 Putrajaya  
Tel: +60 3 8886 1111  
Fax: +60 3 8889 2672  
Website: [www.nre.gov.my](http://www.nre.gov.my)

**Ministry of Plantation Industries & Commodities Malaysia  
Timber, Tobacco & Kenaf Industries Development Division**

No. 15, Persiaran Perdana, Presint 2  
62574 Putrajaya  
Tel: +60 3 8880 3300  
Fax: +60 3 8880 3441  
Website: [www.kppk.gov.my](http://www.kppk.gov.my)

**Forestry Department Peninsular Malaysia**

Jalan Sultan Salahuddin  
50660 Kuala Lumpur  
Tel: +60 3 2616 4488  
Fax: +60 3 2692 5657  
Website: [www.forestry.gov.my](http://www.forestry.gov.my)

**STATE FORESTRY SERVICES**
**Johor State Forestry Department**

Level 2, Bangunan Sultan Ibrahim  
Jalan Bukit Timbalan  
80000 Johor Bahru  
Johor  
Tel: +60 7 224 3566  
Fax: +60 7 224 3840

**Kedah State Forestry Department**

8th Floor, Bangunan Sultan Abdul Halim  
Jalan Sultan Badlishah  
05000 Alor Setar  
Kedah  
Tel: +60 4 733 3844  
Fax: +60 4 731 0610

**Kelantan State Forestry Department**

Block 5, 1st Floor  
Kota Darul Naim  
15503 Kota Bharu  
Kelantan  
Tel: +60 9 748 2140  
Fax: +60 9 744 5675

**Negeri Sembilan/Melaka State Forestry Department**

Block C, 4th Floor  
Wisma Negeri  
70503 Seremban  
Negeri Sembilan  
Tel: +60 6 765 9849  
Fax: +60 6 762 3711

**Pahang State Forestry Department**

5th Floor, Kompleks Tun Razak  
Bandar Kuantan Mahkota  
25990 Kuantan  
Pahang  
Tel: +60 9 573 2911  
Fax: +60 9 573 3355

**Perak State Forestry Department**

Jalan Panglima Bukit Gantang  
30000 Ipoh

Perak

Tel: +60 5 255 0020  
Fax: +60 5 255 3644

**Perlis State Forestry Department**

KM 2, Jalan Kaki Bukit  
01000 Kangar  
Perlis

Tel: +60 4 976 5966  
Fax: +60 4 976 7901

**Pulau Pinang State Forestry Department**

20th Floor, Menara KOMTAR  
10000 Pulau Pinang  
Tel: +60 4 650 5250  
Fax: +60 4 263 6335

**Selangor State Forestry Department**

3rd Floor, Podium Utara  
Bangunan Sultan Salahuddin Abdul  
Aziz Shah  
40660 Shah Alam  
Selangor  
Tel: +60 3 5544 7498  
Fax: +60 3 5510 2358

**Terengganu State Forestry Department**

8th Floor, Wisma Negeri  
20200 Kuala Terengganu  
Terengganu  
Tel: +60 9 622 2444  
Fax: +60 9 623 6552

**Sabah Forestry Department**

KM 10, Labuk Road  
PO Box 311  
90000 Sandakan  
Sabah  
Tel: +60 89 660811  
Fax: +60 89 669170  
Website: [www.forest.sabah.gov.my](http://www.forest.sabah.gov.my)

**Sarawak Forest Department**

Bangunan Wisma Sumber Asli  
Jalan Stadium, Petra Jaya  
93660 Kuching  
Sarawak  
Tel: +60 82 442180  
Fax: +60 82 441377  
Website:  
[www.forestry.sarawak.gov.my](http://www.forestry.sarawak.gov.my)

**NATIONAL RESEARCH INSTITUTION****Forest Research Institute Malaysia (FRIM)**

52109 Kepong  
Selangor

Tel: +60 3 6279 7000

Fax: +60 3 6273 1314

Website: [www.frim.gov.my](http://www.frim.gov.my)

**UNIVERSITY FACULTIES/ DEPARTMENTS****University Putra Malaysia (UPM)**

**Faculty of Forestry**  
43400 UPM Serdang  
Selangor

Tel: +60 3 8946 7171  
Fax: +60 3 8943 2514

Website: [www.forr.upm.edu.my](http://www.forr.upm.edu.my)

**MALDIVES****NATIONAL FOREST SERVICE****Deputy Minister**

**Agriculture & Forestry Division**  
**Ministry of Fisheries, Agriculture & Marine Resources**

Gaazee Building, Ameer Ahmed  
Magu,  
Malé  
Tel: +960 322625 / 321239  
Fax: +960 321168 / 326558  
E-mail: [it@fishagri.gov.mv](mailto:it@fishagri.gov.mv)  
Website: [www.fishagri.gov.mv](http://www.fishagri.gov.mv)

**MALTA****NATIONAL FOREST SERVICE**

Malta does not have a forest service but the Ministry for Rural Affairs & the Environment is responsible for afforestation and horticulture.

**Ministry for Rural Affairs & the Environment**

Barriera Wharf  
Valletta – CMR 02  
E-mail: [info.mrae@gov.mt](mailto:info.mrae@gov.mt)  
Website: [www.mrae.gov.mt](http://www.mrae.gov.mt)

**MAURITIUS****NATIONAL FOREST SERVICE**

**Forestry Service of Mauritius**  
**Ministry of Agriculture & Natural Resources**

Botanical Garden St  
PO Box 445  
Curepipe  
Tel: +230 211 0554  
Fax: +230 212 4427

E-mail: [npcs.agr@intnet.mu](mailto:npcs.agr@intnet.mu)

Website: [www.gov.mu/portal/sites/moasite/](http://www.gov.mu/portal/sites/moasite/)

**MOZAMBIQUE****NATIONAL FOREST SERVICE****National Directorate of Lands & Forestry**

**Ministry of Agriculture**  
Avenue Samora Machel  
Government Building No.1, 6th floor  
Maputo  
Tel: +258 21 312072  
Fax: +258 21 421804  
Website: [www.dnffb.mz](http://www.dnffb.mz)

**UNIVERSITY FACULTIES/ DEPARTMENTS****Faculdade de Agronomia e Engenharia Florestal**

Av. J. Nyerere/Campus 3453  
Tel: +258 21 492142 (Director)  
Fax: +258 21 492176  
Website: [www.agronomia.uem.mz](http://www.agronomia.uem.mz)

**NAMIBIA****NATIONAL FOREST SERVICE****Ministry of Agriculture, Water & Forestry**

**Directorate of Forestry**  
Government Office Park  
Luther Street, 3rd floor, Room 303  
(Private Bag 13184)  
Windhoek  
Tel: +264 61 221478  
Fax: +264 61 222830

**NATIONAL RESEARCH AND TRAINING INSTITUTION****National Botanical Research Institute**

PO Box 13184  
Windhoek  
Tel: +264 61 202 9111  
Website: [www.nbri.org.na](http://www.nbri.org.na)

**UNIVERSITY FACULTIES/ DEPARTMENTS****The University of Namibia**

Faculty of Forestry  
PO Box  
Windhoek

**NAURU****NATIONAL FOREST SERVICE**

Governmental responsibility for natural resources lies with the Department of Island Development and Industry, thus responsibility for forestry is under its purview.

**NEW ZEALAND****NATIONAL FOREST SERVICE****Ministry of Agriculture & Forestry (MAF)**

Pastoral House, 25 The Terrace  
PO Box 2526  
Wellington  
Tel: +64 29 894 0707  
Fax: +64 4 894 0742  
Website: [www.maf.govt.nz](http://www.maf.govt.nz)

**NATIONAL RESEARCH INSTITUTION****Scion (formerly NZ Forest Research Institute Limited)**

Rotorua  
Website: [www.scionresearch.com](http://www.scionresearch.com)

**UNIVERSITY FACULTIES/ DEPARTMENTS****University of Canterbury School of Forestry**

Christchurch  
Website: [www.fore.canterbury.ac.nz](http://www.fore.canterbury.ac.nz)

**Forest Industry Training & Education Council (FITEC)**

Auckland  
Website: [www.fitec.org.nz](http://www.fitec.org.nz)

**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)**

PMB 5054, Jericho  
Ibadan

Oyo State  
Tel: +234 22 414 441 / 073 / 022

Telex: 31207

Website: [www.frin.gov.ng](http://www.frin.gov.ng)

**Federal College of Forestry**

PMB 5054, Ibadan,  
Nigeria

**Federal College of Forestry**

PMB 2019, Jos


**UNIVERSITY FACULTIES/  
DEPARTMENTS**

**University of Ibadan**  
Department of Forestry Resources  
Management  
Ibadan  
Website: <http://ui.edu.ng/?q=forestry>

**The Federal University of  
Technology**  
**Department of Forestry & Wood  
Technology**  
PMB 704, Akure  
Ondo State  
Website: [www.futa-forestry.org](http://www.futa-forestry.org)

**Uthman Fodio University**  
Sokoto

**Federal University of Agriculture**  
Abeokuta  
Website: [www.unaab.edu.ng](http://www.unaab.edu.ng)

**Federal University of Agriculture**  
Umudike  
Website: <http://michaelokparaunivesi.tripod.com>

**The University of Benin**  
Website: [www.uniben.edu](http://www.uniben.edu)

**PAKISTAN**
**NATIONAL FOREST SERVICE**

**Inspector General of Forests**  
**Ministry of Environment**  
**Government of Pakistan**  
**CDA Block-4, Old Naval Head**  
Quarters  
Islamabad  
Tel: +92 51 924 5589  
Fax: +92 51 924 5598  
Website:  
[www.202.83.164.26/wps/portal/Moe](http://www.202.83.164.26/wps/portal/Moe)

**Secretary Environment**  
**Ministry of Environment**  
**Govt of Pakistan**  
CDA Block-4, Old Naval Head  
Quarters  
Islamabad  
Tel: +92 51 922 4579  
Website:  
<http://202.83.164.26/wps/portal/Moe>

**Secretary Environment**  
**Department of Environment**  
**Govt of North West Frontier**  
**Province**  
Khyber Road  
Peshawar  
Tel: +92 91 921 0333  
Website: [www.nwfp.gov.pk/  
Environment/Department/index.php](http://www.nwfp.gov.pk/Environment/Department/index.php)

**Chief Conservator of Forests**  
**North West Frontier Province Forest**  
**Department**  
Shami Road  
Peshawar  
Tel: +92 91 921 2177  
Mob: +92 300 911 7371  
E-mail: [ccfnwfp@gmail.com](mailto:ccfnwfp@gmail.com)

**Director**  
**Forestry Planning & Monitoring**  
**Circle**  
Amanabad, Palosi Road  
Peshawar  
Tel: +92 91 921 6248 / 6249  
Fax: +92 91 921 6637

**Director**  
**Human Resource Development**  
**Directorate**  
**NWFP Forest Department**  
Shami Road  
Peshawar  
Tel: +92 91 921 2459  
Fax: +92 91 528 7640

**NATIONAL RESEARCH INSTITUTIONS**

**Director**  
**Research & Development**  
**Directorate**  
**NWFP Forest Department**  
Shami Road  
Peshawar  
Tel: +92 91 921 0584

**Director General**  
**Pakistan Forest Institute**  
Rahatabad, Palosi Road  
Peshawar  
Tel: +92 91 921 8145 / 8148  
Fax: +92 91 921 6203

**UNIVERSITY FACULTIES/  
DEPARTMENTS**

**University of Agriculture,**  
**Faisalabad**  
**Department of Forestry, Range &**  
**Wildlife Management**  
380 University Avenue  
Faisalabad 38040  
Tel: +92 41 920 0161  
Fax: +92 41 164 7846  
Website: [www.uaf.edu.pk/faculties/  
agri/depts/frw/fr\\_overview.html](http://www.uaf.edu.pk/faculties/agri/depts/frw/fr_overview.html)

**University of Arid Agriculture,**  
**Rawalpindi**  
**Department of Range Management**  
**& Forestry**  
**University of Arid Agriculture**  
Shamsabad, Muree Road, Rawalpindi.  
Tel: +92 51 929 0151 /0152

Fax: +92 51 929 0160  
Website: [www.uaar.edu.pk](http://www.uaar.edu.pk)

**PAPUA NEW GUINEA**
**NATIONAL FOREST SERVICE**

**Papua New Guinea Forest**  
**Authority**  
**National Forest Service**  
PO Box 5055  
Boroko  
National Capital District  
Tel: +675 327 7800  
Fax: +675 325 4433  
Email: [info.general@pngfa.gov.pg](mailto:info.general@pngfa.gov.pg)  
Website: [www.forestry.gov.pg](http://www.forestry.gov.pg)

**NATIONAL RESEARCH AND TRAINING  
INSTITUTIONS**

**Forest Research Institute of Papua**  
**New Guinea (PNGFRI)**  
Box 5854  
Boroko  
National Capital District 111  
Website:  
[www.nri.org.pg/pages/research](http://www.nri.org.pg/pages/research)

**RWANDA**
**NATIONAL FOREST SERVICE**

**Direction general de Fôrets**  
PO Box 3502  
Kigali  
Tel: +250 250 85008  
Fax: +250 250 84644

**SAMOA**
**NATIONAL FOREST SERVICE**

**Western Samoa Forestry Division**  
**Department of Agriculture,**  
**Forestry & Fisheries**  
PO Box 1874  
Apia  
Tel: +685 22561  
Fax: +685 23426

**SEYCHELLES**
**NATIONAL FOREST SERVICE**

**Forestry Section**  
**Ministry of Environment &**  
**Transport**  
E-mail: [forestry@seychelles.net](mailto:forestry@seychelles.net)

**SIERRA LEONE**
**NATIONAL FOREST SERVICE**

**Ministry of Agriculture, Forestry &**  
**Environment (MAFE)**  
Private Mail Bag 540  
Tower Hill  
Freetown  
Website: [www.statehouse-sl.org/  
ministryagriculture](http://www.statehouse-sl.org/ministryagriculture)

**NATIONAL RESEARCH AND TRAINING  
INSTITUTION**

**Institute of Agricultural Research**  
**(IAR)**  
Njala Headquarters  
Ministry of Agriculture, Forestry &  
Environment  
Freetown  
Tel: +232 22 223380  
Fax: +232 22 223473  
E-mail: [iarsl@sierratel.sl](mailto:iarsl@sierratel.sl)

**UNIVERSITY FACULTIES/  
DEPARTMENTS**

**Njala University**  
University of Sierra Leone  
Private Mail Bag, Freetown  
Tel: +232 22 228788 / 226851  
E-mail:  
[nuc@sierratel.sl](mailto:nuc@sierratel.sl) / [nuclib@sierratel.sl](mailto:nuclib@sierratel.sl)  
Website: [www.nuonline.com](http://www.nuonline.com)

**SINGAPORE**
**NATIONAL FOREST SERVICE**

**National Parks Board**  
1 Cluny Road  
Singapore 259569  
Helpline Number: 1800 471 7300  
(Toll free)  
Fax: 1800-471 6472 3033  
E-mail:  
[NPARKS\\_MAILBOX@NPARKS.GOV.SG](mailto:NPARKS_MAILBOX@NPARKS.GOV.SG)  
Website: [www.nparks.gov.sg/cms](http://www.nparks.gov.sg/cms)

**Parks and Recreation Department**  
7 Maxwell Road  
5th Floor Annexe B, MND Complex  
Singapore 069110  
Tel: + 65 222 1211  
Fax: +65 221 3103

**SOLOMON ISLANDS**
**NATIONAL FOREST SERVICE**

**Ministry of Forestry, Environment**  
**& Conservation**  
PO Box G24  
Honiara



Tel: +677 22453 / 22944  
Fax: +677 21245

The Ministry of Forestry includes a Research & Development section.

#### SOUTH AFRICA

##### NATIONAL FOREST SERVICE

##### Department of Water Affairs & Forestry

Private Bag X313  
Pretoria 0001  
Website: [www.dwaf.gov.za](http://www.dwaf.gov.za)

##### Natural Resources & Environment

PO Box 395  
Pretoria 0001  
Website: [www.csir.co.za](http://www.csir.co.za)

##### Department of Environmental Affairs & Tourism

Private Bag X447  
Pretoria 0001  
Website: [www.deat.gov.za](http://www.deat.gov.za)

##### NATIONAL RESEARCH AND TRAINING INSTITUTIONS

##### Southern African Institute of Forestry

Post Suite 329  
Private Bag X4  
Menlo Park 0102  
Website: [www.foresters.co.za](http://www.foresters.co.za)

##### South African National Biodiversity Institute

Private Bag X101  
Pretoria 0001  
Website: [www.sanbi.org](http://www.sanbi.org)

##### Forestry & Agriculture Biotechnology Institute

University of Pretoria  
Pretoria 0002  
Website: [www.fabinet.up.ac.za](http://www.fabinet.up.ac.za)

##### Forest Industries Education and Training Authority

Website: [www.fieta.org.za](http://www.fieta.org.za)

##### Forestry South Africa

PO Box 1553  
Rivonia 2128  
Website: [www.forestry.co.za](http://www.forestry.co.za)

##### Institute for Commercial Forestry Research

PO Box 100281  
SCOTTSVILLE 3209  
Website: [www.icfr.unp.ac.za](http://www.icfr.unp.ac.za)

##### UNIVERSITY FACILITIES/ DEPARTMENTS

##### Nelson Mandela Metropolitan University

Saasveld Campus  
Private Bag X6531  
George 6530  
Website: [www.nmmu.ac.za](http://www.nmmu.ac.za)

##### Forestry Programme

University of Kwazulu-Natal  
Private Bag X1  
Scottsville 3209  
Website: [www.ukzn.ac.za](http://www.ukzn.ac.za)

##### Department of Forest Science

Faculty of Agricultural & Forestry Sciences  
University of Stellenbosch  
Private Bag X1  
Matieland 7602  
Website: [www.sun.ac.za/forestry](http://www.sun.ac.za/forestry)

#### ST KITTS & NEVIS

##### NATIONAL FOREST SERVICE

##### Ministry of Housing, Agriculture & Fisheries

Govt of St Kitts & Nevis  
La Guerite  
PO Box 39  
Basseterre, St Kitts  
Tel: +1 869 465 2335  
Fax: +1 869 465 2928  
E-mail: [doastk@caribsurf.com](mailto:doastk@caribsurf.com)  
Website: [www.gov.kn](http://www.gov.kn)

##### RESEARCH INSTITUTIONS

##### Nevis Field Study Centre (NFSC)

Nevis Historical & Conservation Society  
PO Box 563  
Charlestown, Nevis  
Tel: +1 869 469 5786  
Fax: +1 869 469 0274  
Website: [www.nevis-nhcs.org](http://www.nevis-nhcs.org)

##### UNIVERSITIES, COLLEGES AND OTHER TRAINING CENTRES

##### Clarence Fitzroy Bryant College Burdon Street Campus

PO Box 268  
Basseterre, St Kitts  
Tel: +1 869 465 2856 / 8791 / 8990  
Fax: +1 869 465 8279  
E-mail: [info@cfbc.edu.kn](mailto:info@cfbc.edu.kn)  
Website: [www.cfbc.edu.kn](http://www.cfbc.edu.kn)

#### ST LUCIA

##### NATIONAL FOREST SERVICE

##### Department of Forestry

Ministry of Agriculture, Fisheries & Forestry  
5th Floor, Sir Stanislaus Building  
Waterfront, Castries  
Tel: +1 758 450 2078 / 2231  
Fax: +1 758 450 2287  
E-mail: [deptforest@slumaffe.org](mailto:deptforest@slumaffe.org)  
Website: [www.slumaffe.org/Forestry\\_Department/forestry\\_department.html](http://www.slumaffe.org/Forestry_Department/forestry_department.html)

##### RESEARCH INSTITUTIONS

##### Department of Forestry – Research Unit Ministry of Agriculture, Fisheries & Forestry

5th Floor, Sir Stanislaus Building  
Waterfront, Castries  
Tel: +1 758 450 2078 / 2231  
Fax: +1 758 450 2287  
E-mail: [deptforest@slumaffe.org](mailto:deptforest@slumaffe.org)  
Website: [www.slumaffe.org/Forestry\\_Department/forestry\\_department.html](http://www.slumaffe.org/Forestry_Department/forestry_department.html)

##### UNIVERSITIES, COLLEGES AND OTHER TRAINING CENTRES

##### Sir Arthur Lewis Community College (SALCC)

Morne Fortune, Castries  
Tel: +1 758 452 5507  
Fax: +1 758 452 7901  
Website: [www.salcc.edu.lc](http://www.salcc.edu.lc)

#### ST VINCENT & THE GRENADINES

##### NATIONAL FOREST SERVICE

##### Forestry Department

Ministry of Agriculture, Forestry & Fisheries  
Campden Park  
Kingstown, St Vincent  
Tel: +1 784 457 8594  
Fax: +1 784 457 8502  
E-mail: [forestrysvg@vincysurf.com](mailto:forestrysvg@vincysurf.com) / [forestrysvg93@yahoo.com](mailto:forestrysvg93@yahoo.com)  
Website: [www.gov.vc](http://www.gov.vc)

##### UNIVERSITIES, COLLEGES AND OTHER TRAINING CENTRES

##### University of the West Indies (UWI)

University Centre  
Murray Road  
PO Box 610  
Kingstown, St Vincent

Tel: +1 784 456 1183

Fax: +1 784 456 1251  
E-mail: [uwisvg@gmail.com](mailto:uwisvg@gmail.com); [scs@caribsurf.com](mailto:scs@caribsurf.com)  
Website: [www.cavehill.uwi.edu/bnccde/svg/index.html](http://www.cavehill.uwi.edu/bnccde/svg/index.html)

#### SWAZILAND

##### NATIONAL FOREST SERVICE

The unit responsible for forestry in Swaziland is the Forestry Section of the Department of Agriculture & Extension within the Ministry of Agriculture & Cooperatives; website: [www.gov.sz/home](http://www.gov.sz/home).

Research in the plantations is carried out by the private sector, 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.

#### TANZANIA (UNITED REPUBLIC OF)

##### NATIONAL FOREST SERVICE

##### Forestry & Beekeeping Division Ministry of Natural Resources & Tourism

TFCMP Ivory Room, Nyerere Rd  
PO Box 40832  
Dar es Salaam  
Tel: +255 22 212 6844  
Fax: +255 22 213 0091  
E-mail: [tfcmp@intafrica.com](mailto:tfcmp@intafrica.com)  
Website: <http://nfp.co.tz/>

##### National Forest Programme (NFP)

PO Box 11979  
Dar es Salaam  
Tel: +255 741 325706  
Fax: +255 22 213 0091  
Website: [www.nfp.co.tz](http://www.nfp.co.tz)

##### National Environment

Management Council (NEMC)  
PO Box 63154  
Dar es Salaam  
E-mail: [nemc@simbanet.net](mailto:nemc@simbanet.net) / [nemc@nenactz.org](mailto:nemc@nenactz.org)  
Tel: +255 22 213 4603 / 741-608930 / 2323210  
Fax: +255 22 213 4603  
Website: [www.newctz.org](http://www.newctz.org)



## RESEARCH INSTITUTIONS

**Tanzania Forestry Research Institute (TAFORI)**  
PO Box 1854  
Morogoro  
Tel: +255 23 261 4498 / 4499 / 3725  
Website: [www.tafori.org](http://www.tafori.org)

## ACADEMIC/ TRAINING

**Sokoine University of Agriculture**  
Tel: +255 23 263511  
E-mail: [Forestry@hhetan.gn.apc.org](mailto:Forestry@hhetan.gn.apc.org)  
/ [Forestry@costach.gn.apc.org](mailto:Forestry@costach.gn.apc.org)

**University of Dar es Salaam Institute of Resource Assessment (IRA)**  
PO Box 35097  
Dar es Salaam  
E-mail: [fiti@africaonline.com](mailto:fiti@africaonline.com)  
Website: [www.udsm.ac.tz/ucb/institofresources.html](http://www.udsm.ac.tz/ucb/institofresources.html)

**Forestry Training Institute Olmontonyi**  
PO Box 943  
Arusha  
Tel: +255 27 50441

**Forestry Industries Training Institute (FITI) Moshi**  
PO Box 1425  
Moshi  
Tel: +255 27 275 5016  
Fax: +255 27 275 3835

## TONGA

## NATIONAL FOREST SERVICE

**Forestry Division Ministry of Agriculture, Food, Forestry & Fisheries**  
PO Box 14  
Nuku'alofa  
Tel: +676 29500  
Fax: +676 30340  
E-mail: [foresto@kalianet.to](mailto:foresto@kalianet.to)  
Website: [www.pmo.gov.to](http://www.pmo.gov.to)

## TRINIDAD &amp; TOBAGO

## NATIONAL FOREST SERVICE

**Forestry Division Ministry of Public Utilities & the Environment**  
PO Bag 30  
St James, Port of Spain  
Fax: + 1 868 628 5503  
E-mail: [forestry@tstt.net.tt](mailto:forestry@tstt.net.tt)

## RESEARCH INSTITUTIONS

**Centre for Caribbean Land & Environmental Appraisal Research (CLEAR)**  
**The Office of Research The University of the West Indies**  
St Augustine, Trinidad  
Tel: + 1 868 662 2002 ext. 2108 / 3314  
Fax: + 1 868 662 4414  
Website: <http://sta.uwi.edu/clear/index.asp>

**National Herbarium of Trinidad & Tobago**  
**The University of the West Indies**  
St Augustine, Trinidad  
Tel: + 1 868 645 3509 / 662 2002 ext. 3326  
Fax: + 1 868 645 3509 / 663 9686  
E-mail: [trinherb@hotmail.com](mailto:trinherb@hotmail.com)  
Website: <http://sta.uwi.edu/herbarium/>

## UNIVERSITIES, COLLEGES AND OTHER TRAINING CENTRES

**College Of Science, Technology & Applied Arts of Trinidad & Tobago (COSTAATT)**  
9-11 Melville Lane  
Port of Spain, Trinidad  
Tel: + 1 868 625 5030 / 627 5946  
E-mail: [info@costaatt.edu.tt](mailto:info@costaatt.edu.tt)  
COSTAATT includes the Eastern Caribbean Institute of Agriculture & Forestry (ECIAF)  
Centeno via Arima PO  
Trinidad  
Tel: + 1 868 646 2650  
Fax: + 1 868 646 3964  
E-mail: [eciaf@tstt.net.tt](mailto:eciaf@tstt.net.tt)  
Website: [www.angelfire.com/zine/eciaf/](http://www.angelfire.com/zine/eciaf/)

**University of the Southern Caribbean**  
PO Box 175  
Port of Spain, Trinidad  
Tel: + 1 868 662 2241 / 2242 / 2206  
Fax: + 1 868 662 1197  
Website: <http://usc.edu.tt>

**University of the West Indies**  
St Augustine Campus  
St Augustine, Trinidad  
Tel: + 1 868 662 2002  
Fax: + 1 868 663 9684  
Website: <http://sta.uwi.edu/>

## TUVALU

## NATIONAL FOREST SERVICE

Responsibility for forestry in Tuvalu rests with the Forestry Division of the Department of Agriculture, itself a part of the Ministry of Natural Resources & Environment (MNRE). Also within the MNRE is an Environment Unit, which focuses on the environment in general.

## UGANDA

## NATIONAL FOREST SERVICE

**National Forestry Authority**  
10/20 Spring Road, Nakawa  
PO Box 1752  
Kampala  
Tel: +256 31 264 035/6  
Tel: +256 41 230 365/6  
Fax: +256 41 230 369  
E-mail: [info@nfa.org.ug](mailto:info@nfa.org.ug)  
Website: [www.nfa.org.ug](http://www.nfa.org.ug)

**Uganda Wildlife Authority**  
Plot 7 Kira Road, Kamwokya  
PO Box 3530  
Kampala  
Tel: +256 414 355000  
Fax: +256 414 346291  
Email: [uwa@uwa.or.ug](mailto:uwa@uwa.or.ug)  
Website: [www.uwa.or.ug](http://www.uwa.or.ug)

**National Environment Management Authority**  
Tel: +256 41 251064 / 5 / 8  
Fax: +256 41 257521  
Kampala  
E-mail: [info@nemaug.org](mailto:info@nemaug.org)  
Website: [www.nemaug.org](http://www.nemaug.org)

## RESEARCH

**Forestry Resources Research Institute (FORRI)**  
PO Box 1752  
Kampala  
E-mail: [foridir@infocom.co.ug](mailto:foridir@infocom.co.ug)  
Website: [www.naro.go.ug/Institute/Forestry/Index.html](http://www.naro.go.ug/Institute/Forestry/Index.html)

## ACADEMIC

**Faculty of Forestry & Nature Conservation**  
Makerere University  
PO Box 7062  
Kampala  
Website: [www.makerere.ac.ug/forestry/](http://www.makerere.ac.ug/forestry/)

## Institute of Environment &amp; Natural Resources

Nyabyeya Forestry College  
Tel: +256 465 20370  
Fax: +256 465 20370  
E-mail: [nfc@infocom.co.ug](mailto:nfc@infocom.co.ug)

## UNITED KINGDOM

## NATIONAL FOREST SERVICE

**Forestry Commission**  
Silvan House  
231 Corstorphine Rd  
Edinburgh EH12 7AT  
Tel: +44 131 334 0303  
E-mail: [enquiries@forestry.gsi.gov.uk](mailto:enquiries@forestry.gsi.gov.uk)  
Website: [www.forestry.gov.uk/forestry](http://www.forestry.gov.uk/forestry)

## NATIONAL RESEARCH AND TRAINING INSTITUTIONS

**Forest Research**  
Alice Holt Lodge  
Farnham  
Surrey GU10 4LH  
Tel: +44 1420 22255  
Fax: +44 1420 23653  
E-mail: [research.info@forestry.gsi.gov.uk](mailto:research.info@forestry.gsi.gov.uk)  
Website: [www.forestry.gov.uk/](http://www.forestry.gov.uk/)

**Forest Research**  
Northern Research Station  
Roslin  
Midlothian EH25 9SY  
Tel: +44 131 445 2176  
Fax: +44 131 445 5124  
E-mail: [nrs@forestry.gsi.gov.uk](mailto:nrs@forestry.gsi.gov.uk)  
Website: [www.forestry.gov.uk/](http://www.forestry.gov.uk/)

## UNIVERSITY FACULTIES/ DEPARTMENTS

**University of Aberdeen**  
School of Biological Sciences  
Department of Agriculture & Forestry  
Zoology Building  
Tillydrone Avenue, University of Aberdeen  
Aberdeen AB24 2TZ  
Tel: +44 1224 272861  
Fax: +44 1224 272396  
E-mail: [bioscience@abdn.ac.uk](mailto:bioscience@abdn.ac.uk)  
Website: [www.abdn.ac.uk/biologicalsci/](http://www.abdn.ac.uk/biologicalsci/)

**University of Edinburgh**  
College of Science & Engineering  
School of Biological Sciences  
Michael Swann Building





The King's Buildings  
Mayfield Road  
Edinburgh EH9 3JR  
Tel: +44 131 650 5525  
Fax: +44 131 650 6556  
E-mail: [biology@ed.ac.uk](mailto:biology@ed.ac.uk)  
Website: [www.biology.ed.ac.uk](http://www.biology.ed.ac.uk)

**University of Wales, Bangor**  
**School of the Environment & Natural Resources**  
Bangor  
Gwynedd LL57 2UW  
Tel: +44 1248 382281  
Fax: +44 1248 354997  
E-mail: [senr@bangor.ac.uk](mailto:senr@bangor.ac.uk)  
Website: [www.senr.bangor.ac.uk](http://www.senr.bangor.ac.uk)

**Inverness College**  
**Scottish School of Forestry**  
Viewhill  
Inverness IV2 5EA  
Tel: +44 1463 273600  
Fax: +44 1463 792497  
E-mail: [ssf@inverness.uhi.ac.uk](mailto:ssf@inverness.uhi.ac.uk)  
Website: [www.school-of-forestry.org](http://www.school-of-forestry.org)

**University of Central Lancashire**  
School of Natural Resources  
National School of Forestry  
Preston PR1 2HE  
Tel: +44 1772 201201  
Tel: +44 1768 863791  
Fax: +44 1768 867249  
Website:  
[www.uclan.ac.uk/facs/science/forestry](http://www.uclan.ac.uk/facs/science/forestry)

#### **VANUATU**

##### **NATIONAL FOREST SERVICE**

**Department of Forestry**  
PO Box 9068  
Port Vila  
Tel: +678 23171 / 23856  
Fax: +678 25051  
The Forest Research Division is within the Department of Forestry.

#### **ZAMBIA**

##### **NATIONAL FOREST SERVICE**

**Department of Forests**  
**Ministry of Tourism, Environment & Natural Resources (MTENR)**  
Kwacha House, Cairo Road  
PO Box 34011  
Lusaka  
Tel: +260 21 234375  
Fax: +260 21 226131  
E-mail: [info@mtenr.gov.zm](mailto:info@mtenr.gov.zm)  
Website: [www.mtenr.gov.zm](http://www.mtenr.gov.zm)

**Zambia Forestry College**  
Private Bag 1  
PO Box 1  
Kitwe  
Tel: +260 2 239 009  
Fax: +260 2 230 532  
E-mail: [office@zambiaforestrycollege.org](mailto:office@zambiaforestrycollege.org)  
Website: [www.zambiaforestrycollege.org](http://www.zambiaforestrycollege.org)

##### **NATIONAL RESEARCH INSTITUTIONS**

**Division of Forestry Research (ZFRIC)**  
PO Box 22099  
Kitwe

**Zambia Agricultural Research Centre (ZAREC)**  
P/Bag Chilanga  
Mount Makulu Research Station  
Kafue Road, Chilanga  
Lusaka

##### **UNIVERSITY FACULTIES/DEPARTMENTS**

**The Copperbelt University**  
**School of Natural Resources**  
PO Box 21692  
Jambo Drive  
Riverside  
Kitwe  
Tel: +260 212 222066  
Fax: +260 212 222469  
Website: [www.cbu.edu.zm](http://www.cbu.edu.zm)

**The University of Zambia**  
**School of Natural Resources**  
Great East Road Campus  
PO Box 32379  
Lusaka  
Website: [www.unza.zm](http://www.unza.zm)

##### **REGIONAL/PROVINCIAL FOREST SERVICES**

**Provincial Forest Extension Officer**  
Lusaka Province  
Department of Forestry  
PO Box Lusaka

**Provincial Forest Extension Officer**  
Eastern Province  
Department of Forestry  
PO Box Chipata

**Provincial Forest Extension Officer**  
Western Province  
Department of Forestry  
PO Box Mongu

**Provincial Forest Extension Officer**  
North-Western Province  
Department of Forestry  
PO Box Solwezi

**Provincial Forest Extension Officer**  
Southern Province  
Department of Forestry  
PO Box Choma

**Provincial Forest Extension Officer**  
Northern Province  
Department of Forestry  
PO Box Kasama

**Provincial Forest Extension Officer**  
Luapula Province  
Department of Forestry  
PO Box Mansa

**Provincial Forest Extension Officer**  
Central Province  
Department of Forestry  
PO Box Kabwe

**Provincial Forest Extension Officer**  
Copperbelt Province  
Department of Forestry  
PO Box Ndola

# Managing forests for the future



**The Food and Agriculture Organization of the United Nations (FAO)** counts sustainable management of the world's forests as one of its strategic goals. The FAO Forestry Department works to balance social, economic and environmental objectives so that present generations can reap the benefits of the Earth's forest resources while preserving them to meet the needs of future generations. FAO serves as a neutral forum for policy dialogue, as a reliable source of information on forests and trees and as a provider of expert technical assistance and advice to help countries develop and implement effective national forest programmes.

## Sharing ideas, creating partnerships

FAO works in partnership with governments, international organizations and agencies, non-governmental groups, the private sector, communities and individuals. FAO works with its member countries through its headquarters in Rome; through a network of decentralized but closely coordinated offices at country, subregional and regional levels; and through field projects.

FAO's Committee on Forestry brings together decision-makers from national forest services, international organizations, the private sector and civil society to examine emerging international forestry issues and shape the Organization's programme of work. Six regional forestry commissions meet to address regional issues. There is also an FAO Advisory Committee on Paper and Wood Products that brings together leaders from the private sector to address global issues and to provide advice to FAO.

The Collaborative Partnership on Forests, a group of 14 leading international organizations concerned with the world's forests, is chaired by FAO. The Organization also hosts the Mountain Partnership, an international consortium concerned with livelihoods of mountain people and the conservation of mountain ecosystems, and the National Forest Programme Facility, an innovative approach to forest development in developing countries that promotes participatory processes and effective national policies that integrate forestry with other key sectors.

## Sound information for sound forest policy

FAO is both a global clearinghouse for information on forests and forest resources and a facilitator that helps build countries' capacity to provide their own national forest data. In collaboration with member countries, FAO carries out periodic global assessments of forest resources, which are made available through reports, publications and the FAO Web site. The Global Forest Resources Assessment provides the most comprehensive reporting on forests worldwide, at five year intervals.

FAO, in collaboration with member countries, undertakes regional forest sector outlook studies to examine the direction of development of forests and forestry. Such studies help to identify the policy, programme and investment options that can enhance the forest sector's contribution to sustainable development.



FAO/FO-6871/J. BALL



FAO/FO-6887/E.B. SUBIYANTORO



FAO/22115/R. MESSORI

## CONTACT

Forestry Information Officer  
Forestry Department  
FAO  
Viale delle Terme di Caracalla  
00153 Rome, Italy  
E-mail: fo-library@fao.org

Senior Forestry Officer  
FAO Regional Office for Asia and the Pacific  
Maliwan Mansion  
39 Phra Athit Road  
Bangkok 10200, Thailand  
E-mail: FAO-RAP@fao.org

Senior Forestry Officer  
FAO Regional Office for the Near East  
11, El Eslah El Zerai Street  
PO Box 2223  
Dokki, Cairo, Egypt  
E-mail: FAO-RNE@fao.org

Every two years, FAO publishes *State of the World's Forests*, a major report covering current and emerging issues facing the forest sector. *Unasylva*, FAO's peer-reviewed journal on forestry, has been published in English, French and Spanish on a regular basis since 1947 – the longest-running multilingual forestry journal in the world.

## Knowledge for better forest management

FAO provides technical assistance and advice to help countries develop and improve national forest programmes, plan and carry out forest activities, and implement effective forest legislation. Through training and workshops, for example, FAO helps develop the institutional capacity for policy formulation at the national level. More than 120 countries have benefited from the Organization's forestry guidance over the last 20 years.

FAO develops guidelines for forest management through broad consultative processes with stakeholders in all regions of the world. Existing guidelines cover fire management, responsible management of planted forests and best practices in forest harvesting and utilization.

Recognizing the harmful effects of climate change on forest ecosystems and resources, and the role of forests in mitigating climate change by storing carbon in their biomass, FAO is intensifying efforts in this area. In addition to providing technical expertise to international climate change negotiations, FAO provides advice to countries on how they can contribute to mitigation of climate change.

Forests are the world's most important source of renewable bioenergy. FAO provides assistance to member countries that are facing critical policy decisions in this important area. FAO works with countries to develop systems for harnessing energy without depleting tree resources.

The Organization also helps countries develop strategies to control pests and diseases, in addition to providing emergency assistance to safeguard forest health.

Fire affects millions of hectares of forest land every year. FAO works with countries to adopt community-based approaches, strengthen fire-related policy and legislation, and promote international cooperation in fire management.

FAO's varied work programme also addresses, among others, watershed management, forest biodiversity, arid zone forestry, forest finance, forest tenure and appropriate forest industry development.

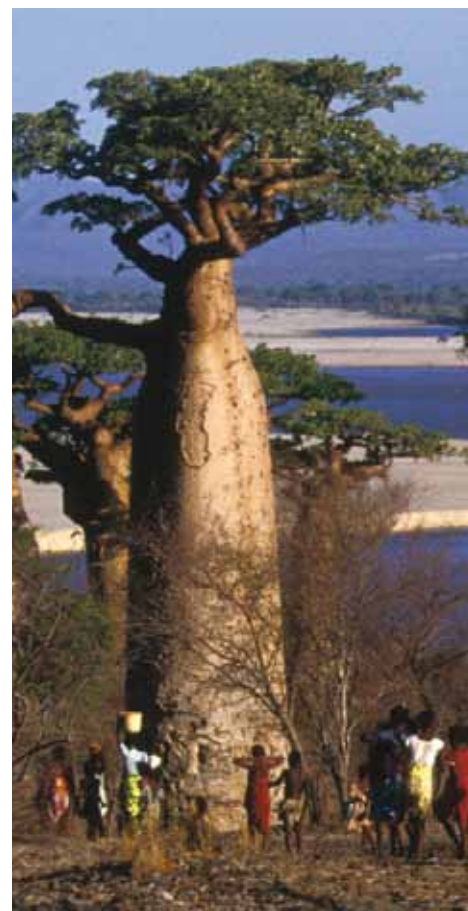
The livelihoods of hundreds of millions of rural people depend on forests and trees. People who benefit from forests are more likely to conserve them if they have a say in how they are managed. FAO promotes participatory forestry and community-based enterprise development to enable communities to balance their economic needs with the conservation of forest resources for the future.



FAO/FO-0662/S. BRAATZ



FAO/FO-6079/C. JEKKE



FAO/23510/A. MIHICH

# Commonwealth Forests 2010

*Commonwealth Forests 2010* is a thoroughly revised and updated edition of a book that was originally published in 2007.

Commonwealth Forests 2010 provides a complete picture of the state of forests and forestry in the Commonwealth. It covers not only the extent of forest cover, rates of forest loss and the creation of planted forests in the 54 countries of the Commonwealth but also sustainable forest management, benefits from the forest such as tangible products like timber and firewood as well as other benefits that are rarely quantified and are often taken for granted such as fruits, fodder and shelter, and the conservation of biological diversity. There are also chapters on forest research, the education of future generations of foresters, administration of Commonwealth forest services and the role of Commonwealth countries in the international dialogue on forests – especially in relation to forests and climate change. The final chapter on Challenges and Opportunities identifies the main issues facing Commonwealth foresters, planners and policymakers and describes the opportunities that exist for collaboration in addressing them.

The figures on which the text is based are in annexes, which also include details of the forest authorities for each Commonwealth country.



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