Food and Agriculture Organization of the United Nations

2014

State of the World's Forests

Enhancing the socioeconomic benefits from forests

Cover illustration: Elena Grossi

Photos on divider pages:

Chapter 1: Patrick Dugan, President of Bagong Pag-asa Foundation Incorporate, Philippines, and supporter of the implementation of the Assisted Natural Reforestation project, points out trees that have flourished thanks to the project.

Chapter 2: Nakiru, from the Karamojong ethnic group of agro-pastoral herders living mainly in the north-east of Uganda, learns how to spell the words "tree" and "table" in her tribal language.

Chapter 3: Making furniture, Hanoi, Viet Nam.

Chapter 4: High-rise housing seen from the elevated walkway of the Forest Walk, Southern Ridges, Singapore.

Chapter 5: Children planting trees, Guatemala.

2014

ISSN 1020-5705

State of the World's Forests

Enhancing the socioeconomic benefits from forests

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Rome, 2014

ISBN 978-92-5-108269-0 (print)
E-ISBN 978-92-5-108270-6 (PDF)

Contents

Figures

Boxes

Tables

Foreword

This edition of FAO's *State of the World's Forests (SOFO 2014)* analyses data on the socioeconomic benefits of forests, showing that well managed forests have tremendous potential to contribute to sustainable development and to promote food security: goals that are at the heart of FAO's mandate.

Forests are widely known as the world's largest repository of terrestrial biodiversity. They also play a vital role in global climate change mitigation and contribute to soil and water conservation in many fragile ecosystems.

Furthermore, forests contribute significantly to food security in many ways. Millions of people depend on food from forests, and from trees located outside forests, to increase the nutritional quality and diversity of their diets. This is particularly relevant during periods of seasonal food shortages, extreme climatic events and conflict. They also contribute to rural livelihoods and poverty alleviation through income generated by employment in the production of forest goods and services.

As reported in *SOFO 2014*, about one-third of the world's population, living mainly in less developed countries, rely on wood as their primary or only energy source. They use woodfuel to prepare safe and nutritious food and, in many cases, to sterilize water by boiling. Forests can also contribute to poverty alleviation by providing sustainable and affordable shelter.

To further measure the importance of forests, we need to improve our understanding of the people who live in and around forests – in many cases depending directly on forests for their livelihoods. For this reason, one of the key recommendations of *SOFO 2014* is that data collection must focus on people – not on trees alone.

This is a very timely statement, given that the International Year of Family Farming is being celebrated in 2014, an observance that FAO is honored to coordinate on behalf of the United Nations System.

Forest dwellers are part of the group of family farmers, pastoralists and artisanal fishers that already play an important role in guaranteeing food security, promoting sustainable development and preserving biodiversity in many countries but, at the same time, are among the world's most vulnerable people.

I hope you will enjoy reading *SOFO 2014* and that it will stimulate new ideas on the multiple relationships between people and forests and how we can work together on their advancement in order to promote food security and sustainable development.

José Graziano da Silva
FAO Director-General

Acknowledgements

State of the World's Forests 2014 was prepared by E. Rametsteiner and A. Whiteman under the overall coordination of E. Muller. Substantial inputs were provided by I. Animon, J. Baumgartner, D. Judge-Lord, D. Kneeland, A. Lebedys and Y. Li. Inputs were also provided by R. d'Annunzio, F. Bojang, M. Boscolo, A. Ferrazzo, A. Halloran, M. Hogarth, L. Jin, F. Kafeero, V. Khristolyubova, I. Kouplevatskaya, Q. Ma, K. MacDicken, R. Matta, J. Maes, J. Mbairamadji, C. Münke, L. Pettinotti, J. Tissari and M. Wilkie. The publication benefited from reviews and comments from many members of the Collaborative Partnership on Forests (CPF) and other technical divisions within FAO. S. Lapstun edited and coordinated the production of the publication. The FAO Meeting Programming and Documentation Service provided printing services and carried out the translations, with feedback from N. Berrahmouni, A. Hamid, D. Morales, D. Reeb, D. Rozas, and C. Sabogal, in addition to the contributors mentioned above. FAO's Office for Corporate Communication provided design and editorial support. Layout was carried out by ITCILO on the basis of a design by O. Bolbol.

Acronyms and abbreviations

ALRI	Acute lower respiratory infection
BREEAM	Building Research Establishment Environmental Assessment Method
C&I	Criteria and indicators
CBD	Convention on Biological Diversity
CDM	Clean Development Mechanism
CEPF	Confederation of European Forest Owners
CER	Certified emission reduction
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COMIFAC	Central African Forest Commission
COPD	Chronic obstructive pulmonary disease
CPA	Charcoal Producers Association (Kenya)
DALY	Disability-adjusted life year
DHS	Demographic and Health Surveys
ETS	Emission trading schemes
EU	European Union
EUTR	European Union Timber Regulation
FAO	Food and Agriculture Organization of the United Nations
FFC	Forest Farmer Cooperative
FLEGT	Forest Law Enforcement, Governance and Trade (European Union)
FRA	Global Forest Resources Assessment (FAO)
FSC	Forest Stewardship Council
FTE	Full-time equivalent
GDP	Gross domestic product
GVA	Gross value added
IAF	International Arrangement on Forests
IAP	Indoor air pollution
IEA	International Energy Agency
ILO	International Labour Organization
INDSTAT4	Industrial Statistics Database (UNIDO)
ITTO	International Tropical Timber Organization
LEED	Leadership in Energy and Environmental Design
LSMS	Living Standards Measurement Study
MDG	Millennium Development Goal
MEA	Millennium Ecosystem Assessment
MICS	Multiple Indicator Cluster Survey (UNICEF)
MTOE	Million tonnes of oil equivalent
NFP	National forest programme
NGO	Non-governmental organization
NWFP	Non-wood forest product

PEFC	Programme for the Endorsement of Forest Certification
PES	Payments for environmental services
PINPEP	Programa de incentivos para pequeños poseedores de tierras de vocación forestal o agroforestal (forest smallholders incentives programme, Guatemala)
PP	Pulp and paper production
PRSP	Poverty Reduction Strategy Paper
REDD	Reducing Emissions from Deforestation and Forest Degradation
Rio+20	United Nations Conference on Sustainable Development, Rio, 2012
RRI	Rights and Resources Initiative
SDG	Sustainable Development Goal
SEIA	Socioeconomic impact assessment
SFM	Sustainable forest management
SOEF	State of Europe's Forests report
SOFO	State of the World's Forests report
SWP	Sawnwood and wood-based panel production
TFRK	Traditional forest-related knowledge
TPES	Total primary energy supply
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNFF	United Nations Forum on Forests
UNICEF	United Nations Children's Fund
UNIDO	United Nations Industrial Development Organization
UNSD	United Nations Statistics Division
USAID	United States Agency for International Development
WCFSD	World Commission on Forests and Sustainable Development
WHO	World Health Organization
WHS	World Health Survey (WHO)
VCM	Voluntary Carbon Market
VPA	Voluntary Partnership Agreement

Executive summary

This edition of FAO's *State of the World's Forests* report (*SOFO 2014*) addresses a crucial knowledge gap by bringing together and analysing data about the socioeconomic benefits of forests that has not been systematically examined before.

The first chapter of the report sets out its context and purpose. Although forests provide employment, energy, nutritious foods and a wide range of other goods and ecosystem services, clear evidence of this has been lacking. This evidence is necessary to inform policy decisions regarding forest management and use and to ensure that the socioeconomic benefits from forests are recognized in the post-2015 agenda.

Chapter 2 describes what is known about the socioeconomic benefits from forests. It provides a working definition of these benefits for the purposes of this publication, i.e. "the basic human needs and improvements in quality of life (higher order needs) that are satisfied by the consumption of goods and services from forests and trees or are supported indirectly by income and employment in the forest sector." The approaches currently available for measuring forests' socioeconomic benefits are often inadequate, however, due both to methodological limitations and a lack of reliable data.

Section 3 presents the data that was collected for *SOFO 2014* and the results of the analysis showing how forests contribute to well-being. Income in the sector is just one of the many benefits provided by forests.

Consumption benefits relating to energy, shelter, food security and health are recognized as more significant socioeconomic benefits, although it is also more difficult to obtain the relevant data.

Wood energy for example is often the only energy source in rural areas of less developed countries and is especially important for poor people. In the same areas, the use of forest products in house construction to meet the basic need for shelter is particularly important, especially where these materials are the most affordable. Many developed countries also make extensive use of wood to meet these needs, including an increasing use of wood energy.

With respect to food security, despite low overall figures, the consumption of edible non-wood forest products may provide vital nutritional benefits. Perhaps even more importantly, woodfuel is used for cooking by about 40 percent of people living in less developed countries. The use of medicinal plants and woodfuel to boil and sterilize water are also key health benefits.

Chapter 4 describes the policies and measures that countries have used to support or enhance the production of these benefits. The policy shifts currently being witnessed in countries with significant forest resources include a broader concept of sustainable forest management taken up in national forest programmes or policies, more emphasis on participation in policy processes and forest management, and greater openness to voluntary and market-based approaches.

The chapter covers the progress of countries in addressing poverty reduction and rural development, access to forest resources, the investment environment, use of voluntary instruments, measures to improve production efficiency (including waste reduction and recycling), traditional forest-related knowledge, and the recognition in the marketplace of the values of assets and ecosystem services that forests provide. Despite advances in all of these areas, it is clear that progress remains to be made, particularly in strengthening implementation capacities and monitoring so that policies are translated into concrete results.

The concluding chapter synthesizes the results and presents recommendations about how the links between policies and benefits might be improved. It looks at the importance of strengthening people's rights to manage and benefit from forests, with a change in emphasis from prohibition to sustainable production. In this regard, improving the efficiency of production and use will be crucial to be able to meet future demands from a static (or declining) resource base and move towards a greener economy.

Making a case for investing in capacities to manage forests for people requires evidence of the benefits they provide. A more concerted effort will be needed to strengthen the availability of relevant information, including evidence that amended policies are indeed being implemented and, ultimately, that they have resulted in improvements to well-being.

Key findings

The socioeconomic benefits from forests are mostly derived from the consumption of forest goods and services.

The number of people that use forest outputs to meet their needs for food, energy and shelter is in the billions. In addition, large (but currently unknown) numbers may benefit indirectly from the environmental services provided by forests. The number of people that benefit from income and employment generation is relatively small, although if informal activities are included, this nevertheless reaches the tens – if not hundreds – of millions.

The formal forest sector employs some 13.2 million people across the world and at least another 41 million are employed in the informal sector.

Informal employment in forestry is often not captured in national statistics, but the estimates presented in *SOFO 2014* show that it is significant in less developed regions. It is also estimated that some 840 million people, or 12 percent of the world's population, collect woodfuel and charcoal for their own use.

Wood energy is often the only energy source in rural areas of less developed countries and is particularly important for poor people.

It accounts for 27 percent of total primary energy supply in Africa, 13 percent in Latin America and the Caribbean and 5 percent in Asia and Oceania. However it is also increasingly used in developed countries with the aim of reducing dependence on fossil fuels. For example, about 90 million people in Europe and North America now use wood energy as their main source of domestic heating.

Forest products make a significant contribution to the shelter of at least 1.3 billion people, or 18 percent of the world's population.

Forest products are used in the construction of peoples' homes all over the world. The recorded number of people living in homes where forest products are the main materials used for walls, roofs or floors is about 1 billion in Asia and Oceania and 150 million in Africa. However, as this estimate is based on only partial information, the true number could be much higher.

A major contribution of forests to food security and health is the provision of woodfuel to cook and sterilize water.

It is estimated that about 2.4 billion people cook with woodfuel, or about 40 percent of the population of less developed countries. In addition, 764 million of these people may also boil their water with wood. Collection of edible non-wood forest products also supports food security and provides essential nutrients for many people.

Key messages

To measure the socioeconomic benefits from forests, data collection must focus on people, not only trees.

With the exception of formal employment figures, forestry administrations have little information on how many people benefit from forests, and the data available is often weak. Current data collection, which focuses on forests and trees, needs to be complemented by data collection on the benefits that people receive. This is best done by collaborating with public organizations undertaking such surveys.

Forest policies must explicitly address forests' role in providing food, energy and shelter.

Many countries have made great progress in strengthening forest tenure and access rights and supporting forest user groups. Yet there still appears to be a major disconnect between a policy focus on formal forest sector activities and the huge numbers of people using forests to meet their needs for food, energy and shelter.

Recognition of the value of forest services, such as erosion protection and pollination, is essential to sound decision-making.

If the value of services provided is not measured or recognized, economic and policy decisions affecting forests will be based on incomplete and biased information. This is critical for the sustainable provision of many services, from essential services for food security and agricultural productivity such as erosion protection and pollination, to recreation and other amenities that forests provide to people.

To meet rising and changing demands, sustainable forest management must include more efficient production.

Demand for many of the benefits derived from the consumption of forest products is likely to continue to increase as populations increase, and change as lifestyles change, whether due to the emerging middle class, the global shift to predominantly urban living, or other factors. These demands will have to be met from a static or declining resource. To avoid significantly degrading this resource, more efficient production techniques must be adopted, including in the informal sector.

Providing people with access to forest resources and markets is a powerful way to enhance socioeconomic benefits.

Countries are providing people with greater access to forest resources and markets, amongst many other measures to encourage the provision of goods and services. This is particularly effective at local levels. The facilitation of producer organizations can support access to markets and more inclusive and efficient production.

To make real progress in enhancing the socioeconomic benefits from forests, policies must be underpinned by capacity building.

Numerous policies and measures to promote sustainable forest management have been developed since 2007, including a trend towards incorporating sustainable forest management (SFM) as a broad national goal, increasing stakeholder participation, and greater openness to voluntary and market-based approaches. Yet implementation capacity remains weak in many countries.

Chapter 1

1 Introduction

In most regions of the world, forests, trees on farms, and agroforestry systems play important roles in the livelihoods of rural people by providing employment, energy, nutritious foods and a wide range of goods and ecosystem services. Well managed forests have tremendous potential to contribute to sustainable development and to a greener economy. What is lacking is empirical data that provides clear evidence of this. This edition of FAO's *State of the World's Forests* report (*SOFO 2014*) addresses this crucial knowledge gap by systematically gathering and analysing available data on the socioeconomic benefits of forests.

The Millennium Development Goals (MDGs), established by world leaders in 2000, committed countries to a global partnership to reduce extreme poverty through a series of time-bound targets with a deadline of 2015. Although forests directly or indirectly contribute to most of the MDGs, they were considered as an indicator only for Goal 7 on reducing the loss of environmental resources. A lack of data on, and therefore visibility of, the actual and potential contributions of forests is one possible reason why they were not included in the other MDGs.

The global rate of deforestation has slowed in the last decade, but it is still alarmingly high in many parts of the world and the MDG indicator on forests has not been achieved. Without convincing evidence of the many contributions of forests to sustainable development, policymakers are unlikely to take decisive action to discontinue land-use policies that favour the conversion of forests to agriculture and other land uses.

At the United Nations Conference on Sustainable Development (Rio+20) in 2012, UN Member States launched a process to develop a set of sustainable development goals (SDGs) to address, in a balanced way, the economic, social and environmental dimensions of sustainable development; these SDGs are to be coherent with and integrated into the UN development agenda beyond 2015. The development of the SDGs provides a great opportunity to properly recognize the role of forests in sustainable development, especially their socioeconomic contributions. *SOFO 2014* aims to assist in seizing this opportunity by compiling, analysing and making available existing information on the socioeconomic benefits of forests from a variety of sources, many of them outside the forest sector.

In 2015, the eleventh session of the UN Forum on Forests (UNFF 11) will review the International Arrangement on Forests (IAF), including progress towards the achievement of the four Global Objectives on Forests and the implementation of the Non-Legally Binding Instrument on All Types of Forests (or Forest Instrument), a voluntary agreement adopted by the UN Economic and Social Council in 2007. The Forest Instrument sets out 25 national-level policies and measures to achieve sustainable forest management, 19 measures related to international cooperation and the means of implementation, and four Global Objectives on Forests. The four Global Objectives on Forests are:

1. Reverse the loss of forest cover worldwide through sustainable forest management, including protection, restoration, afforestation and reforestation, and increase efforts to prevent forest degradation.

2. Enhance forest-based economic, social and environmental benefits, including by improving the livelihoods of forest-dependent people.
3. Increase significantly the area of sustainably managed forests, including protected forests, and increase the proportion of forest products derived from sustainably managed forests.
4. Reverse the decline in official development assistance for sustainable forest management and mobilize significantly increased, new and additional financial resources from all sources for the implementation of sustainable forest management.

The review of the IAF will benefit from preliminary data gathered for FAO's Global Forest Resource Assessment (FRA 2015) and reports to be submitted by UNFF member countries on their progress in achieving the MDGs and the Global Objectives on Forests and on implementing the Forest Instrument. One of the biggest challenges in the review, however, will be assessing the achievement of the second Global Objective on Forests. FRA 2015 will provide only part of the information required for such an assessment because few countries systematically collect data on the socioeconomic benefits of forests or their contributions to improving livelihoods.

The lack of attention to the socioeconomic role of forests is the reason for the focus of *SOFO 2014*, which presents evidence of the significance of this role as well as an independent technical review of progress towards enhancing the socioeconomic benefits of forests, as stated in the second Global Objective on Forests.

In so doing, *SOFO 2014* aims to contribute to the international dialogue on forests and help ensure that appropriate attention is paid to all dimensions of forests in the consideration of the SDGs.

Due to the difficulty in obtaining data, and the wide scope of actual and potential benefits, *SOFO 2014* does not present a comprehensive picture of the socioeconomic contributions of forests. Rather, it focuses on the forest-based socioeconomic benefits for which reliable data are available at the global level or where information from case studies is sufficient to draw conclusions on global trends. *SOFO 2014* also includes, to the extent possible, an examination of the measures taken by countries to promote the socioeconomic benefits of forests and an assessment of their relative effectiveness.

SOFO 2014 has four chapters in addition to this introduction. Chapter 2 discusses how the socioeconomic benefits of forests might be defined and what is currently known about them. Chapter 3 provides a synthesis of the current status of and global and regional trends in forest benefits, focusing on concrete benefits that can be assessed using the data currently available and emphasizing their importance for less developed countries. Chapter 4 reviews measures taken by countries, both developed and less developed, to realize and increase a broad range of socioeconomic benefits from forests, many of which remain difficult to assess. Finally, Chapter 5 provides a summary of the main findings, conclusions and suggestions on the way forward.

© UNESCO/M. Hofer

Chapter 2

2 The measurement of socioeconomic benefits

As countries strive to achieve sustainable forest management, it is important to measure progress in all of the different dimensions of sustainability. Information is routinely collected about environmental and economic aspects of forest management, but measuring the social or socioeconomic benefits from forests is much more challenging, due to a scarcity of data and lack of a clear definition of what exactly should be measured.

There are some assessments of socioeconomic benefits from forests at the level of individual projects – e.g. in socioeconomic impact assessments and village-level case-studies – and some data collection is included in large-scale exercises such as FAO's Global Forest Resources Assessment and the regional criteria and indicators processes. However, the collection and analysis of information about socioeconomic benefits remains comparatively weak and this should be addressed if the contribution of forests to society is to be properly recognized.

Key message

To measure the socioeconomic benefits from forests, data collection must focus on people, not only trees

With the exception of formal employment figures, forestry administrations have little information on how many people benefit from forests. Current data collection, which focuses on forests and trees, needs to be complemented by data collection on the benefits that people receive. This is best done by collaborating with public organizations undertaking such surveys.

The definition of socioeconomic benefits

Despite frequent references to social or socioeconomic benefits in many disciplines, there is no clear and commonly agreed definition of what exactly this means. For example, these benefits no doubt include some economic benefits, but they may also include more fundamental social benefits, such as: social justice; the preservation of culture; social harmony; freedom; and public security. The latter, however, are more often produced through societal change than through activities in individual sectors. The analysis here will therefore focus primarily on socioeconomic (rather than social) benefits, where these can be defined as: "the benefits to society of economic activity".

Economic activity is the production of all goods and services in a country and is usually measured as the gross domestic product (GDP). However, by referring to "socioeconomic benefits", a reversal of perspective is required; it is now the consumption of goods and services (rather than production) that becomes the focus of interest and the contribution of a sector to socioeconomic benefits may be very different to its share of GDP. Agriculture provides a good example of this difference, in that it often accounts for a small proportion of GDP but delivers significant benefits to society by feeding the population and supporting (usually less developed) rural areas.

The final challenge to developing a definition of socioeconomic benefits from forests is to define exactly what is meant by "benefits to society". The numerous socioeconomic impact assessments (SEIAs) that have been produced refer to a range of benefits, but the benefits mentioned tend to be

context-specific and focused on those aspects of human life affected by each project.[1] An alternative approach is to examine the frameworks, handbooks and methodologies used by different institutions to produce SEIAs. One recent and comprehensive study (Arora and Tiwari, 2007) has done exactly this and provides a useful working definition that can be adapted for the forest sector. Based on a review of the SEIA literature and SEIA practices in five major international agencies, as well as government and non-governmental organizations (NGOs), this study defines socioeconomic well-being as:

> The status of a household where the basic social and economic needs for survival are fulfilled and the household has the capacity to improve its quality of life.

Although it does not refer directly to socioeconomic benefits, this definition implies that such benefits occur when basic needs are met and quality of life is improved. The study then suggests that:

> Socioeconomic well-being can be measured with the parameters of literacy and education, employment, income and consumption, shelter and urban services, health and nutrition, environmental concerns, safety and security, time use and availability.

This highlights the importance of measuring socioeconomic well-being across several different dimensions and the study then proposes a set of indicators for each. Although it is still context-specific due to the fact that its focus is on the transportation sector (it mentions, for example, time use and availability), it covers some of the basic needs that could be relevant to forestry.

A more general observation about socioeconomic benefits is that increased equality is coming to be seen as a major benefit. This can be seen in changes in public spending, which have increasingly focused on income redistribution and the creation of social safety nets over the past 50 years. The importance of this is that the magnitude of socioeconomic benefits depends partly upon who is receiving those benefits. Thus, income from forestry has a higher socioeconomic benefit when earned by relatively poor people. This distinction between different types of beneficiary is not captured in GDP statistics and national income accounts, but should be examined in any assessment of socioeconomic benefits.

Over the past few decades, there have been numerous studies carried out at the village level on the impacts of forestry on poverty. These studies have shown that any attempt to examine forestry's impacts on inequality is likely to require considerable data collection and analysis that would be difficult and expensive to implement on a larger scale. A simpler way to examine if and how forests provide benefits for the poor is to try to identify beneficiaries that are generally known to be relatively poor or disadvantaged in some way. Hence the importance of collecting and analysing disaggregated data on how forests might benefit disadvantaged groups (such as women, youth and indigenous people) to give a better indication of socioeconomic benefits.

Current measures of the socioeconomic benefits from forests

Before proposing some measures of the socioeconomic benefits from forests it is useful to examine the information that is currently collected on this subject and is readily available for many countries. A small amount of information is collected as part of national population censuses and large-scale surveys (e.g. the use of wood energy) and this will be described later. Other than this, most of the readily available information is collected in FAO's Global Forest Resources Assessment (FRA) and the regional criteria and indicators (C&I) processes.

This information is examined and assessed below, taking into consideration the quality of the data that is currently available (for further explanation of this assessment, see Annex 1). In particular, the following analysis focuses on the validity of much of the data currently collected as measures of socioeconomic benefits.

Data collected in FAO's Global Forest Resources Assessment (FRA) and regional criteria and indicators processes

The FRA collects information from countries every five years, using an internationally agreed set of definitions and covering a range of topics relevant to sustainable forest management. A number of the questions asked in the FRA relate to the socioeconomic functions of forests.

[1] Employment and income generation, which are included in almost all studies, are an exception. Although this appears to contradict the statement that benefits primarily concern consumption rather than production, there is no real contradiction given that income provides the means to purchase goods and services for consumption.

The three main C&I processes also collect information on a number of aspects of sustainable forest management and, for each of the criteria, use indicators to measure progress. The countries covered by each process and the frequency of data collection are as follows:

- FOREST EUROPE, which collects information on 11 indicators of socioeconomic functions and conditions in forests for every European country (including the Russian Federation). The most recent data was collected for the years 2005 or 2010 and was presented in the *State of Europe's Forests 2011* report (FOREST EUROPE, 2011).
- International Tropical Timber Organization (ITTO) Criteria and Indicators, where data collected covers 33 tropical countries that together account for about 85 percent of the global tropical forest area. Countries provide information about 14 different economic, social and cultural aspects of forest management and use (ITTO, 2005) and the latest assessment covered the year 2010 (ITTO, 2011).
- The Montréal Process, which covers 12 temperate and boreal countries (including the Russian Federation again) that account for just over 80 percent of the temperate and boreal forest area or about half of the global forest area. The framework for reporting progress towards sustainable forest management includes a criterion on the "maintenance and enhancement of long-term multiple socioeconomic benefits to meet the needs of societies" with 20 related indicators (Montréal Process, 2009).

A summary of the data collected in each of these four exercises is given in Table 1.

Assessment of the data quality and validity of indicators

The measures shown in Table 1 have been grouped into different types of indicators and a brief assessment of the data collected is presented below:

Economic indicators: Information about the value of production or contribution of the forest sector to GDP is collected by the FRA and all C&I processes. Data on forestry's contribution to GDP is available for almost all countries and, as it is collected as part of national income accounts, is likely to be quite accurate in many countries. The main concern with this data is that it may not capture the value added in informal production (e.g. production of woodfuel and non-wood forest products (NWFPs)), which may be significant in many tropical countries. For the same reason, information about the total value of production may be inaccurate for many countries.

With respect to the validity of these measures, the contribution of the forest sector to GDP is an indicator of the net income received by forest owners, shareholders and workers in the forest sector and, as such, is a valid measure of the socioeconomic benefits received by people involved in the sector. The total value of production is not such a valid measure of socioeconomic benefits, mainly because it does not measure net income.[2] The other economic indicators collected in these exercises (concerning trade and investment) are useful economic indicators but are not good measures of socioeconomic benefits, as they do not focus on the benefits that people receive.

[2] Value added in production is the correct measure of income, because it subtracts the cost of all materials purchased from other sectors from the value of production to give the surplus revenue that is then divided into income for capital (profit), land (rent) and labour (wages and salaries).

Table 1: Information currently collected regularly on the socioeconomic benefits from forests

Type of indicator	FRA	FOREST EUROPE (Criterion 6)	ITTO (Criterion 7)	Montréal Process (Criterion 6)
Economic indicators	Value of forest product removals. Contribution of forestry to GDP.	*6.2* Contribution of the forest sector to GDP. *6.3* Net revenue of forest enterprises. *6.8* Imports and exports of wood and products derived from wood.	*7.1* Contribution of the forest sector to GDP. *7.2* Value of domestic production (products and services).	*6.1.a,b* Value and volume of production. *6.1.c* Revenue from forest based environmental services. *6.1.f,g* Value and volume of trade. *6.1.h* Export and import shares. *6.2.a,b* Investment and expenditure (on various forest-related activities).
Labour indicators	Forestry employment.	*6.5* Number of persons employed. *6.6* Frequency of occupational accidents and diseases.	*7.7* Training and labour development programmes. *7.8* Existence and implementation of health and safety procedures.	*6.3.a* Employment in the forest sector. *6.3.b* Wage rates, average income and injury rates.
Consumption indicators	Wood removals. Area of forest removed for other land uses.	*6.7* Consumption per head of wood and products derived from wood. *6.9* Share of wood energy in total energy consumption, classified by origin of wood.	*7.6* Number of people depending on forests for their livelihoods. *7.9* Area of forests used for subsistence uses and traditional and customary lifestyles.	*6.1.d,e* Consumption of wood and non-wood forest products. *6.3.d* Area and percent of forests used for subsistence purposes.
Other use indicators	Area of forest designated for social services.	*6.10* Area where public has access rights for recreation and intensity of use. *6.11* Number of sites having cultural or spiritual values.	*7.10* Number and extent of forests available primarily for: research and education; and recreation. *7.11* Number of important archaeological, cultural and spiritual sites protected.	*6.4.a* Area and percent of forests available/managed for recreation. *6.4.b* Number and type of forest visits and available facilities. *6.5.a* Area of forests managed for cultural, social and spiritual values.
Governance and participation indicators	Involvement of stakeholders in forestry policy. Involvement of stakeholders in forest management.		*7.4* Mechanisms for cost and benefit sharing. *7.5* Conflict-resolution mechanisms. *7.12* Tenure and use rights in public forests. *7.14* Involvement of local people in forest management.	*6.3.e* Distribution of revenues derived from forest management.
Other indicators	Forest ownership and management rights (in public forests). Public expenditure and revenue collection.	*6.1* Number of forest holdings, by ownership and size classes. *6.4* Total expenditure on forest service provision.	*7.3* Forest industry structure and efficiency. *7.13* Use of indigenous knowledge in forest management.	*6.1.i* Recovery or recycling of forest products. *6.3.c* Resilience of forest-dependent communities. *6.4.b* The importance of forests to people.

Sources: derived from FOREST EUROPE (2011), ITTO (2005) and the Montréal Process (2009). Note: the numbering reflects the criteria and indicators numbers used in each process.

■ Women working in a plywood factory, China.

© FAO/A. Lebedys

Labour indicators: Information about the number of people employed in forestry or the forest sector is collected in the FRA and all criteria and indicators processes and most countries provide this data.[3] The employment data provided by developed countries is reasonably accurate, but for less developed countries the exclusion of employment in informal activities is again problematic. Another concern is whether part-time employment figures are converted to full-time equivalents (FTE) in the figures provided by some countries.

As an indicator of socioeconomic benefits, employment statistics are useful because they show the number of people that derive some benefits from activities in the sector. However, unlike the value added data, they do not indicate the magnitude of those benefits. Thus, they are more useful as indicators of the distribution of socioeconomic benefits than as indicators of the size of those benefits.[4]

The other labour-related indicators collected in these exercises measure health and safety and human resource development. Health and safety statistics are very relevant to any assessment of socioeconomic issues in the forest sector, but the availability of data is quite weak. Similarly, information collected by ITTO about human resource development is also potentially relevant, but only a few countries provide information and this is mostly qualitative rather than quantitative.

Consumption indicators: FOREST EUROPE and the Montréal Process indicators collect information about the consumption of wood products; data about wood energy use is collected in Europe; and NWFP consumption data is collected as part of the Montréal Process indicators.[5] With the exception of the latter, most countries have reasonably accurate data on consumption. If socioeconomic benefits are considered to be consumption benefits, as discussed earlier, then these figures are valid measures of the benefits that people receive from forest use. However, if socioeconomic benefits are defined as meeting basic needs and contributing to quality of life, then these measures will be imprecise because they include a wide range of end uses of forest products that may be difficult to evaluate according to this definition. To assess how this consumption meets different needs, it would be more useful to produce disaggregated statistics, as is done in Europe for wood energy.

ITTO and the Montréal Process indicators also collect information about the area of forests used for subsistence and ITTO asks countries to report on the number of people dependent on forests for subsistence. Very few countries are able to provide this information and the accuracy of the data provided may be inaccurate due to the lack of a clear definition. For example, the countries providing information to ITTO about the numbers of forest-dependent people showed a wide range of assumptions and calculation methodologies. In addition, the validity of these measures is questionable. Reporting on the area of forests used for subsistence is focused on measuring forest area rather than numbers of people or quantities of goods and services extracted to meet human needs. The number of people who depend on forests is also, like the employment data, more an indication of the distribution of benefits than the level of benefits that people receive from their use of forests.

Other use indicators: The FRA and all criteria and indicators processes ask countries to provide information about the areas of forests designated or used for various social purposes (most commonly recreation, but also education, research and conservation of cultural or spiritual sites). The definitions used to collect this

[3] Many countries provide employment data as part of the ITTO indicator for the number of people depending on forests for their livelihoods.

[4] The Montréal Process indicators include a section on wage rates and average incomes, but many countries do not collect this information.

[5] In addition, it should be noted that FAO and ITTO also collect information about the production and trade of all forest products every year, from which consumption can be calculated.

information are quite precise and most countries do provide some data, but in some cases the information is only partial or qualitative rather than quantitative. In addition, many countries noted that a number of these uses occur across a large part of the forest estate and in the same areas (i.e. where forests are managed for multiple uses) rather than being limited to a few specific areas. Collecting data about forest area leads not only to this problem of imprecision but also to the problem of validity (noted previously) that forest area is a measure of the potential supply of benefits rather than their consumption.

The data collected by FOREST EUROPE and the Montréal Process also includes estimates of forest visitor numbers. This is a potentially more useful indicator of the socioeconomic benefits provided by forests because it is a measure of forest use. However, few countries systematically collect this information and the information that is collected often does not cover the entire forest area used by visitors.

Governance and participation indicators: Information about benefit sharing is included in the ITTO and the Montréal Process indicators. Like the employment statistics, this is an indicator of the distribution rather than the magnitude of socioeconomic benefits and is therefore useful to show how some of the income generated in the sector is distributed to local people living in and around forest areas (who are likely to be relatively poor).

In the country reports provided to ITTO and the Montréal Process, many countries provide information on benefit sharing, although much of the information describes the policies and regulations in place rather than measurable achievements. Furthermore, where real results are described, most of the information given is qualitative rather than quantitative, so it is not possible to calculate how much income in the sector is specifically targeted towards local people or the value of other benefits that they may receive. This is a topic that deserves much more attention in the future.

The other data collected by ITTO and the FRA refers to the rights of local people and the ways in which they are involved in forest management. While this, at first glance, may not appear relevant to the subject of socioeconomic benefits, social justice, safety and security are basic human needs that, in many tropical countries, may be affected by activities in the forest sector. Many countries do provide information, describing if and how local people, communities and indigenous people may be involved in forest management, planning and decision making. However, as with benefit sharing, most of the information provided is qualitative rather than quantitative and focuses more on what should happen rather than measurable results.

Other indicators: All four exercises also collect a range of other information related to social or economic aspects of forest management. Information about efficiency, expenditure, revenue collection and recycling is generally easy to quantify and many countries seem to be able to provide statistics easily, although these measures are not particularly relevant to the measurement of socioeconomic benefits. Conversely, some of the more relevant variables (e.g. the importance of forests to people) are much more difficult to quantify and few countries seem able to provide this information.

The other piece of information that is collected in the FRA and by FOREST EUROPE and ITTO concerns the ownership of forests.[6] Information on the area of privately owned forests is collected and most countries are able to provide this information. Analysis of the FRA 2010 data suggests that about 25 percent of the world's forests are owned or managed by local people (Whiteman, 2013), who presumably receive some socioeconomic benefits from these areas. However, because this is a measure of area rather than numbers of people that benefit from ownership and management rights, it is not particularly useful as a measure of socioeconomic benefits.

In addition, FOREST EUROPE also collects information about the number of forest holdings in a country. This is potentially more useful as this number is probably close to the number of forest owners and could be used as a rough estimate of the number of people benefiting from forest ownership. However, the information collected is incomplete, suggesting that countries have more difficulty collecting and reporting this information.

Forest-dependent people

The concept of the number of "forest-dependent people" first appeared in discussions about forestry almost two decades ago (Lynch and Talbott, 1995; Ruiz Pérez and Arnold, 1996) and is frequently mentioned in discussions on the socioeconomic benefits of forests. It has also

[6] This information is collected by ITTO as an indicator of the enabling environment for sustainable forest management (Indicator 1.2) rather than a socioeconomic indicator.

featured prominently in national and international discussions about forestry. For example, improving the livelihoods of forest-dependent people is mentioned as part of one of the four global objectives for forests in the Non-Legally Binding Instrument on All Types of Forests adopted by the UN General Assembly in December 2007 (UN, 2008).

The World Commission on Forests and Sustainable Development (WCFSD) produced the first global estimate of the number of forest-dependent people, suggesting that 350 million people depend almost entirely on forests for subsistence and a further 1 billion on woodlands and trees for their essential fuelwood, food and fodder needs (WCFSD, 1997). Shortly afterwards, the World Bank (2002) estimated that 1.6 billion rural people depend upon forests and, since then, various other estimates have been made using different definitions and assumptions. The most recent review and synthesis of all of these estimates (Chao, 2012) suggests that the number of forest-dependent people is in the range of 1.2–1.4 billion people or just under 20 percent of the global population.

The number of forest-dependent people appears, at first glance, to be an indicator of the importance of forests for social well-being, because it attempts to measure the number of people that derive some socioeconomic benefits directly from forests. Indeed, measuring the number of people deriving benefits from forests (rather than number of hectares of forest) is more valid than some of the other indicators of socioeconomic benefits described previously. However, there are several issues related to the measurement and interpretation of these estimates.

The first issue is that forest dependence is not defined in many of these studies and, even where it is defined, it is unclear whether the data collected is compatible with the definitions used. For example, the study by Chao (2012) defines forest people as "people who traditionally live in forests and depend on them primarily and directly for their livelihoods". The report then explains that there are many different types and levels of dependence (see also Byron and Arnold, 1997), and it is unclear whether the estimates presented in the report (from numerous country studies) are compatible with the definition provided. In particular, given that the intensity of use or level of dependence is not accurately quantified in many of data sources, it seems somewhat ambitious to claim that almost one-fifth of the world's population live in forests and depend on them primarily for their livelihoods (see Box 1).

In addition to the problem of definitions, a second issue concerns the quality of the underlying data and the techniques used to calculate these estimates. The only comprehensive study of the quality of data used to estimate the number of forest-dependent people (University of Reading, 2000) concluded that there are no reliable global or regional sources of data. Some global and regional data is available on different aspects of forest dependency, but there are many data gaps and uncertainties about how statistics have been collected. The report also suggested that it would be difficult

Box 1: How many people live in or near forests?

One way to check the validity of the estimated number of forest-dependent people is to compare this with the number of people living in or near forests. To do this, the latest available information about global land cover (vegetation) was overlaid with population census data to examine how many people live in areas with different levels of forest cover and the results are as follows:

- 3.1 billion live where there is little or no vegetation (<5 percent)
- 1.9 billion live where there is some vegetation (5-10 percent)
- 600 million live where there are some shrubs and sparse woody vegetation (10-15 percent)
- 500 million live in open forests (15-25 percent)
- 750 million live in closed forest (>25 percent)

These figures suggest that the number of people living in or near forests might be around 750 million. In addition, some of the 500 million people living in open forests may depend on them for their livelihoods. Even under the most optimistic assumption (that everyone living in open forests is forest-dependent), the total number of forest-dependent people would only be 1.25 billion, which is at the bottom end of the range quoted in Chao (2012). Thus, the results suggest that the number of forest-dependent people may be much lower than currently estimated.

Sources: Global Land Cover Facility; LandScan, 2010.

■ A man in Adarawa, Niger, collects wood for cooking. It is difficult to estimate of the numbers forest-dependent people.

© FAO/G. Napolitano

to aggregate or synthesize the data that is available from the many local and national studies that have been carried out. Apart from differences in definitions, measurements and methodologies used, it would be very difficult to combine numbers of people living in forests, employed in forestry or using forest products, as these are all measurements of different types of forest benefits.

Perhaps the most serious problem with the available estimates of the number of forest-dependent people is that the figures are of little use for policymaking. For example, while an increase in income or employment in forestry would generally be viewed unambiguously as an improvement in the socioeconomic benefits derived from forests, it is unclear whether an increase in the number of forest-dependent people would represent an increase in the well-being of people or not. Indeed, their dependence on forests is often due to a lack of alternative ways to make a living and their well-being might be improved if their dependence on forests was reduced.

The conclusion of this brief analysis concurs with the statements made by Byron and Arnold (1997) that the number of forest-dependent people is not a particularly useful measure of the benefits derived from forests. Instead, disaggregated information about the different types of uses, the benefits derived from these uses and the distribution of those benefits is likely to be needed to quantify the complex relationships between people and forests in ways that can be useful for forest management and policymaking.

Summary assessment

Four main conclusions can be drawn from current attempts to measure the socioeconomic benefits from forests.

Area statistics are a very poor indicator of socioeconomic benefits: A wealth of data is collected about the areas of forest managed or used for different purposes. Although the accuracy of this data is quite high, its validity (as an indicator of socioeconomic benefits) is low because the figures do not show how many people receive these benefits or the amount of benefits that they receive.

New approaches to data collection will be required: To measure socioeconomic benefits, people rather than forests must be the focus of attention but, with the exception of employment statistics, forestry administrations appear to have relatively little information about the numbers of people receiving different types of benefits from forests. However, relevant information may be collected in countries in other surveys and collaboration on these efforts could lead to more useful results.

The importance of different benefits will vary between countries and regions:[7] The ways that forests contribute to well-being are likely to depend greatly on the level of development in a country. For example, the indicators of socioeconomic benefits developed and agreed by the member countries of ITTO are very different to those used by FOREST EUROPE. Put simply, the contribution of forests to meeting basic needs is likely to be more relevant for less developed countries, while improvements to quality of life may benefit everyone. Measuring these different types of benefit will lead to different challenges (e.g. measuring informal and subsistence activities in less developed countries or trying to quantify how forests contribute to quality of life in countries at different levels of development).

A number of different measures will be required: Based on the assessment of the number of forest-dependent people and the points made in the previous paragraph, it does not appear useful or feasible to try to consolidate or aggregate the many different socioeconomic benefits from forests into one simple measure. Instead, it is more useful to identify and focus on a few key measures that can be defined and measured accurately and are valid indicators of the different ways that forests can contribute to well-being.

A proposed definition of the socioeconomic benefits from forests

Socioeconomic benefits from forests are the basic human needs and improvements in quality of life (higher order needs) that are satisfied by the consumption of goods and services from forests and trees or are supported indirectly by income and employment in the forest sector.

As a working definition to be used for the analysis presented in the rest of this report, it is proposed that the assessment of socioeconomic benefits from forests should focus on improvements in human well-being that arise from the consumption of forest outputs.[8] Thus, the above definition captures both the basic and higher order needs that may improve peoples' lives. It also includes the benefits of income and employment in the sector that enable people to meet their needs through the consumption of marketed goods and services.[9]

It should be noted that the definition above and the following analysis does not include the indirect, non-use or existence benefits that may be provided by forests. Forests are known to provide a wide range of environmental services that may indirectly benefit many people and their existence may also provide benefits for current and future generations without them directly consuming forest outputs. These are not included here for several reasons. First, there is the practical consideration that comprehensive and reliable information about the value of such benefits is not available for many countries. Secondly, the aim is to make a clear distinction between the socioeconomic benefits from forests and the contribution that forests make to the global environment that are already measured in numerous different ways in exercises such as the FRA. Finally, by focusing on those benefits that are likely to have a more direct and measurable impact on peoples' lives, this analysis will provide new useful information for policymakers that should complement what is already known about the many other benefits provided by forests.

With respect to the needs that are most relevant to forestry, the analytical framework will follow the hierarchy of needs first postulated by Maslow (1943), which presents a general framework describing human needs. A summary of the needs that are most likely to be met in some way by the socioeconomic benefits from forests is presented in Figure 1. Such an approach is similar to other studies that have drawn linkages between human needs and environmental goods and services, such as the Millennium Ecosystem Assessment (MEA, 2005).

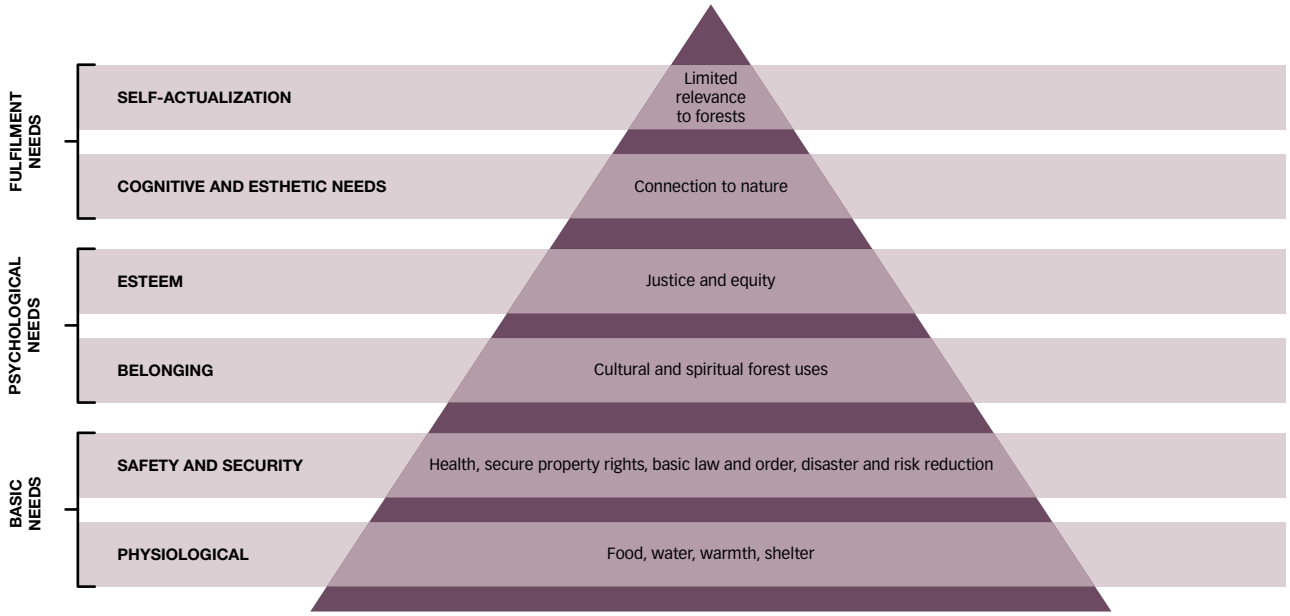
At the bottom of the pyramid are the basic physiological needs for food, water, warmth (energy) and shelter. Forests provide a number of goods and services that can be used to meet some of these needs. Above this comes safety and security. Forests may contribute to human health in a number of ways (e.g. the collection of medicinal plants and the use of woodfuel to boil and sterilize water) and may also help to reduce the risk of natural disasters (floods, landslides, etc.). Forests do not directly contribute to

[7] The regions used in this publication are: Africa; Asia and Oceania; Europe; Latin America and the Caribbean; and North America. Latin America and the Caribbean includes South America, Central America and the Caribbean. Oceania has been combined with Asia due to its relatively small size. The countries included in each region can be found in the Annex tables.

[8] Following the FRA definition of forests, agricultural tree crops (with the exception of rubber trees) are excluded from this analysis, but the definition includes a reference to benefits from trees outside forests, because it will be practically impossible to identify whether benefits have come from forests or other trees.

[9] Income and employment in first-stage processing of forest outputs (e.g. employment in sawmilling) will also be counted as socioeconomic benefits from forests, because these activities are directly linked to forests and can usually be measured or estimated quite easily.

Figure 1: Hierarchy of needs that may be satisfied by the consumption of forest goods and services



Sources: Adapted from Maslow (1943).

security, but the policy and legal framework related to the access and use of forests may contribute to providing secure property rights and basic law and order in forest areas.

Cultural and spiritual uses of forests can contribute to meeting some psychological needs; and measures that attempt to ensure fair and equal access to forests, the sharing of forest benefits or an increase in forest benefits received by the poor can support a more just and equitable society. As noted previously, a focus on the distribution of human well-being in society has been a major feature of measures to support socioeconomic development in recent years.

At the middle and higher levels of the hierarchy of needs, the connections to forests are likely to be less direct and more difficult to measure. For example, the presence of forests and wood products in a country may help to support a connection between people and nature and owning a forest or working with forests and nature may contribute to self-actualization. However, it would probably be difficult to measure these benefits in a robust and meaningful way and the availability of information about this is likely to be very limited. Thus, these potential benefits are noted here for completeness but are not investigated in the following analysis.

Measurement of the socioeconomic benefits from forests

In accordance with the definition presented above, the measures that will be used to quantify the socioeconomic benefits from forests will focus largely on the numbers of people that use forest goods and services in a variety of different ways. A summary showing how the production and consumption of wood products, non-wood forest products and forest services can contribute to different needs is shown in Table 2. Where possible and appropriate, the extent or intensity of use will also be estimated or at least described.

Because most information about the consumption of forest goods and services is collected and organized by type of output, the analysis will systematically examine how each output contributes to one or more needs. Some products will contribute to several needs and, where this occurs, the different benefits will be noted. For example, the production and consumption of woodfuel is not only the main source of energy for many people, but it also generates income and employment, and contributes to food security (as a major source of fuel used for cooking) and human health (where it is used to boil and sterilize water). The analysis will then summarize the results by the different types of needs that are met in various ways by forest goods and services and assess where gaps in information exist.

Table 2: The linkages between the production and consumption of forests goods and services and fulfilment of human needs

Main areas where forests can contribute to meeting different needs	Income from forestry	Collection, purchase or use of forest outputs			Institutional arrangements for forestry
		Wood products	Non-wood forest products	Forest services	
Physiological needs					
• Food	x	x	x	x	
• Water	x			x	
• Energy	x	x	x		
• Shelter	x	x	x		
Safety and security					
• Health	x	x	x		
• Disaster and risk reduction				x	
• Secure property rights					x
• Basic law and order					x
Belonging (social need)					
• Cultural and spiritual uses				x	
Esteem					
• Justice and equity	x	x	x		
Aesthetic needs					
• Connection to nature		x	x	x	

© FAO/J.M. Baliellas

Chapter 3

3 The multiple benefits provided by forests

Forests have direct and measurable impacts on people's lives. The production and consumption of wood products, non-wood forest products and forest services meet food, energy, shelter and health needs, as well as generating income. Although the figures for income generated in the sector and the number of people that benefit from this appear to be low, they remain significant, particularly for less developed countries. The benefits derived from the consumption of forest products and services and the numbers of people that receive these benefits are even more impressive. Further progress needs to be made however in evaluating and developing forests' socioeconomic benefits for specific groups, including women, indigenous people and the poor.

The data sources used in this assessment are summarized in Table 3 and explained in further detail in Annex 1.

Key findings

The formal forest sector employs some 13.2 million people across the world and at least another 41 million are employed in the informal sector

Informal employment in forestry is often not captured in national statistics, but the estimates presented in *SOFO 2014* show that it is significant in less developed regions. It is also estimated that some 840 million people, or 12 percent of the world's population, collect woodfuel and charcoal for their own use.

Wood energy is often the only energy source in rural areas of less developed countries and is particularly important for poor people

It accounts for 27 percent of total primary energy supply in Africa, 13 percent in Latin America and the Caribbean and 5 percent in Asia and Oceania. However it is also increasingly used in developed countries with the aim of reducing dependence on fossil fuels. For example, about 90 million people in Europe and North America now use wood energy as their main source of domestic heating.

Forest products make a significant contribution to the shelter of at least 1.3 billion people, or 18 percent of the world's population

Forest products are used in the construction of peoples' homes all over the world. The recorded number of people living in homes where forest products are the main materials used for walls, roofs or floors is about 1 billion in Asia and Oceania and 150 million in Africa. However, as this estimate is based on only partial information, the true number could be much higher.

A major contribution of forests to food security and health is the provision of woodfuel to cook and sterilize water

It is estimated that about 2.4 billion people cook with woodfuel, or about 40 percent of the population of less developed countries. In addition, 764 million of these people may also boil their water with wood. Collection of edible non-wood forest products also supports food security and provides essential nutrients for many people.

Table 3: Summary of available information on the socioeconomic benefits from forests

Type of benefit	Source(s)	Reference year(s)	Assessment of data quality		
			Accuracy	Coverage	Comments
Income benefits					
• Forest sector value added (formal production)	UN national income accounts	2011	High	High	Collected by national statistical agencies from large-scale surveys and censuses (data quality likely to be high), but informal sector often excluded.
• Income from benefit sharing	National reports	2000–2010	Low	Low	Only qualitative information available.
• Payments for environmental services (PES)	Literature search	2005–2011	Medium	Medium	Some studies report budgets rather than payments and it is unclear whether older schemes are still making payments. Very little data available for Europe.
• Income from informal wood production	Derived from value added and production	2011	Medium	Low	Figures include only estimated income from production of woodfuel and wood for housing. Other artisanal activities are not estimated and may be significant.
• Income from bushmeat (game) production	FAOSTAT	2011	Medium	Low	No data for many countries and available data appears to be scarce. Income is measured as gross production value, which may be an overestimate.
• Income from medicinal plant production	FRA	2005	Low	Low	System boundary problems (difficult to attribute income specifically to forest sector) and income measured as gross production value.
• Income from production of other NWFPs	FAOSTAT	2011	Low	Medium	Data available for many countries, but not for the full range of NWFPs. In addition, same problems as noted for medicinal plants.
Beneficiaries					
Formal sector employment	ILO and UNIDO employment statistics	2011	High	High	Data quality likely to be high, but informal sector often excluded.
Informal employment	Literature search and production data	2011	Medium	Low	Limited to employment in production of woodfuel and wood for housing. Woodfuel labour productivity estimated from the results of a few surveys.
Forest owners	SOEF and agricultural censuses	2000–2010	Medium	Low	Forest ownership statistics only available for Europe and a few other countries.
Consumption benefits					
Consumption of food from forests	FAOSTAT	2011	Medium	Low	No data for many countries and for many types of edible NWFP; available data appears to be quite scarce.
Wood energy consumption	IEA and UNSD	2010–2011	Medium	High	Data collected by national statistical agencies, but may include estimates.
Numbers of people using wood energy	National censuses, WHO, DHS, MICS	2000–2011	High	High	Collected by national statistical agencies from large-scale surveys and censuses (data quality likely to be high).
Numbers of people using forest products for shelter	National censuses, DHS, MICS	2000–2011	Medium	High	Collected from large-scale surveys and censuses, but with some imputation for missing values.
Impacts of forest products on human health	WHO, DHS, MICS and literature search	2000–2011	Low	Low	Few reliable figures for medicinal plant consumption (and health benefits), but reliable data available for a few very specific examples.

Note: This table covers the data sources used in this assessment. Further details can be found in Annex 1, which also assesses the quality and validity of the data used here and describes the procedures used to impute or estimate figures where data was lacking.

Income from forestry and forest-related activities

Income from forestry and forest-related activities includes the wages, profits and timber revenue earned in the formal sector, plus the income earned in informal activities, such as production of woodfuel and non-wood forest products (NWFPs).

Income in the formal forest sector

Gross value added (GVA) is the sum of all revenue earned in the sector, less the cost of all purchases from other sectors. This surplus is paid to the owners of the three factors of production: labour (employee salaries and wages); land (land rents and payments for standing trees); and capital (profits and dividends to shareholders etc.). It is therefore a valid measure of the income generated from activities in the sector.

Information about value added in the forest sector and the contribution of the sector to gross domestic product (GDP) is presented in Table 4. This shows that value added in roundwood production and the production of solid wood products (sawnwood and wood-based panels) each account for just over a quarter of value added in the sector, with the remaining share of just under half occurring from the production of pulp and paper. Overall, the value added in the forest sector amounts to just over US$600 billion and accounts for about 0.9 percent of the global economy.

At the regional level, activities in the formal forest sector make the largest contribution to income in Asia and Oceania. Furthermore, the GVA in the forest sector and in each of the three components of the sector is also higher here than elsewhere. In all other regions except Africa, forestry activities make a relatively small contribution to income, but the production of processed forest products increases the contribution of the sector significantly, to 0.9 percent (in Europe and Latin America and the Caribbean) and 0.7 percent in North America. In Africa the situation is reversed, with the production of roundwood accounting for most income (US$11 billion in 2011), while forest processing generates an additional US$6 billion in income, raising the total contribution of the sector to 0.9 percent.

Figure 2 shows the contribution of the forest sector to GDP in all countries in the world. The highest contribution to income (of about 15 percent) occurs in Liberia. In a few other countries, the forest sector accounts for between 5 and 10 percent of income (Latvia, Sierra Leone and the Solomon Islands). The contribution to income in other countries is less than 5 percent and close to zero in many places.

The map shows that the sector makes a very low contribution to income across much of North Africa, the Near East and Central Asia, where forest cover is generally low and many economies earn relatively high incomes from the production of oil and gas. In Europe, the relatively high contribution of the forest sector in northern and eastern Europe is clearly indicated, as is the importance of the sector for income generation in western Africa and parts of central Africa, southeast Asia and Latin America.

Table 4: Value added in the forest sector and contribution to GDP in 2011, by region and sub-sector

Region	Gross value added in the forest sector (in billion US$ at 2011 prices)				Share of forest sector GVA in total GDP (%)			
	Forest	SWP	PP	Total	Forest	SWP	PP	Total
Africa	11	3	3	**17**	0.6	0.2	0.1	**0.9**
Asia and Oceania	84	66	111	**260**	0.3	0.3	0.5	**1.1**
Europe	35	61	68	**164**	0.2	0.3	0.4	**0.9**
North America	26	29	61	**115**	0.2	0.2	0.4	**0.7**
Latin America and Caribbean	14	12	24	**49**	0.3	0.2	0.4	**0.9**
World	169	170	266	**606**	0.3	0.3	0.4	**0.9**

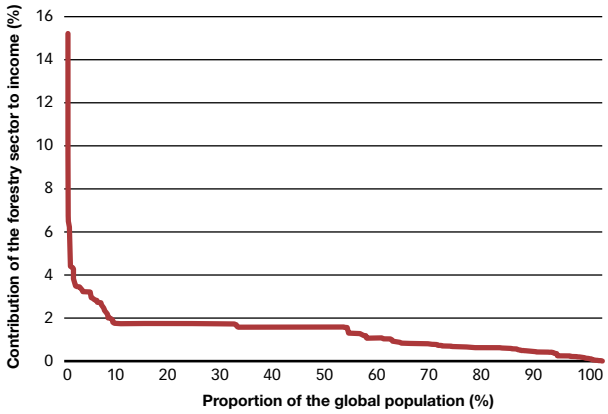
Note: Forest = forestry and logging activities; SWP = sawnwood and wood-based panel production; PP = pulp and paper production.
Sources: UN (2012a), supplemented with national income account data from country sources.

Figure 2: Contribution of the forest sector to GDP in 2011

Sources: UN (2012a), supplemented with national income account data from country sources.

To some extent, the regional averages for income generation shown in Table 4 are slightly misleading. This is because they are weighted by total size of the economies (i.e. GDP) in each region. If the information is presented in terms of the population that benefits from income generated in formal forest sector activities, then the contribution of the sector to an average person is almost twice as high. For example, Figure 3 shows the results for every country in the world ranked in terms of the importance of the sector (contribution to GDP) and the population in each country (shown as a cumulative percentage). This shows that the forest sector accounts for 1.6 percent of income or more in countries accounting for over half of the global population. Furthermore, most of the countries where the sector is relatively more important – to the left of the figure – are less developed countries (India and China are the two countries where the forest sector accounts for just under 2 percent of income and these appear as the long flat lines in the figure). Countries to the right of the figure (where the forest sector is relatively less important) are mostly developed countries, less developed countries with low forest cover, and small island states.

Figure 3: Income generated in the forest sector across the global population in 2011



Sources: UN (2012a) supplemented with national income account data from country sources.

Income from payments for environmental services (PES)

In addition to the revenue generated from the sale of marketed outputs, some forest owners may also receive income from payments for environmental services (PES). PES occur where resource owners or managers are paid for the production of environmental services such as watershed protection, carbon storage or habitat conservation. Such schemes can result in real economic costs and benefits if they bring about changes in management of the resource or increased net revenue for those making the payments. They are therefore relevant components of value added or income in the sector.

Interest in PES has increased in recent years, especially with the development of market mechanisms to trade carbon as one response to the growing concern about climate change. Income from PES is unlikely to be captured in the figures presented above but may be added to them for a more complete assessment of income. However, the amounts of income generated so far by forestry PES schemes are so small as to make very little difference to total income in the sector (see Box 2).

Income from informal wood production

For informal wood production, income from the production of woodfuel and unrecorded production of forest products used for construction was estimated for the countries in the three less developed regions. For woodfuel this was based on employment in these activities (explained in the next section), while the income earned from the production of products for construction was based on the estimated volume of production and value added per unit of output recorded in the formal sector.

Box 2: The impact of PES on forestry income

A summary of the information collected about PES is presented in the table below. Income from PES varies from year to year depending on the timing and duration of schemes, but the overall trend is upwards. For example, from 2005 to 2010, the global level of PES income was just over US$1.9 billion per year, but the figure for 2011 is US$2.5 billion. Two countries (China and United States of America) account for the majority of PES income, followed by Mexico and Costa Rica.

Region	Average annual PES income (US$ million)		Total payments since 2005 (US$ million)	No. of people paid since 2005 (thousands)	Payments per person (US$)
	2005–2010	2011			
Africa	4	24	<1	2	52
Asia and Oceania	779	1 181	5 792	217 750	27
Europe	57	138	n.a.	n.a.	n.a.
North America	933	1 027	n.a.	n.a.	n.a.
Latin America and Caribbean	91	164	399	987	404
World	1 863	2 535	6 191	218 739	28

The majority of PES schemes cover payments for a bundle of ecosystem services, although some schemes focus more on one service (usually watershed protection). Payments for forest carbon are relatively minor (accounting for only 3 percent of all payments since 2005), although payments have increased rapidly in recent years and have continued to increase since 2011 (Peters-Stanley, Gonzalez and Yin, 2013).

Many PES schemes do not report the number of people that have received payments (beneficiaries), but for those that do, the total number of people that have received income from PES since 2005 is about 220 million (almost all in China). Total payments to these people amounted to about US$6.2 billion over the period, equal to US$28 per person or US$4 per person per year on average.

The figures presented above may be an underestimate of the total income from PES. For example, there are PES schemes in Europe (see UN, in press) but, apart from carbon payments and some schemes funded by the EU, information about the level of payments is not readily available. In addition, it is difficult to distinguish between PES and more general subsidies to forestry (which are significant). However, even if these figures are a large underestimate, it seems reasonable to assume that income from PES is small compared to income from the production of forest products each year.

Sources: Ecosystem Marketplace website (www.ecosystemmarketplace.com), *State of the Forest Carbon Market* (various years), Watershed Connect website (http://www.watershedconnect.com), and other published reports on PES.

Table 5: Estimated income from the informal production of woodfuel and forest products used for house construction in 2011

Region	Income (in million US$ at 2011 prices)			
	Woodfuel	Charcoal	Construction	Total
Africa	3 705	10 585	112	**14 402**
Asia and Oceania	4 446	5 403	47	**9 896**
Latin America and Caribbean	3 909	5 067	0	**8 976**
World	12 060	21 055	159	**33 274**

Sources: Derived from a comparison between national census data (on woodfuel and building material use) and reported woodfuel and solid wood product consumption (from FAOSTAT) and income or value added per unit of output.

The total estimated income from these activities is shown in Table 5. Overall, the total amount of income generated by these activities is relatively small, at about US$33 billion, with approximately one-third of this from woodfuel production and two-thirds from charcoal production. A very small amount of income is generated from the informal production of construction materials, but this estimate is uncertain and the true figure could be much higher.

At the regional level, income from these activities is just under US$10 billion in both Latin America and the Caribbean and in Asia and Oceania. It makes a very small additional contribution to the GDP in these regions. In Africa, however, the income is much higher and the additional contribution to GDP is almost 1 percent.

With the addition of this informal income, the total contribution of the forest sector to GDP in Africa becomes 2 percent, the highest in any region. It is also worth noting that this income is almost as high as the value added in the whole of the formal forest sector in Africa, suggesting that it is higher than all of the salaries and wages paid in the formal sector. Thus, both in terms of meeting needs (shown later) and providing income, the main socioeconomic benefit provided by forests in Africa is the production of energy rather than the production of wood products.

Income from the production of non-wood forest products

To estimate income from the production of NWFPs, these products were divided into three categories: medicinal plants; animal-based NWFPs (bushmeat or game, and honey); and plant-based NWFPs. Most of the estimates of income were taken from FAOSTAT agriculture statistics, but this source does not include medicinal plants so data for these products was taken from FRA 2010. The FRA figures (based mostly on expert opinion) were collected for the year 2005, but were updated for inflation to give figures at 2011 prices. A summary of the results is given in Table 6.

Table 6: Estimated income from the informal production of NWFPs in 2011

Region	Income (in million US$ at 2011 prices)			
	Medicinal plants	Animal-based NWFPs	Plant-based NWFPs	Total
Africa	52	3 165	2 082	**5 299**
Asia and Oceania	171	3 549	63 688	**67 408**
Europe	446	2 130	5 450	**8 026**
North America	0	1 016	2 627	**3 643**
Latin America and Caribbean	29	646	2 963	**3 638**
World	697	10 506	76 810	**88 013**

Sources: Medicinal plant data from the FRA 2010 (FAO, 2010) and other figures from FAOSTAT. Note that figures for medicinal plants are for the year 2005 (updated for inflation to 2011 prices) and the other figures are for 2011.

A firewood seller arranges his stock of wood, India.

© FAO/S. Mukhopadhyay

The total income from these activities in 2011 was about US$88 billion, coming for the most part (US$77 billion) from the production of plant-based NWFPs. The production of animal products generates another US$10.5 billion in income, with bushmeat or game accounting for almost all of this. Collection of medicinal plants generates about US$700 million in income, although these figures only include income generated from the collection of raw materials for the production of medicines and not income generated further along the value chain.

Although the estimates presented above are based on the gross production value (which is an overestimate of income), the total amount of income generated from the production of NWFPs may be much higher than shown here. In particular, data is not available for the volume and value of bushmeat or game production for many countries where this is known to be important (and some of the figures that are available are likely to be underestimates). In addition, data for some of the plant products also appears to be missing (e.g. natural gums, which were reported to have a very high production value in the FRA but are almost completely absent in the FAOSTAT data).

At the regional level, most of the income generated from the production of NWFPs appears in Asia and Oceania (US$67.4 billion or 77 percent of the total). Following this, Europe and Africa have the next highest levels of income generation from these activities. Compared to the other activities in the forest sector, income from the production of NWFPs makes the greatest additional contribution to GDP in Asia and Oceania and in Africa where they account for 0.4 percent and 0.3 percent of GDP respectively.

Benefit sharing

In forestry, benefit sharing occurs where some of the income from the production of forest products is transferred to others (usually people living in or around production areas). This can include revenue sharing (e.g. where some forest charges collected by governments are transferred to others) or agreements where companies working in the sector provide payments or benefits in kind to the local communities where they are working.[10]

Benefit sharing is a redistribution of income in the sector rather than income from a separate economic activity, so it cannot be added to the other figures for income presented above. However, it can be used to assess whether income from forestry benefits specific groups.

Information about benefit sharing is available for only a few countries and where this information exists it is mostly qualitative rather than quantitative. Therefore, it was not possible to assess how much income is transferred through benefit-sharing schemes or the numbers of people that benefit from such schemes.

[10] Community forestry mechanisms are a third type of benefit sharing, where rights to access and extract forest products from a designated forest area are given to local communities by the forest owner (Morrison et al., 2009). This is not included here, but is covered in the analysis of beneficiaries.

The numbers of people benefiting from income generation

Income generated in the forest sector is distributed to forest owners, employees and shareholders and the number of people that benefit from this income as employees or forest owners is assessed here. It should be noted that the employment statistics presented here are one simple measure of the socioeconomic benefits from forests and that a more complete assessment would require more detailed data and analysis. At present, the required data (apart from gender-disaggregated statistics) is not available in most countries, so it has not been possible to explore these issues further.

Employment in the formal forest sector

Total employment in the forest sector and the share of total workforce employed in the sector are shown in Table 7. Enterprises producing solid wood products are the largest employers at the global level and in all regions except Africa, with total employment at about 5.4 million people. This is followed in importance by pulp and paper production and then production of roundwood. Total employment in the forest sector is about 13.2 million people or about 0.4 percent of the global workforce.

At the regional level, employment is highest in Asia and Oceania, which accounts for about half of the global total. Employment is also highest in this region in all three sub-sectors. However, because of the larger population of this region, the share of total workforce employed in the forest sector is relatively low, at about 0.1 percent for all three sub-sectors or 0.3 percent for the sector as a whole.

Europe has the next highest level of employment in the forest sector, with 3.2 million people working in the sector. The highest proportion of the workforce employed in the forest sector is also found in Europe, at roughly twice the global average in all three sub-sectors and in the sector as a whole.

In the Americas, forest sector employment is more modest, with about 1.1 million employees in North America and 1.3 million in Latin America and the Caribbean. The majority of this employment is in the processing sub-sectors, with the total share of the workforce employed in the forest sector at 0.6 percent in North America and 0.5 percent in Latin America and the Caribbean. In Africa, due to the relatively low level of development of the processing sector, total employment is less than one million people and the majority of employment is in the production of roundwood. The proportion of the workforce employed in the sector is also only half the global average, or 0.2 percent.

Table 7: Total employment and average proportion of the workforce employed in the forest sector in 2011, by region and sub-sector

Region	Employment in the forest sector (in millions)				Share of the total workforce employed in the sector (%)			
	Forest	SWP	PP	Total	Forest	SWP	PP	Total
Africa	0.3	0.2	0.1	**0.6**	0.1	0.1	0.0	**0.2**
Asia and Oceania	1.8	2.6	2.5	**6.9**	0.1	0.1	0.1	**0.3**
Europe	0.8	1.5	0.9	**3.2**	0.2	0.4	0.2	**0.9**
North America	0.2	0.4	0.5	**1.1**	0.1	0.2	0.3	**0.6**
Latin America and Caribbean	0.4	0.6	0.4	**1.3**	0.1	0.2	0.1	**0.5**
World	3.5	5.4	4.3	**13.2**	0.1	0.2	0.1	**0.4**

Note: Forest = forestry and logging activities; SWP = sawnwood and wood-based panel production; PP = pulp and paper production.

Sources: ILO (2013a), supplemented with employment statistics from country sources.

Figure 4: Contribution of the forest sector to employment in 2011

Sources: ILO (2013a), supplemented with employment statistics from country sources.

Figure 4 shows the proportion of the workforce employed in the forest sector in all countries in the world. The highest proportion of the workforce employed in the forest sector is in the Solomon Islands, at about 3.9 percent, with the majority of employment in industrial roundwood production. The forest sector employs more than 2 percent of the workforce in 12 other countries, mostly in northern and eastern Europe, but also including Cameroon, Gabon, Guyana and Suriname. About 1 percent of the workforce is employed in the sector in a number of other European countries as well as in Canada. Employment in the forest sector in most other countries is under 0.5 percent and in many cases much less than this.

The map shows that the countries where employment in the forest sector is relatively high are similar to those where value added in the sector accounts for a relatively high proportion of GDP (see Figure 2). However, there are two important points to note. The first is that the shading on the employment map covers a 0–5 percent range, compared to 0–15 percent on the map showing contribution to GDP. The second is that the formal forest sector employs relatively few people in western and central Africa (excluding Cameroon and Gabon), even though the contribution of the sector to GDP in many of these countries is quite high. This is due to the low level of processing and focus on the export of roundwood and simply processed products in many of these countries, which generates significant income but little employment.

Informal employment

Informal employment in the forest sector includes employment in wood production not captured in official statistics (e.g. in woodfuel and charcoal production, unrecorded production of materials used for housing, and small-scale enterprises making handicrafts and other artisanal products), plus people employed in the commercial production of NWFPs. Little data is available on employment in these activities, which are known to play an important role in less developed countries.[11]

To address this problem, employment in informal activities in less developed countries was estimated using labour productivity rates (employment per unit

[11] The analysis here is restricted to less developed countries on the assumption that most employment in the production of woodfuel, NWFPs and in small-scale enterprises is already included in official statistics in developed countries and has, therefore, already been included in the figures for formal sector employment.

of output) and production statistics.[12] Unfortunately, information about labour productivity is also scarce, so informal employment could be estimated only for the production of woodfuel and charcoal and the unrecorded production of forest products used as housing materials. The figures presented below nevertheless give at least a partial picture of the importance of informal production for employment in these countries.[13]

For woodfuel and charcoal production, a review of the literature showed that the average amount of time required to collect one cubic metre of woodfuel varies from about 106 hours in Latin America and the Caribbean and 110 hours in Africa to 139 hours in Asia and Oceania. For charcoal production, estimates of labour productivity were very similar in all three less developed regions and showed that labour productivity was about 5.25 kg of charcoal per hour. These figures were multiplied by the woodfuel and charcoal production statistics (shown in FAOSTAT) to estimate the amount of time used to produce woodfuel and charcoal.

One further calculation was made to divide total production into production for rural and urban markets (based on the woodfuel consumption data described later). This was done to distinguish between the collection of woodfuel for subsistence use (which cannot be counted as employment) and woodfuel collection for urban markets and the production of charcoal, which were assumed to be income-generating activities.

Following the procedures described above, the estimated number of people producing woodfuel and charcoal is shown in Table 8. These figures (in full-time equivalents or FTE) show that about 115 million years of labour are required to produce all of the woodfuel and charcoal that is currently used in these three regions. About 75 million years of labour are required to produce woodfuel for rural use and 40 million years of labour are required to produce charcoal and to produce woodfuel for urban use. Following the assumption that the latter are income-generating activities that can be counted as employment, about 1.2 percent of the global workforce is employed in these activities. For comparison, this is about three times the number of people employed in the formal forest sector.

At the regional level, the table shows that Africa and Asia and Oceania account for most of the time that people spend producing woodfuel and charcoal. However, because a large part of this in Asia and Oceania is the collection of woodfuel for subsistence use, the contribution of these activities to employment is relatively low there. In contrast, more time is spent on charcoal production in Africa, with the result that these activities make a significant contribution to employment in that region.

Studies of the socioeconomic benefits from wood energy often present very high estimates of the numbers of people producing woodfuel, because they do not follow the normal convention of converting collection time into FTE. This is misleading because most people collecting woodfuel spend only part of their time on this activity and often combine it with other tasks as part of their rural lives. However, estimates of the gross number of

[12] This approach is an indirect estimation methodology. It should be noted that surveys of informal employment would produce more useful information for policymakers, and ILO (2013b) provides useful guidance about how such surveys might be implemented.

[13] Another issue is the number of people employed along the value chain in these activities. The estimates of employment in woodfuel and charcoal production shown here do not include employment in the transportation, trade and marketing of these products, which is likely to be high. Thus, these figures are probably a significant underestimate of the total number of people employed along the whole value chain.

Table 8: Estimated amount of labour used to produce woodfuel and charcoal in 2011

Region	Estimated number of people required to produce woodfuel and charcoal (in million FTE)					Contribution of woodfuel and charcoal to employment (%)
	For urban use		For rural use		Total	
	Woodfuel	Charcoal	Woodfuel	Charcoal		
Africa	4.9	11.2	26.2	2.9	**45.3**	4.6
Asia and Oceania	7.1	2.6	42.6	1.7	**54.0**	0.6
Latin America and Caribbean	6.3	2.3	5.7	1.8	**16.0**	3.6
Total	**18.3**	**16.1**	**74.5**	**6.4**	**115.3**	**1.2**

Note: The calculation of the contribution of woodfuel to employment only includes the time spent producing charcoal or collecting woodfuel for urban markets, and the contribution shown at the bottom of the table is the contribution to global employment (i.e. employment in these three regions divided by the total global workforce).

Sources: Based on ILO (2013a) and FAO (2013b).

people engaged in woodfuel production are useful as an indicator of how many people are involved in these activities in total.

An estimate of the total number of people engaged in woodfuel and charcoal production (including people collecting woodfuel part-time) is presented in Table 9. This assumes that producers supplying informal markets are in full-time employment and that the collection of woodfuel for rural use is part-time. Comparing this number with the labour inputs required to produce woodfuel (in FTE), the proportion of time each part-time collector spends on woodfuel collection can also be calculated and is shown in the table.

The table shows that about 880 million people or 13 percent of the global population are engaged in woodfuel and charcoal production, with the vast majority of these people collecting woodfuel in rural areas and spending about 5 percent of their time on this activity.

At the regional level, almost 20 percent of the population of Africa and 15 percent of the population in Asia and Oceania produce woodfuel and charcoal. This may seem low, but this is because a large part of the population in these regions lives in urban areas where households are more likely to use other types of fuel. It also reflects the assumption that urban residents do not usually collect woodfuel but mostly purchase woodfuel or charcoal from others. For part-time collectors, the allocation of time in Africa is also about twice as high as in Asia and Oceania, largely because of differences in the per capita consumption of woodfuel.

In Latin America and the Caribbean, the number of people producing woodfuel and charcoal (in total and FTE) is much less than in the other two regions because of the smaller population size and the relatively low proportion of households where woodfuel is the main type of fuel used for cooking.

For employment in the informal production of forest products used as housing materials, estimates of the unrecorded production of these materials were multiplied by average labour productivity in each country (from the statistics on employment in the formal sector) to give estimates of employment.

These calculations showed that employment in these informal activities is relatively small (in FTE), amounting to about 146 000 people in Africa, 112 000 people in Asia and Oceania and only 1 000 people in Latin America and the Caribbean. However, if much of this employment is part-time, then the gross number of people involved in these activities could be several times higher than this.

The above figures are quite speculative and based on assumptions about local demand for forest products and how much of this might be already be captured in official statistics. There are, however, a few countries where informal markets are clearly significant. For example, official statistics for wood consumption in the Democratic Republic of the Congo suggest that the 67 million people living there use only 100 000 m^3 of sawnwood and wood-based panels each year. The calculation of what it would require to maintain the housing stock suggests that the consumption of forest products for this use alone could be over one million cubic metres or much higher than the reported consumption figures. Some other large countries such as India are in a similar position. Although these figures are uncertain, they do show that informal activities may generate significant amounts of employment (and

Table 9: Estimated number of people engaged in woodfuel and charcoal production in 2011

Region	Gross number of people producing woodfuel and charcoal (in millions)				Proportion of population producing woodfuel and charcoal (%)
	Total number	Full-time number	Part-time		
			Number	Allocation of time (%)	
Africa	195	19	176	8	19
Asia and Oceania	642	11	631	4	15
Latin America and Caribbean	45	10	35	9	8
Total	**882**	**41**	**841**	**5**	**13**

Note: The contribution of woodfuel to employment is the share of the workforce engaged in the production of charcoal or woodfuel for urban markets and excludes the number of people collecting woodfuel for rural use.

Sources: Based on ILO (2013a) and FAO (2013b).

income) and that it could be worthwhile to improve this information to get a better estimate of total forest-related employment and income in countries.

Forest owners

Forest owners are the other major group of people that may benefit from income generated in the forest sector. Forest ownership statistics were taken from the State of Europe's Forests report (FOREST EUROPE, 2011) and the results of agricultural censuses implemented during the last decade. These figures were then converted from numbers of holdings to numbers of people that own forests and the results are presented in Table 10.

The number of people that benefit from family or household ownership of forests is about 30 million, although this figure should be considered a minimum estimate because information is simply not available for many countries. It should be noted that this figure is more than twice the number of people that are employed in the sector.

The largest number of forest owners (8.2 million) is found in Africa, which is interesting because FRA statistics concerning areas of privately-owned forest show that private ownership is relatively uncommon in Africa. This could be because the results (from agricultural censuses) refer to very small forest areas that would not be counted in the FRA.

Europe has the second largest number of private forest owners (7.2 million), but this figure is based on information from only about half of the countries in this region and is likely to be an underestimate. For example, the Confederation of European Forest Owners claims that there are 16 million forest owners in Europe (CEPF, 2013), although the basis of this estimate is not clear.

In terms of the share of the population that benefits from forest ownership, about 0.4 percent of the global population own forests. However, at the regional level, about 1 percent of the population benefit from forest ownership in four of the regions. The exception is Asia and Oceania, where a much smaller proportion of the total population are forest owners. However, the figure for this region is probably a vast underestimate due to a lack of data for China and India.

The figures presented above are not only minimal estimates of the number of private forest owners but they also omit the numbers of people that may benefit from communal ownership of forests or rights of access to forests. The results of the FRA show that communally-owned forest areas and areas where people have access rights are much greater than the areas of forest owned by private individuals. However, it is not feasible at present to estimate the numbers of people that might benefit from these arrangements. Given that the numbers of people receiving benefits from ownership is likely to be many times higher than employment in the sector, collection of more accurate statistics about forest ownership could be a major priority for any future assessment of the socioeconomic benefits from forests.

Consumption benefits

Consumption of food from forests

The statistics collected about the consumption of edible NWFPs were converted to estimates of food supply from forests, following the methodologies used by FAO to calculate food balance sheets. First, consumption of products (in tonnes) was converted to consumption in kg per capita per year in each country; then these figures were converted to kcal/person/day for comparison with total food consumption.

Table 10: Estimated number of people that benefit from private forest ownership

Region	Number of people (in millions)	Share of total population (%)
Africa	8.2	0.8
Asia and Oceania	4.7	0.1
Europe	7.2	1.0
North America	3.3	1.0
Latin America and Caribbean	5.7	0.9
World	29.0	0.4

Note: These figures assume that the number of forest holdings is approximately equal to the number of households that own forests and this is converted to number of people using an average household size in each country (see Annex 1 for further details).

Sources: FOREST EUROPE (2011) and the results of various agricultural censuses from the last decade.

Table 11: Consumption of food from forests in 2011, by region and source

Region	Total consumption (in thousand tonnes)			Per capita consumption (in kg)		
	Animal-based NWFPs	Plant-based NWFPs	Total	Animal-based NWFPs	Plant-based NWFPs	Total
Africa	1 292	3 001	**4 293**	1.2	2.9	**4.1**
Asia and Oceania	1 158	60 937	**62 095**	0.3	14.4	**14.6**
Europe	505	2 374	**2 879**	0.7	3.2	**3.9**
North America	351	888	**1 239**	1.0	2.6	**3.6**
Latin America and Caribbean	271	5 360	**5 631**	0.5	9.0	**9.4**
World	3 578	72 560	**76 138**	0.5	10.4	**10.9**

Source: FAO (2013b).

Table 11 shows the amount of food from forests consumed in 2011, as recorded in FAOSTAT. Plant-based NWFPs account for the majority of consumption, with coconuts (and coconut products such as coconut oil) accounting for much of this. At the regional level, 62 million tonnes of NWFPs are consumed in Asia and Oceania, accounting for about 80 percent of the global total. The other two less developed regions also consume significant amounts of NWFPs and Africa, in particular, has a relatively high consumption of animal products (i.e. bushmeat).

In terms of per capita consumption, about 10.9 kg of edible NWFPs were consumed on average in 2011 at the global level. The highest level of consumption is in Asia and Oceania, at 14.6 kg per capita, followed by Latin America and the Caribbean, and Africa. Consumption in the two developed regions was under 4 kg per capita. At the global level, consumption of animal products was low compared to consumption of plant-based NWFPs, but this consumption was relatively important in Africa and North America, as well as Europe (to a lesser extent).

Table 12 shows the consumption of edible NWFPs converted into kilocalories (kcal) and compared to the average calorific intake per capita in each region and at the global level. Overall, the contribution of food from forests to food supply is relatively low, amounting to only about 0.6 percent of all food consumption at the global level. As noted previously, the figures presented above are likely to be a major underestimate of the total consumption of food from forests because information about production (and consumption) of these products is far from complete. However, even if the true amount of consumption is several times higher than shown here, the contribution of forests to food security is still relatively modest when measured in this way.

Table 12: Contribution of edible NWFPs to food supply, by region and source

Region	Food supply from edible NWFPs (in kcal/person/day)			Contribution to total food supply (shown in FAO food balance sheets) (%)		
	Animal-based NWFPs	Plant-based NWFPs	Total	Animal-based NWFPs	Plant-based NWFPs	Total
Africa	4.7	2.4	**7.0**	2.3	0.1	**0.3**
Asia and Oceania	1.8	18.8	**20.6**	0.4	0.8	**0.8**
Europe	4.7	4.9	**9.6**	0.5	0.2	**0.3**
North America	4.6	6.2	**10.9**	0.5	0.2	**0.3**
Latin America and Caribbean	3.3	12.4	**15.7**	0.5	0.5	**0.5**
World	2.8	13.7	**16.5**	0.6	0.6	**0.6**

Note: The food supply from edible NWFPs (in 2011) is compared with the most recent food balance sheets (from 2009).

Source: FAO (2013b).

There are four dimensions to food security (availability, accessibility, utilization and stability) and the information presented above is a measure of the availability of food from forests, which appears to be relatively low. The income generated from forest-related activities provides economic accessibility to food (by enabling people to purchase food) and it seems likely that this is a relatively more important benefit of forests for food security than the direct collection of food from forest resources. Furthermore, as will be shown later, the use of woodfuel for cooking is an even more important benefit to food security in the utilization dimension.

With respect to stability, there is anecdotal evidence that the collection of food from forests can be very important in situations where other sources of food have failed. This particular benefit of forests for food security is likely to be very location-specific however, and it would be difficult to try to measure it at a broader level as has been done here for the other socioeconomic benefits from forests. However, it would probably be worthwhile to investigate more fully the socioeconomic benefits from forests in terms of their contributions to food security. Another possible line of enquiry would be to examine in more depth the other ways that food from forests contributes to nutrition (e.g. through the provision of micronutrients and more varied and healthy diets).

One final point worth noting is that the figures presented above mask the variability between countries and, even more so, that within countries. Examination of consumption statistics for individual countries showed that there are many countries where food from forests accounts for a much higher share of food supply than appears from the table above. In particular, the consumption of bushmeat in Africa is under-reported in these statistics, but still accounts for over 10 percent of the supply of kilocalories from animals in several countries and probably an even higher proportion in rural areas of those countries. Improving information on bushmeat consumption in Africa should be a priority for assessing how this contributes to food security as well as for improving the management of this important resource.

■ Mushrooms and berries for sale at the Dorogomilovsky Food Market, Moscow, Russia.

© FAO/V. Maksimov

Wood energy consumption

One of the major socioeconomic benefits provided by forests is the use of wood as a source of energy. Wood energy is often the only energy source in rural areas in less developed countries and is particularly important for poor people that cannot afford alternatives. However, it is also playing a growing role in developed countries that are trying to reduce their dependence on fossil fuels.

Total primary energy supply (TPES) is the measure of total energy use in a country and is usually measured in energy statistics in million tonnes of oil equivalent (MTOE). Consumption of wood energy and its contribution to the TPES in 2011 is shown in Table 13. Globally, woodfuel from forests provides 496 MTOE of energy and the forest processing sector produces an additional 277 MTOE of energy, to give a total of 772 MTOE. This accounts for about 6 percent of TPES, with roughly two-thirds coming from woodfuel and one-third from the forest processing industry.

At the regional level, there are some significant differences, with wood energy accounting for the smallest shares of TPES in Europe and North America (5 percent and 2 percent respectively) and with the majority of energy coming from the forest industry in those regions. In Asia and Oceania, wood energy also only accounts for about 5 percent of TPES, but with about two-thirds of the total coming from the use of woodfuel (particularly in China, India and Indonesia).

Wood energy makes the greatest contribution to TPES in Latin America and the Caribbean and in Africa (13 percent and 27 percent respectively). In both of these regions, woodfuel from forests accounts for the majority of all wood energy used, the highest contribution being in Africa where about one-quarter of all energy used in this region comes from forests and trees.

Figure 5 shows the variation in importance of wood energy between countries and its particular significance in a number of African countries. For example, wood energy accounts for 90 percent or more of all energy used in 13 African countries, as well as in Bhutan and Lao People's Democratic Republic. In addition to much of western and central Africa, wood energy also accounts for a high proportion of TPES in a number of countries in Central America, Southeast Asia and the Pacific.

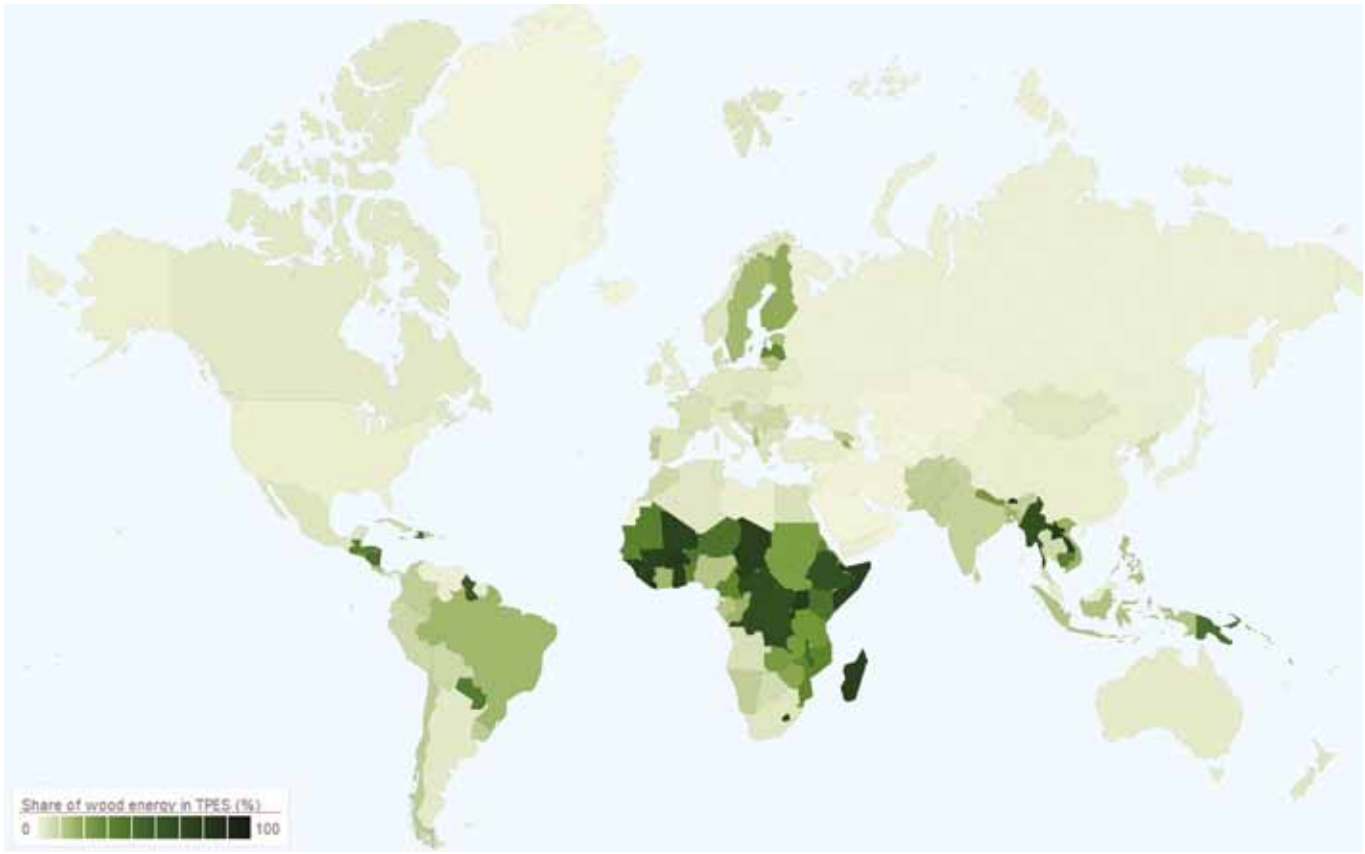
Similar to the analysis of income in the formal forest sector (value added), the averages presented above can be misleading, as they reflect the total amount of energy used in different countries rather than the importance of wood energy to the average individual. If the contribution of wood energy to TPES is examined across the global population (see Figure 6), then it appears that wood energy accounts for 30 percent or more of all energy used by 10 percent of the global population and accounts for 10–30 percent of energy use for another 40 percent of the global population (including India, where wood energy accounts for about 13 percent of TPES). Thus, there is a significant number of people for whom wood energy probably represents by far the most important source of energy used in their daily lives.

Table 13: Consumption of wood energy in 2011, by region and source

Region	Consumption of wood energy (in MTOE)			Contribution of wood energy to total primary energy supply (%)		
	From forests	From industry	Total	From forests	From industry	Total
Africa	166	16	**181**	25	2	**27**
Asia and Oceania	202	91	**293**	3	2	**5**
Europe	41	87	**128**	2	3	**5**
North America	11	50	**61**	0	2	**2**
Latin America and Caribbean	76	33	**109**	9	4	**13**
World	496	277	**772**	4	2	**6**

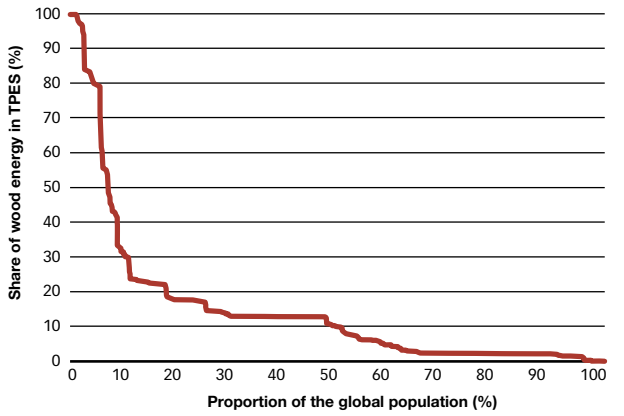
Sources: Derived from FAO (2013b), IEA (2013) and UN (2010).

Figure 5: Contribution of wood energy to TPES in 2011



Sources: Derived from FAO (2013b), IEA (2013) and UN (2010).

Figure 6: Contribution of wood energy to TPES across the global population in 2011



Sources: Derived from FAO (2013b), IEA (2013) and UN (2010).

Numbers of people using wood energy

As an alternative measure of the socioeconomic benefits from wood energy use, information was collected about the number of people using woodfuel as their main source of energy for cooking. This is both an indicator of the contribution of forests to meeting energy needs and an indicator of the way that woodfuel contributes to the utilization dimension of food security, by supplying the energy required to prepare safe and nutritious food (which has not, to date, been systematically assessed at the global level). In addition to this, information was also collected about the use of woodfuel for heating in Europe and North America. This was done partly because almost none of these countries relies on woodfuel for cooking, but also to show how woodfuel can contribute to the domestic need for energy in developed countries.

Information on the proportion of households where wood is the main type of fuel used for cooking is presented in Table 14. This shows that about one-third of the world's households rely on woodfuel for cooking which, on the basis of average household size in each country, amounts to about 2.4 billion people.

Table 14: Proportion of households cooking with woodfuel in 2011, by region and fuel type

Region	Share of households where wood is the main fuel used for cooking (%)			Estimated population using woodfuel for cooking ('000)		
	Fuelwood	Charcoal	Woodfuel	Fuelwood	Charcoal	Woodfuel
Africa	53	10	63	555 098	104 535	659 632
Asia and Oceania	37	1	38	1 571 223	59 034	1 630 257
Europe	3	0	3	19 001	156	19 157
North America	0	0	0	0	0	0
Latin America and Caribbean	15	1	16	89 569	5 383	94 952
World	32	2	34	2 234 890	169 108	2 403 998

Sources: National census data and the results of WHO, MICS and DHS surveys.

At the regional level, the highest proportion of households using woodfuel for cooking is in Africa, followed by Asia and Oceania, then Latin America and the Caribbean. For these three less developed regions combined (and excluding Australia, Japan and New Zealand), the proportion of households using woodfuel for cooking is 42 percent. There is also a relatively small number of countries in Europe where some households use woodfuel as their main source of fuel for cooking.

In households where woodfuel is used for cooking, charcoal is used in about 10 percent of households and fuelwood in the other 90 percent at the global level, although there are major differences between regions. The majority of charcoal is used in Africa, where about 10 percent of the population uses it to cook. In the other regions, charcoal is much less important, used only in one percent of households or less.

The relatively high level of charcoal use in Africa has been noted many times before over the last decade and is largely due to urbanization on the continent. Urbanization results in changes in domestic energy consumption, because people in urban areas generally have higher incomes and access to alternative fuels that are too expensive or simply not available in rural areas. In most regions, people moving to urban areas switch to gas or kerosene to meet their cooking fuel needs. However, in Africa, these other fuels are often still too expensive or difficult to obtain, so the urban population uses charcoal instead of fuelwood. Given the relatively low incomes in Africa (even in urban areas) and the continued growth in urban areas expected in the future, it is likely that the number and possibly the proportion of households using charcoal for cooking will continue to grow.

Figure 7 presents a more detailed picture of the importance of woodfuel for cooking in different parts of the world. It shows that the importance of woodfuel for cooking is generally much higher than its contribution to total energy use (see Figure 5). It also shows that there are considerable differences in the use of woodfuel for cooking within each continent. For example, in Latin America and the Caribbean, woodfuel use is concentrated in Central America, Haiti and a few countries in South America. Almost all of the countries where the use of woodfuel for cooking is very high (over 80 percent of households) are in Africa, but the proportion of households using woodfuel for cooking is generally lower in southern and northern Africa. Similarly, the countries in Europe where cooking with woodfuel is still quite common appear clearly on this map.

The information collected about the use of woodfuel for heating covered all of North America and 23 countries in Europe (accounting for 80 percent of the population in Europe). This information came from recent large-scale surveys and studies, and is therefore likely to be quite accurate.

The statistics, although possibly an underestimate, showed that woodfuel is the main source of heating for at least 80.6 million people in Europe, or 11 percent of the region's population. In North America, the domestic use of wood energy is less common, with about 7.9 million people or 2 percent of the population using woodfuel for heating. Although these figures are much lower than those for less developed countries using woodfuel for cooking, they do show that woodfuel is also making a contribution to the energy needs of a significant number of people in developed regions.

Figure 7: Proportion of households using woodfuel for cooking in 2011

Sources: National census data and the results of WHO, MICS and DHS surveys.

The use of forest products for housing

Where forest products are used in house construction, they make a contribution to the basic need for shelter. This is particularly important in the rural areas of less developed countries, especially where these materials are more affordable than other building materials or if they are sourced from informal producers or collected by the households for their own use. Information was therefore collected from national censuses and other large-scale household surveys about the main type of material used for different parts of houses.[14]

The information about the use of forest products in housing is presented in Table 15, which shows that forest products are most commonly used in walls (15 percent of households), followed by roofs (7 percent) and floors (4 percent). Overall, forest products are used in housing in some way in 18 percent of households and contribute to the provision of shelter for about 1.3 billion people.

[14] It should be noted that forest products are used in house construction in many more countries than are shown here. However, to show where there is a strong link between forests and the provision of shelter, this analysis only focuses on properties where forest products are the main type of material used in construction.

Table 15: Proportion of households where forest products are the main material used in houses in 2011, by region and type of use

Region	Share of households using forest products for housing (%)				Estimated population where forest products are the main material used in houses ('000)			
	Walls	Floor	Roof	Any	Walls	Floor	Roof	Any
Africa	9	2	12	14	93 960	20 197	124 613	148 225
Asia and Oceania	20	5	7	23	830 960	194 007	313 589	996 590
Europe	4	4	n.a.	8	32 721	28 739	n.a.	61 461
North America	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Latin America and Caribbean	11	4	7	12	68 451	25 323	43 624	73 374
World	15	4	7	18	1 026 092	268 266	481 827	1 279 649

Sources: National census data and the results of WHO, MICS and DHS surveys.

At the regional level, the highest proportion of households using forest products for housing is in Asia and Oceania, followed by Africa, and Latin America and the Caribbean. For these three less developed regions combined, the proportion of households using forest products for housing is 21 percent. There is also a relatively small number of people in Europe living in houses made from forest products, mostly in eastern and central Europe.

The majority of people using forest products for housing are in Asia and Oceania (almost one billion). This figure is only a partial estimate, but may be close to the true total given that most of the countries where data is not available are in the Near East (where forest cover is low, incomes are relatively high, and the use of forest products for housing may therefore be low). For Africa, and Latin America and the Caribbean, the use of forest products for housing may be much greater than shown here, because information was not available for a number of countries with high forest cover.

Figure 8 presents a more detailed picture of the use of forest products in houses in different parts of the world. The figure shows the proportion of households in each country where forest products are used for any one of the different parts of the building (walls, floors or roofs). This figure highlights the huge variation between countries in their use of forest products in house construction, although this is partly due to differences in the availability of information. It also highlights the difficulty of interpreting these figures as an indicator of socioeconomic benefits. For example, in Armenia, Azerbaijan and Turkmenistan, over 80 percent of houses have wooden floors, which explains their high use of forest products. When compared with the result that about 66 percent of households have roofs made from forest products in the Democratic Republic of the Congo, the socioeconomic implications are very different.

Although these figures are only partial and are very variable, the quality of available data is high and the results show that forest products do make a significant contribution to the provision of shelter in many parts of the world.

Figure 8: Proportion of households where forest products are the main material used in house construction in 2011

Note: Countries without any shading are where no information is available.

Sources: National census data and the results of WHO, MICS and DHS surveys.

The contribution of forest product consumption to human health

There are numerous ways in which the use of forests and consumption of forest outputs may lead to health benefits. The most obvious benefits are the use of medicinal plants as a source of traditional medicine and the use of woodfuel to boil and sterilize water. Having a high quality living environment and access to forests for recreational use may also have beneficial effects on health, both physical and mental. This is increasingly recognized as important in developed countries, but the benefits are difficult to measure and likely to be location-specific. Therefore, this analysis has focused on trying to estimate the health benefits from the consumption of forest products.

Three different indicators of the contribution of forest products to human health were examined:

- the number of people believed to rely on traditional medicine as their main source of primary health care;
- the number of people using woodfuel to boil and sterilize water; and
- the number of people using a home remedy or herbal medicine to treat children's diarrhea.

Traditional medicine. Many estimates of the number of people using traditional medicine have been produced over the past three decades. For example, in the 1980s, two prominent studies suggested that about 80 percent of the world's population relied solely or largely on traditional remedies for primary health care (Bannerman, 1982; Farnsworth, Akerele and Bingel, 1985). A similar figure was suggested in the mid-1990s by Lambert, Srivastava and Vietmeyer (1997), who estimated that herbal medicines were used by over 4 billion people in developing countries. Most recently, WHO's Traditional Medicine Strategy (WHO, 2002) has provided more detailed estimates of the use of traditional medicine that are similarly high, stating that up to 80 percent of people in Africa use traditional medicine, along with 65 percent of people in India and 40 percent in China. Together, users in these three areas alone would amount to 2.8 billion people in 2011.

Estimates of the number of people using traditional medicine, such as those quoted above, tend to be imprecise and are often based mainly on information relating to lack of access to other types of healthcare. However, they appear plausible and suggest that traditional medicine is the only feasible source of healthcare for a vast number of people living in less developed countries, especially in rural areas.

Many of these studies also highlight the huge complexity of this subject. For example, traditional medicine covers a broad spectrum of different approaches to treatment that include the use of herbal medicines, manual and spiritual therapies, exercises and other treatments such as acupuncture. Thus, traditional medicine is not synonymous with the use of medicinal plants, although WHO does note that herbal remedies are the most widely used form of traditional medicine. It has also been noted that medicinal plants are used as ingredients in up to a quarter of all prescription drugs (Rates, 2001), so the number of people using medicinal plants (at least for part of their treatment) is much larger than just those using traditional medicine.

Given the complexity of this subject, it seems unlikely that it will be possible to reliably estimate the socioeconomic benefits from forests in terms of their contribution to human health without focusing on some specific products that clearly come from forests or trees, can be measured (in terms of the number of people using them) and are known or strongly believed to have positive therapeutic effects. Some small-scale studies have done this at the local level (often to assess the effectiveness of commonly used traditional medicines), but such studies do not appear to have been implemented at a larger scale.[15] Therefore, the remainder of this section presents the results of two simple analyses that can be used to show how the number of people benefiting from the use of forest products (to improve their health) might be estimated.

[15] Some studies have come close to what is proposed here. For example, the bark of the *Prunus Africana* tree is clearly a forest product and is known to have therapeutic properties, but studies have focused on the market value of production rather than the number of people benefiting from its use (the same is true for a number of other well known medicinal plants coming from forests).

Woman boiling water, Ghana. She is using an improved energy cookstove introduced by the Department of Women in Agricultural Development, Ghana.

© FAO/P. Cenini

The use of woodfuel to boil and sterilize water. Boiling water is one of the most common ways that people in less developed countries sterilize their water. Clean and safe drinking water has obvious benefits for human health in terms of reducing the incidence of water-borne diseases and, if woodfuel is used to boil water, these benefits can be linked to its use.

Information about drinking water treatment is collected in DHS and MICS surveys and estimates of the number of people treating and boiling water were collected from the most recent surveys (carried out during 2006–2011). In total, the available information covered 76 countries and accounted for 78 percent of the total population in the three less developed regions. The results were used to produce estimates of the number of people treating and boiling water in all of the countries in these regions.

The information about water boiling and treatment was combined with the data about the numbers of households using woodfuel for cooking to produce estimates of the number of households using woodfuel to boil water in every country. A minimum estimate was produced by multiplying the proportion of households boiling water by the proportion of households using woodfuel and a maximum estimate was calculated by taking the lower of these two proportions. An average of the two estimates was also calculated and used in the analysis presented here, the results of which are presented in Table 16.

Table 16: Number of people using woodfuel to boil and sterilize water

Region	Number of people treating water ('000)			Share of the total population boiling their water with woodfuel (%)
	Total	Boiling	Using woodfuel	
Africa	187 324	93 296	81 891	8
Asia and Oceania	1 620 449	1 197 994	644 516	15
Latin America and Caribbean	202 776	84 124	38 576	6
Total	**2 010 549**	**1 375 415**	**764 983**	**11**

Note: These figures have been compiled from the results of surveys over the period 2006-11.

Source: derived from DHS and MICS surveys.

The table shows that about 2 billion people in these regions treat their drinking water in some way, with about 70 percent (1.4 billion people) doing so by boiling it. Based on the information about the use of woodfuel for cooking, it is estimated that about 764 million of these people might be boiling their water with wood, which is about 11 percent of the global population.

The analysis above presents one example of how the health benefits from the use of forest products might be quantified. It does not go as far as quantifying these benefits in terms of reduced mortality or changes in life expectancy, but this can also be done if adequate knowledge and information is available. An example of one such study is given in Box 3, which highlights one of the negative effects of the use of woodfuel, i.e. the impact of indoor air pollution on health. WHO estimates this to be one of the 10 most important threats to public health and fourth most important risk factor for health in developing countries after malnutrition, HIV/AIDS and the lack of safe water and adequate sanitation (WHO, 2007). Although this is a socioeconomic cost from the use of woodfuel, the study shows how reliable and well presented quantitative information can be used to convey powerful messages.

Box 3: Estimated impacts on human health of cooking with woodfuel in 2011

Estimates of the impacts of indoor air pollution (IAP) were produced by WHO in 2007 for the year 2002, and updated estimates for the year 2004 are available on the WHO website (www.who.int). These show the estimated number of annual deaths due to IAP from acute lower respiratory infections (ALRI) and chronic obstructive pulmonary disease (COPD). They also show an estimated number of years of life lost to early death or disability due to IAP (disease adjusted life years or DALY). ALRI is an illness most common in children under five years old, while COPD is most common in adults over 30 years old. Although WHO does not present gender-disaggregated statistics, it is believed that women suffer the majority of these adult deaths due to IAP, because they come into most contact with smoke from burning solid fuels in households.

The table below presents some revised estimates for the year 2011, using more recent data on mortality from WHO and revised estimates of death and DALY (due to IAP) based on changes in the numbers of households using woodfuel for cooking. The figures also exclude WHO's estimates of lung cancer from burning coal indoors, to arrive at figures for woodfuel alone.

Region	Number of deaths due to IAP ('000)		DALY lost due to IAP ('000)	Mortality due to IAP (%)		IAP disease burden (%)
	ALRI	COPD		Children	Adults	
Africa	479	532	17 341	14	6	3.5
Asia and Oceania	314	1 177	19 163	10	4	2.1
Europe	0	2	31	<1	<1	<1.0
North America	0	0	0	0	0	0.0
Latin America and Caribbean	12	28	691	5	1	0.6
World	805	1 739	37 226	12	3	2.2

Globally, it is estimated that about 2.5 million people die each year due to the effects of long-term smoke inhalation as a result of using woodfuel for cooking and, in a few cases, heating. Almost all of these deaths occur in Africa and Asia and Oceania. These figures account for about 12 percent of the deaths of children (under 5 years old) and 3 percent of adult deaths in a year.

The years of life lost due to smoke inhalation (DALY) is a measure of the long-term impact of IAP on human health. In total, about 37 million years of life are lost due to IAP, with slightly more than half of these losses occurring in Asia and Oceania, and most of the remainder occurring in Africa. As a proportion of the years of life lost due to all causes (disease burden), IAP accounts for about 2.2 percent of the global disease burden, with a figure of 3.5 percent for Africa and 2.1 percent for Asia and Oceania. Outside these two regions, the impacts of IAP on human health are much less significant, due to the lower use of woodfuel and different technologies used for cooking.

Source: derived from WHO (2007).

The use of herbal medicines to treat children's diarrhea. DHS surveys ask a number of questions about health. One of these concerns the treatment of children's diarrhea, with the use of a home remedy or herbal medicine as one possible answer. In total, 45 of these surveys have been carried out over the past decade in countries in the three less developed regions and the results were used to estimate the total number of people using this type of treatment in each region.

The results of the analysis showed that 22 percent of households surveyed in Africa had used a home remedy or herbal medicine on the last occasion that one of their children had been suffering from diarrhea. For Asia and Oceania the figure was 15 percent and in Latin America and the Caribbean it was 28 percent. These figures may be imprecise due to the relatively small number of countries surveyed in each region, but they suggest that possibly about one billion people are using home remedies or herbal medicines for the treatment of children's diarrhea. The effectiveness of this treatment is not known, nor is it known whether forest products were used for treatment, but this example shows how it might be possible to collect better information in the future about the health benefits from the use of forest products.

The importance of forest benefits for specific groups

As part of this assessment, the distribution of the socioeconomic benefits from forests was analysed (wherever information was available) for specific groups such as women and indigenous people or people at different income levels.

The distribution of forest benefits across income groups

None of the data collected for this analysis can be used to show how the socioeconomic benefits from forests are distributed across different income groups within a country. However, the data can be used to examine whether some of these benefits are relatively higher in poorer countries or whether they are higher in rural areas than in urban areas (with the assumption that rural areas are generally poorer).

Starting with income and employment in the formal forest sector, Figure 9 shows the relationship between average income and the contribution of the sector to income in all of the countries in the three less developed regions. This shows that almost all of the countries where the sector contributes more than 2 percent to income are countries with an average annual income of less than US$2 000 per person. Conversely, in almost all countries with incomes of more than US$2 000 per person, the sector accounts for less than 2 percent of income.

This correlation suggests that activities in the formal forest sector may be relatively more important for income generation in poorer countries, although the evidence for this is weak. Indeed, a more detailed investigation of the data showed that poorer countries struggle to generate high levels of income and employment in the forest sector due the limited development of forest processing facilities. For example, richer countries tend to have higher levels of employment than poorer ones because of the high numbers of people employed in processing facilities.

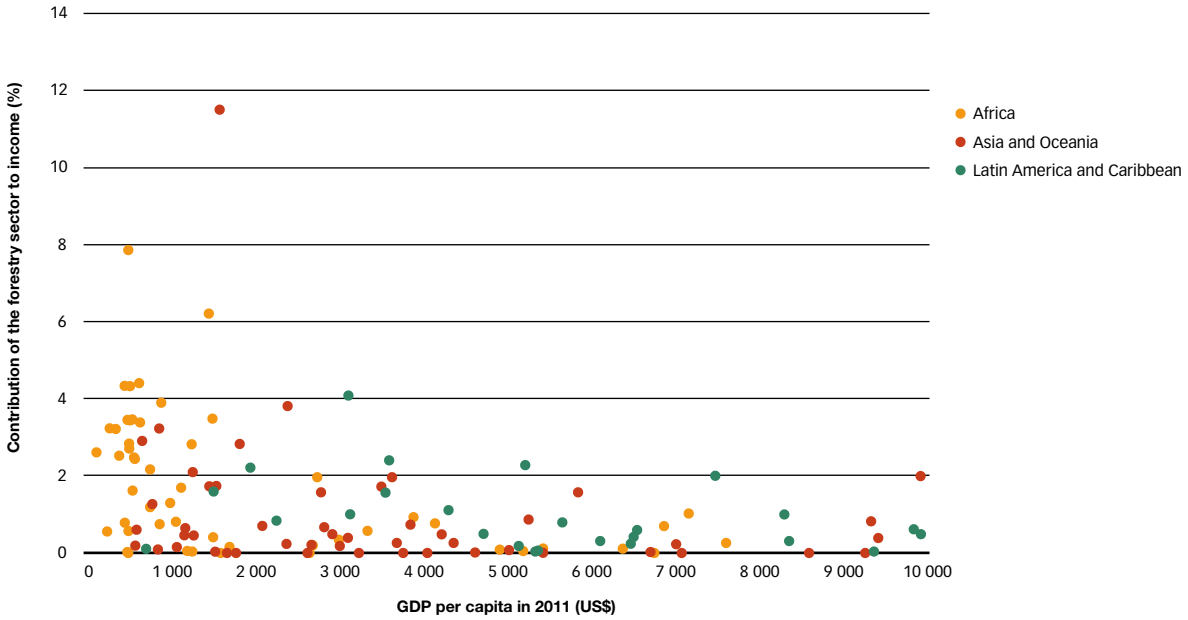
There may be other ways that activities in the formal forest sector benefit the poor, such as through benefit-sharing mechanisms or the development of community-based forest enterprises. However, information about the impacts of these arrangements on poor people is only available for a few countries, so it is not possible to assess whether the sector is generally performing well in this respect.

For informal activities in the sector, quantitative information is generally not available about the impacts of income and employment on poor people. However, given that most of these activities take place in rural areas it can be safely assumed that, for most countries, income and employment in the informal sector probably has a larger positive impact on poverty alleviation than activities in the formal sector.

It is also important to make a clear distinction between informal employment and the time spent by people collecting forest products for subsistence use. Both of these activities generate socioeconomic benefits but, while the former generates income, the time spent collecting products for subsistence use is a cost of production (an opportunity cost) in terms of time that could be used for other productive activities.[16] Poor people that rely on forest resources for subsistence could benefit significantly if the time they spent on these activities could be reduced by, for example, increasing access to resources and better techniques and technology. Improving labour productivity in subsistence production is often overlooked in development projects because of the apparent absence of a clear financial or economic return to such improvements.

[16] This not only includes activities that might generate income, but also activities that could have longer term benefits. For example, the time that women time spend on collecting woodfuel is time that could be used to care for children, improve their education or improve the health of the whole family.

Figure 9: Relationship between the contribution of the forest sector to GDP and per capita GDP in 2011



Source: UN (2012a).

However, given the vast numbers of people involved in such activities (e.g. woodfuel collection), improvements in these areas could result in significant increases in the socioeconomic benefits from forests.

With respect to the socioeconomic benefits derived from the consumption of forest products, there are numerous studies showing that the rural poor benefit greatly from this. The studies show these benefits at the level of individual villages or small regions or for specific groups of people in different parts of the world, but cannot however be used to assess these benefits at a larger scale. However, the data collected for this analysis can be used to show how some of these consumption benefits are relatively more important for people living in rural areas.

For example, Table 17 shows the proportion of households using woodfuel for cooking in urban and rural areas in the three less developed regions. The proportion is several times higher in rural areas than it is in urban areas, highlighting the particular importance of this socioeconomic benefit for rural people. For charcoal the situation is slightly different because, as noted earlier, urban populations can afford and access better types of fuel. Thus, the use of charcoal is more common in urban areas than in rural areas. Charcoal is however still used for cooking by a proportion of the urban population (especially in Africa), whose incomes are likely to be below average for urban areas.

Table 17: Proportion of urban and rural households cooking with woodfuel in 2011

Region	Share of households using wood for cooking (%)				Estimated population using woodfuel for cooking ('000)			
	Urban		Rural		Urban		Rural	
	FW	CH	FW	CH	FW	CH	FW	CH
Africa	24	19	73	4	99 881	79 573	455 216	24 961
Asia and Oceania	11	2	56	1	206 079	27 641	1 365 144	31 393
Latin America and Caribbean	5	1	55	1	23 659	3 862	65 910	1 522
Total	**12**	**4**	**60**	**2**	**329 619**	**111 076**	**1 886 271**	**57 876**

Note: FW = fuelwood and CH = charcoal.

Sources: National census data and the results of WHO, MICS and DHS surveys.

Table 18: Number and proportion of urban and rural households using forest products for housing in 2011

Region	Urban			Rural		
	Walls	Floor	Roof	Walls	Floor	Roof
Estimated population using forest products for housing ('000)						
Africa	14 214	9 476	13 754	79 745	10 721	110 859
Asia and Oceania	204 853	72 126	34 036	626 107	121 881	279 554
Latin America and Caribbean	47 957	18 894	32 619	20 493	6 429	11 006
Total	**267 025**	**100 497**	**80 409**	**726 345**	**139 030**	**401 418**
Share of households using forest products for housing (%)						
Africa	3	2	3	13	2	18
Asia and Oceania	11	4	2	26	5	12
Latin America and Caribbean	10	4	7	17	5	9
Total	**8**	**3**	**2**	**21**	**4**	**12**

Sources: National census data and the results of WHO, MICS and DHS surveys.

Similarly, concerning provision of shelter, Table 18 shows that a much higher proportion of rural households live in homes with walls or roofs made from forest products than do urban households.[17] For example, the proportion of households with walls made from forest products is about five times higher in rural areas than in urban areas in Africa and about twice as high in the other two regions. For roofs the differences are even greater, with the share of rural households using forest products about six times higher than in urban areas. These results provide further evidence that the socioeconomic benefits from the use of forest products in housing are likely to be focused on poorer people living in rural areas.

A final example of a relationship between income and consumption of forest products is given in Figure 10, which compares the average level of income and the use of woodfuel for cooking in less developed countries. This shows a very strong correlation between the two variables. Almost all of the countries where woodfuel is used in over 50 percent of households have an average income of less than US$2 000 per person per year. Conversely, most of the countries where woodfuel is used in less than 20 percent of households are countries with annual incomes of over US$2 000 per capita.

The figure above not only shows how this socioeconomic benefit is particularly important for relatively poor people, but also how some of the socioeconomic benefits from the consumption of forest products will decline as countries develop. This is important because it highlights how people will start to use forests in different ways as they become wealthier and less concerned about meeting basic needs.

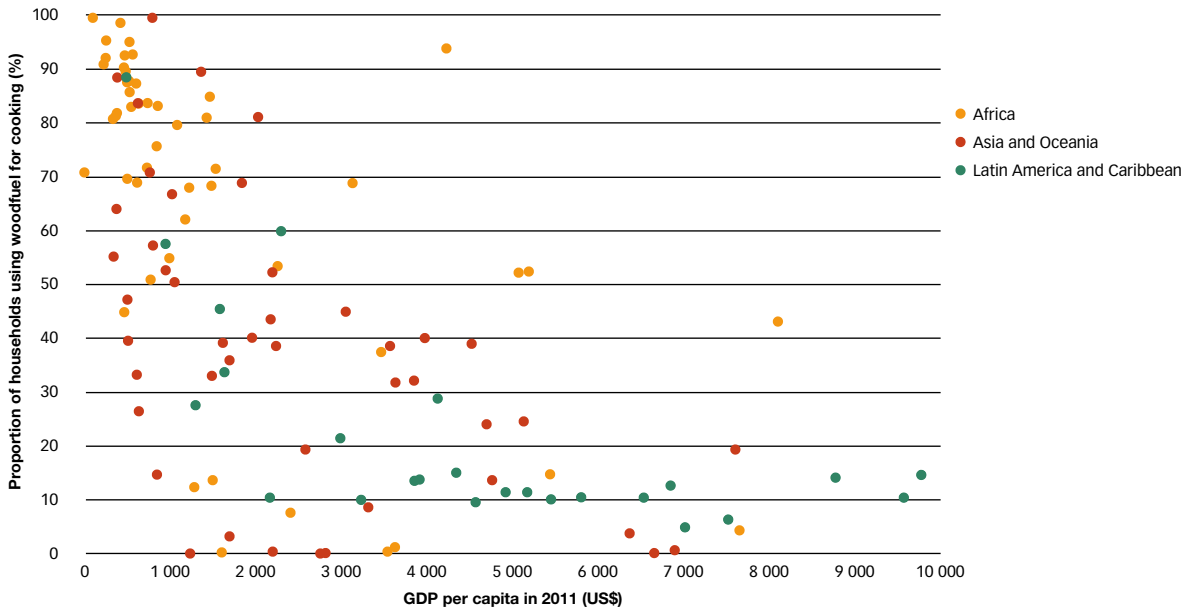
The distribution of forest benefits between men and women

It is well known that men and women receive different socioeconomic benefits from forests, this being particularly well documented at the local level. However, at the national, regional and global level, the availability of data on forest benefits and gender is more limited and mainly concerns employment, so the analysis here will focus primarily on employment-related benefits.

For the formal forest sector, employment statistics in many countries include gender-disaggregated information about the employment of men and women. This is most commonly available for the wood-processing industry, where data is available for countries accounting for about 90 percent of all employment in the industry. Less information is available about the employment of men and women in forestry, where gender-disaggregated data is available for only about half of all employment. At the regional level, similar amounts of information are available in all regions except Africa, where generally much less gender-disaggregated data is available.

[17] For flooring materials the proportions are similar as most households either have no floor covering (poor households) or a concrete floor (rich households), so the presence of a wooden floor is a poor indicator of wealth.

Figure 10: Relationship between the proportion of households cooking with wood in a country and per capita GDP in 2011



Source: UN (2012a) and results of MICS, WHO and DHS surveys.

Table 19 presents information about the proportion of jobs in the forest sector held by women. It shows that women account for roughly a quarter of employment in the sector (in the countries where information was available). Globally, and in most regions, the proportion of jobs held by women is relatively low in forestry, although higher in the solid wood processing industry and highest of all in pulp and paper production. The one exception is Asia and Oceania, where the share is highest in the solid wood processing industry. This primarily reflects the situation in China, where large numbers of women are employed in plywood production. The proportion of jobs held by women is broadly similar in most of the regions with the exception of Africa, where the employment of women in the forest sector is far behind that in the other regions.

Table 19: Female employment as a proportion of total employment in 2011, by region and sub-sector

Region	Female employment as a proportion of total employment (%)				
	Forestry	Sawnwood and panels	Pulp and paper	Forestry sector	All economic activities
Africa	n.a.	8	10	9	42
Asia and Oceania	21	30	28	27	39
Europe	15	20	27	20	46
North America	n.a.	16	24	20	47
Latin America and Caribbean	10	14	28	17	40
World	18	23	27	24	41

Note: The female share of employment in all economic activities is for the latest year available.

Source: ILO (2013a), supplemented with employment statistics from country sources.

The table also shows the proportion of jobs held by women in the total economy obtained from ILO employment statistics (for 2008 or a few years before this, in most cases). Comparing the forest sector with the economy as a whole, the proportion of jobs held by women is generally much lower. However, female employment as a proportion of total employment is similarly low in other primary sectors such as agriculture, mining and energy production, so the employment of women in the forest sector is no worse than in these other sectors.

For activities in the informal sector, it was only possible to analyse the gender dimension of woodfuel collection, due to a lack of data for other activities. The studies used to estimate labour productivity showed that women collect about 60 percent of woodfuel globally, with a much higher share collected by women in Africa and a lower share in Latin America and the Caribbean. They also showed that men tend to focus more on collection of woodfuel for sale (whereas women collect most of the woodfuel for subsistence use), with none of the studies reporting any significant involvement of women in charcoal production.

The information about participation of men and women in different woodfuel-related activities was combined with the estimates of woodfuel and charcoal production (for rural and urban areas) presented earlier to produce the estimates shown in Table 20. Assuming that production of charcoal and woodfuel for urban markets is mostly full-time employment that generates income (and is dominated by men), these show that women may account for only about 10 percent of this employment. For part-time (unpaid) collection of woodfuel for rural uses, women account for almost 80 percent of all labour and a significantly higher proportion than this in Africa and Latin America and the Caribbean. Thus, based on the information available, women appear to bear the greatest cost of woodfuel collection (in terms of opportunity costs) by a very large margin, while they receive very few benefits from the possibilities of earning income from production.[18]

With respect to the socioeconomic benefits from the consumption of forest products, very little information is available about how these benefits are distributed between men and women. The only reliable information available comes from the results of the WHO study of indoor air pollution and health, showing that women and children tend to suffer most from respiratory illnesses associated with poor indoor air quality due to the use of woodfuel for cooking.

[18] It should be noted that this refers only to the production of woodfuel and charcoal. There is evidence to suggest that women are much more actively engaged in the trade and marketing of wood energy, although their ability to engage in any income-generating activities is often constrained by their domestic household responsibilities.

Table 20: Estimated number of people engaged in woodfuel and charcoal production in 2011, by gender and type of engagement

Region	Full-time (in millions)		Part-time (unpaid) (in millions)	
	Men	Women	Men	Women
Africa	19	<1	23	152
Asia and Oceania	11	<1	110	521
Latin America and Caribbean	7	3	2	33
World	37	4	135	706

Sources: Based on ILO (2013a) and FAO (2013b).

The socioeconomic benefits received by indigenous people

The analysis of socioeconomic benefits received by indigenous people suffers from the same problems of data availability noted above for gender. Again, there are many studies about the use of forests by indigenous people in specific localities, but information about the benefits that they receive is rarely collected systematically at the national level.

In terms of income and employment generated in the sector, the available statistics do not identify whether any of these benefits are received by indigenous people. In theory, benefit-sharing mechanisms in countries (where they exist) are often supposed to focus on sharing some of the benefits generated in the formal sector with indigenous people, but little evidence is available on the impacts of these schemes and there is no data on the amount of benefits shared or even the numbers of people benefiting from such arrangements. Information in the FRA (on forest ownership and management rights) also suggests that many indigenous people may benefit in some way from forest ownership, but it is not possible from the FRA data to estimate their numbers.

With respect to informal income and employment, there is also generally little information about the participation of indigenous people in these activities. However, it seems likely that large numbers of indigenous people may be involved, and anecdotal evidence appears to support this assumption. In particular, indigenous people may play a significant role in the collection of medicinal plants in some countries, given their knowledge of forest resources.

Concerning the socioeconomic benefits from the consumption of forest products, the analysis of the use wood products in rural and urban areas shows that the people receiving these benefits tend to be focused in rural areas. Therefore, it seems likely that indigenous people receive a higher than average level of benefits from the consumption of forest products.


© Jpatokal

Chapter 4

4 Policy measures to enhance forest-related benefits

The extent to which people benefit from forests is strongly influenced by government action, including the type of benefits people have access to, who benefits, and how much. Moreover, policies have to be adjusted to changes in demand for the socioeconomic benefits of forests. These demands are expected to grow – and shift. Not only is world population increasing dramatically, but many young people are growing up very differently from their parents. For example, in 2008, for the first time in history, more than half of the world's population lived in towns and cities. This requires policy responses to newly emerging opportunities, such as local tourism and changing consumption patterns, and to potentially negative trends, such as the outmigration of skilled labour needed for rural development. Against this background, it is timely to review the policies and measures undertaken by countries to enhance the socioeconomic benefits of forests.

Key messages

Forest policies have to take into account the changes the world is undergoing, from the increase in population to the shift to predominantly urban living and emerging middle classes

Growing populations and changing lifestyles – or both – lead to growing and changing societal demands for socioeconomic benefits from forests. National forest policies and programmes need to reflect these changing needs, respond to opportunities and address potentially negative trends, while aiming for sustainability in the provision of the wide range of forest benefits.

Countries have developed numerous policies and measures to promote sustainable forest management since 2007, many of which have the potential to enhance socioeconomic benefits

There is a trend towards incorporating sustainable forest management (SFM) as a broad national goal, increasing stakeholder participation, and greater openness to voluntary and market-based approaches. There is however a need to strengthen implementation capacities, so that the potential to enhance socioeconomic benefits is realized.

Providing people with access to forest resources and markets is a powerful way to enhance socioeconomic benefits

Countries are providing people with greater access to forest resources and markets, amongst many other measures to encourage the provision of goods and services. This is particularly effective at local levels. The facilitation of producer organizations can support access to markets and more inclusive and efficient production.

Recognition of the value of forest services, such as erosion protection and pollination, is essential to sound decision-making

If the value of services provided is not measured or recognized, economic and policy decisions affecting forests will be based on incomplete and biased information. This is critical for the sustainable provision of many services, from essential services for food security and agricultural productivity such as erosion protection and pollination, to recreation and other amenities that forests provide to people.

Securing and sustaining forests' benefits

Most of the world's poor live in rural areas. Many have been lifted out of poverty in recent decades. Many have migrated to urban areas. Those who remain poor are often small-scale subsistence producers, family farmers, landless agricultural workers, women or elderly people. Many people living in rural areas have limited access to resources or markets, or to decent jobs in the formal sector. Increasing access to resources, promoting increased productivity in the agricultural sectors, including forestry, and strengthening access to markets that are often local and urban are some of the most effective means of reducing rural poverty and strengthening the development of rural communities. In addition to cash income, forests provide a range of opportunities for non-cash income, which in many cases provides a considerably larger share of socioeconomic benefits. This includes subsistence use of wood for construction, furniture, firewood, charcoal, food, and many other uses, including recreation.

Forests sustain crucial life support system functions for water, air, soils, biodiversity, and other resources. The quality of such services strongly affects the daily life of people, urban and rural, and yet the benefits are taken for granted as long as they are provided.

Forest policymakers often struggle to make the case for sustaining and investing in forests to provide these benefits, in the face of alternative land uses which promise higher short-term or more visible and direct economic returns.

Over the last decades, at the global level, forest policymakers have reflected on how to secure and sustain forests' benefits. In 2007, they adopted the Non-Legally Binding Instrument on All Types of Forests (or Forest Instrument), considered a milestone in global forest policy. One of its four Global Objectives is to "enhance forest-based economic, social and environmental benefits, including by improving the livelihoods of forest dependent people".

The Forest Instrument sets out 25 policies and measures for countries to undertake. This chapter will focus on those most relevant to socioeconomic benefits, listed in Table 21.

This chapter provides an overview of actions taken at national levels since 2007, addressing the seven selected policies and measures of the Forest Instrument to which countries have committed. The main data sources are provided in Table 22, with further information in Annex 4.

Table 21: Key socioeconomic benefits and relevant national policies and measures of the Forest Instrument

Relevant national policies and measures
1. Develop and implement policies that encourage the sustainable management of forests to provide a wide range of goods and services and that also contribute to poverty reduction and the development of rural communities. (para 6.d)
2. Enhance access by households, small-scale forest owners, forest-dependent local and indigenous communities, living in and outside forest areas, to forest resources and relevant markets in order to support livelihoods and income diversification from forest management, consistent with sustainable forest management. (para 6.y)
3. Create enabling environments to encourage private sector investment, as well as investment by and involvement of local and indigenous communities, other forest users and forest owners and other relevant stakeholders, in sustainable forest management, through a framework of policies, incentives and regulations. (para 6.h)
4. Encourage the private sector, civil society organizations and forest owners to develop, promote and implement in a transparent manner voluntary instruments, such as voluntary certification systems or other appropriate mechanisms, to develop and promote forest products from sustainably managed forests harvested according to domestic legislation, and to improve market transparency. (para 6.x)
5. Promote efficient production and processing of forest products, with a view, inter alia, to reducing waste and enhancing recycling. (para 6.e)
6. Support the protection and use of traditional forest-related knowledge and practices in sustainable forest management with the approval and involvement of the holders of such knowledge, and promote fair and equitable sharing of benefits from their utilization, according to national legislation and relevant international agreements. (para 6.f)
7. Encourage recognition of the range of values derived from goods and services provided by all types of forests and trees outside forests, as well as ways to reflect such values in the marketplace, consistent with relevant national legislation and policies. (para 6.j)

The options available to policymakers to ensure the socioeconomic benefits of forests are many. They range from non-intervention, government incentives, and voluntary agreements, to regulations that set constraints and imperatives for individual action. They comprise short-term or ad hoc actions as well as longer-term actions such as modifying policies and strategies or aligning legal and institutional frameworks. Many policies and measures affect a range of aspects and benefits, both directly and indirectly. For example, the clarification of tenure issues can both strengthen livelihoods and motivate investment.

Note that despite the substantive data compilation and material used for the analysis, the data used for this report covers only a fraction of policies and measures taken by countries on these topics since 2007. Far from all policies and measures undertaken by countries are reported or accessible, nor did the time available enable a full and comprehensive search and analysis for each topic. The results reported in this chapter should therefore be considered as indicative rather than as a comprehensive inventory of country policy action. Moreover, countries that consider themselves to have sound policies already in place on the various issues have had no good reason to take action.

The results reflect the nature of the evidence used for the analysis: national forest programmes (NFPs) and policies that express future intentions and plans as well as self-reporting by countries to international bodies. The material used does not enable independent assessment of the degree, political will and capacities of countries to fully implement policies and measures; nor does it assess evidence of changes on the ground. Given the comparatively short time frame, many policies established and measures taken since 2007 have yet to demonstrate concrete results. Furthermore, the data used does not allow a comprehensive assessment of changes in policies and measures from the periods before 2007, but hopefully the report will contribute to a baseline against which policies in future periods can be compared.

Encouraging the provision of goods and services contributing to poverty reduction and the development of rural communities

Key findings

1. All countries that have amended their NFPs or forest policies since 2007 have included sustainable forest management as a policy goal, aiming to balance economic, social and environmental aspects.
2. Almost all countries report that they encourage the provision of goods and services, and about half of those that have revised their NFPs or forest policies since 2007 address poverty reduction.
3. Many countries promote rural development through policy measures that promote the utilization of goods and services, in particular non-wood forest products. However, these measures rarely focus on decent rural employment, or on gender issues.

The demand for goods and services from forests continues to grow. Feeding and providing shelter and energy to a growing global population – projected to reach 9 billion by 2050 – will require a significant increase in productivity and land-use efficiency. Countries deal with this challenge in different ways, applying a mix of approaches aiming at broadly promoting sustainable forest management (SFM) and land use planning.

Table 22: Main sources used for Chapter 4

Type of document	Number of documents	Type of analysis
National forest programmes and national forest policies issued since 2007 (FAO NFP/forest policy document database)	22	Quantitative, qualitative
Country reports to UNFF since 2007 (UNFF 8, UNFF 9, UNFF 10)	45	Quantitative, qualitative
Country reports to regional C&I processes (ITTO, FOREST EUROPE, Montréal Process, COMIFAC) since 2007	49	Quantitative, qualitative
National forest legislation enacted since 2007 (FAOLEX database)	45	Quantitative, qualitative
FAO Infosylva bi-monthly newsletter 2007–2013, IISD Forest Policy and Practice FORESTS-L listserv, Mongabay newsletter, RRI Quarterly Newsletter, FLEGT and REDD+ newsletters 2007–2013	243 newsclips	Qualitative

All countries that have revised their NFPs or forest policies since 2007 have included "sustainable forest management" as a policy goal

Sustainable forest management, as a concept and term, has become popular in national forest policies and, in particular, country reports. Countries use a broad conception of SFM as outlined in the Forest Instrument, which emphasizes a balanced approach to economic, social and environmental benefits and recognizes the multiple roles of forests for different stakeholders. Countries continue to amend their forest policies and legal frameworks, putting SFM at the centre. Since 2007, at least 37 countries have passed and promoted new policies promoting SFM and aiming at socioeconomic development. In addition, at least six countries have reported having further elaborated criteria and indicators (C&I) as a way of operationalizing SFM, supporting policy development, monitoring and reporting (see Table 23).

Table 23: Countries amending NFPs or forest policies with reference to SFM or developing C&I for SFM since 2007

NFPs and forest policies	Algeria, Argentina, Australia, Bhutan, Bolivia, Bosnia and Herzegovina, Burundi, Cambodia, Cameroon, Canada, Costa Rica, Côte d'Ivoire, Finland, France, Gambia, Germany, Guatemala, Guyana, Honduras, Kenya, Kosovo,[1] Kyrgyzstan, Lebanon, Montenegro, Morocco, New Zealand, Nicaragua, Niger, Panama, Peru, Russian Federation, Serbia, Slovenia, Turkey, Uganda, Uzbekistan, Zimbabwe
National C&I for SFM	Brazil, Democratic Republic of the Congo, Guatemala, Malaysia, Mexico, Philippines

[1] References to Kosovo shall be understood to be in the context of Security Council Resolution 1244 (1999).

Source: FAO, 2010 and data sources as listed in Table 22.

Ninety percent of countries have addressed the importance of increased production of goods and services in their policies or reports issued since 2007

Several countries have emphasized strengthened production of goods and services for poverty-focused SFM. For example, Sri Lanka amended its national forest policy in 2009 to facilitate participatory management and introduce additional benefit-sharing instruments. Burundi's new forest policy focuses its vision on the improvement of the contribution of the forest sector to the needs of communities and the national economy through SFM. Liberia amended its National Forest Management Strategy to include the sustainable production of goods and services through community forestry. The goal of the new forest policy of Kenya, adopted in 2007, is to "enhance the contribution of the forest sector in the provision of economic, social and environmental goods and services" (Republic of Kenya, 2007). Tanzania launched a community forestry programme aimed at empowering people and combating illegal logging in 2012. Countries that have revisited policies or programmes after 2007 have also focused strongly on community forestry, as in Nepal's leasehold forestry programmes (see Government of Nepal, 2013). Morocco has undertaken measures to establish and support forest cooperatives as a way of promoting sustainable forestry and NWFPs as part of its NFP. Uganda's National Development Plan of 2010 placed forestry at the centre of Uganda's development agenda by categorizing it as a primary growth sector contributing to employment, income and economic growth of the country.

Some countries have adopted (Burkina Faso, see Box 4) or are in the process of adopting (Benin) a specific national strategy for the sustainable use of NWFPs, promoting their sustainable use and fostering the development of small-scale non-wood forest enterprises and markets for NWFPs.

Box 4: Burkina Faso – enhancing socioeconomic benefits from NWFPs

The Government of Burkina Faso is emphasizing the importance of community-based enterprise development based on NWFPs to alleviate rural poverty and increase the resilience of livelihoods, involving also civil society organizations (CSOs). This has contributed to putting the relevance of NWFPs for the livelihoods of small farmers on the political agenda and resulted in a series of actions focusing on the valorization of NWFPs. The key policy outcomes of this are:

- the institutionalization of an agency focusing on NWFPs at government level (Agence des produits forestiers non ligneux, APFNL) in 2009;
- the development of a national strategy and action plan, 2010–2015, for the sustainable use and valorization of NWFPs in 2010.

With the exception of Australia, Canada and South Africa, references to rural incomes, NWFPs, and other goods and services are often found only in introductions and justification sections of policies and reports. Where concrete policies for the enhanced provision of goods and services in developed countries exist (for example in Finland and the United States of America), they generally emphasize research, innovation and funding for economic development. Australia, China, India and Indonesia reported additional progress in addressing employment, poverty and rural development, albeit in different ways. China has issued a range of laws focusing on SFM and its contribution to development, construction, industry, and energy.

About half of the national forest programmes or policies revised since 2007 make explicit reference to poverty

Policies and reports frequently recognize that forest resources are essential to rural incomes and poverty reduction in their introductory sections. For example, the Viet Nam Forest Protection and Development Plan 2011–2020 has as one explicit objective to generate more jobs and improve incomes for forest-dependent residents, in order to contribute to hunger elimination and poverty reduction. Poverty reduction goals are almost never made explicit, nor do they receive detailed attention, in the main chapters of policies or reports. For example, Montenegro and Canada establish poverty alleviation as an overall goal, but the definition of specific goals and measures for poverty reduction is left to future strategies and plans.

A total of 58 percent of policies and reports directly link SFM to poverty reduction and rural development, particularly in developing countries, where poverty is more prevalent. Ten of the 22 most recent NFPs squarely address poverty, most prominently Cambodia, Gambia, Honduras, Kenya, Niger and Uganda. All countries that focus on poverty reduction have also reported taking measures to increase access to forest resources, especially fuelwood and non-wood forest products. Some countries approach rural livelihoods through forest goods and services in specific poverty-focused policy and development plans, including Bangladesh, Canada, Madagascar and Nepal (see also Box 5). In Indonesia many projects and policy efforts are related to poverty eradication through SFM. Ecotourism as a poverty reduction strategy is found in a number of tropical countries (e.g. Côte d'Ivoire, Dominican Republic, Honduras, Madagascar, Niger, Papua New Guinea, Saint Lucia, Togo), and also in Europe (Cyprus, Finland, Germany) and Turkey.

■ Honduras's most recent NFP addresses poverty explicitly.

© FAO/G. Bizzarri

Many developed countries put a strong and explicit emphasis on SFM in their policy, but do not elaborate on the connections between forestry and poverty. Australia and South Africa's forest policies focus on alleviating poverty through providing education and training opportunities. Poverty reduction and rural development seems to be less of a topic of recent forest policies in Central Asia compared to other regions.

Box 5: Specific poverty reduction measures in national forest policies – Nepal

Nepal's Leasehold Forestry Programme supports the poorest farmers and forest-dependent people in alleviating poverty. The poorest are identified as a sub-group for allocation of land in the name of "leasehold forestry within community forestry", with 35 percent of income allocated to the poorest, women and disadvantaged groups. A household can receive at least one hectare of forest land for a 40-year lease as an entitlement to grow plants and use them. In addition, the programme includes a mandatory plan (Livelihood Improvement Plan) to reduce poverty.

The majority of countries that have published policies or reports since 2007 report measures to strengthen rural communities

A common measure to encourage the provision of goods and services to rural communities is by amending permits, concessions, and rights in order to allow communities, especially forest-dependent ones, to use forest products. Enhancing local and indigenous people's

access to NWFPs was addressed in all NFPs or policies amended since 2007 and by 90 percent of countries in their reports. Fewer countries have taken action to provide access to more valuable resources such as timber. Countries that have undertaken further tenure or community forestry reforms include Equatorial Guinea, Mexico and Peru. Some (mostly African) countries that maintain state ownership of all forests focus primarily on concession reform to enhance benefits for rural communities. For example, the Democratic Republic of the Congo's 2008 Constitution assigns ownership of forests to the state, recent legislation on concessions recognizes usage rights, and new rules adopted in 2010 require negotiations between operators and local communities. Concession rights have also been amended in a range of other countries, including Brazil, Central African Republic, Democratic Republic of the Congo, Guinea-Bissau, Guyana, Liberia, Panama and Slovenia.

A range of countries have amended taxation and revenue systems, with the aim of redirecting funds for community development, or specifically focusing on rural poor, women, and disadvantaged groups. Cameroon's SFM policy of 2005 for public lands requires part of forest tax revenue to be used for rural development, particularly through community forestry and council forestry (forest stands that rural municipalities or councils can manage and use to support local development). Papua New Guinea's Forest Authority requests that forestry projects are developed in accordance with the framework of National and Provincial Forest Plans and contribute towards rural community development.

The European Union adopted a comprehensive Forestry Strategy in 2013 that requires Member States' forestry measures to be integrated into rural development programmes, focusing on supporting SFM, improving the quality of life in rural areas, and encouraging economic diversification.

New Zealand asserts that relatively few communities are economically dependent on forestry and thus does not address rural development or poverty reduction in its SFM guide, but it nevertheless has a long history of ensuring equitable treatment of rural land users.

Several countries report the creation of jobs through direct employment in afforestation and silviculture

The employment of needy people by state-sponsored afforestation programmes results in improved livelihoods and environmental benefits. For example, Armenia, Bangladesh, Gambia, Kenya, the Slovak Republic and South Africa have launched extensive afforestation programmes to boost rural employment and reduce poverty. China's afforestation programme is estimated to have created over 3 million direct and indirect jobs in the country during the 2007–2013 period (Pan, Ma and Zhang, 2011). China reported that its afforestation programme has not only reduced poverty, but also improved ecological conditions for the rural poor. In 2013, Haiti launched a campaign to double the countries' forest cover by 2016 and Zambia launched a National Tree Planting Programme expected to create 200 000 jobs. Tree planting is also the focus of many small projects that create local income opportunities, such as Uganda's project to plant one million trees in the Mt. Elgon region.

Some countries aim at preventing deforestation and strengthening SFM while creating income and employment opportunities outside the forest sector. In India, for example, the Madhya Pradesh forest department launched a contract farming initiative in 2012 to provide alternative livelihoods for people cutting fuelwood. A range of initiatives allow rural communities or small producers to participate in forestry operations and ecotourism for income, including outgrower schemes such as Project Grow and Khula Nathi in South Africa and outgrower partnerships in Australia, Ghana, Indonesia, New Zealand and the Philippines. Agroforestry schemes have gained the attention of policymakers, particularly in Africa and Asia, as a means of linking local communities and small producers to value-added processing chains, including in India, Lao People's Democratic Republic, Malawi and Zambia. The United States of America has also outlined new forest management principles focused on restoration that will create jobs (see Box 6).

Box 6: Public forest programmes creating jobs – the US Collaborative Forest Landscape Restoration Program

The US Collaborative Forest Landscape Restoration (CFLR) Program was created in 2009 to promote job stability, reliable wood supply, forest health, and reduced emergency wildfire costs and risks. Working in 23 forest landscapes across the United States of America, over 3 000 jobs were created in 2011 and another 4 500 in 2012, generating some US$290 million in labour income.

Out of 41 Poverty Reduction Strategy Papers (PRSPs) of relevance produced between 2007 and 2013, 37 address forests, indicating that countries are increasingly recognizing forests' contribution to poverty reduction

Poverty Reduction Strategies are seen as a key instrument for meeting the Millennium Development Goal of halving, between 1990 and 2015, the proportion of people suffering from extreme poverty. While initial PRSPs often only touched upon forest resources, subsequent strategies have in a few cases increased the role accorded to forests in fighting poverty, with more consistent reference to countries' national forest programmes.

Table 24 presents the most common forest-related measures of relevance to poverty eradication.

Improving access to forest resources and markets to support livelihoods and income diversification

Key findings

1. Around half of the countries surveyed have taken measures to improve the access of local communities, families and individuals to forest resources and markets in recent years. At least 26 have addressed tenure reform, mainly to better support local livelihoods.
2. Many countries focus on strengthening the capacities of producer organizations as a means for more efficient provision of benefits and better access to markets.
3. Few countries explicitly address gender and decent employment issues, and countries rarely address informal economies and markets, the dominant source of livelihoods in many rural areas.

As emphasized by the Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security (FAO 2012b), land is central to development, which in turn requires secure tenure rights and equitable access to resources. Enhancing access to forest resources and relevant markets is thus critical to increase access to the socioeconomic benefits of forests, both for subsistence use and to create opportunities for income and employment. According to RRI (2013), by 2012, governments in the developing world had recognized communities' ownership or long-term use rights to 31 percent of the developing world's forests – over

Table 24: Forest-related measures in PRSPs issued since 2007

Forest-related measures in PRSPs	Countries
Implementation of sustainable forest management techniques to satisfy demand for forestry products and other measures to support forestation (including REDD)	Afghanistan, Albania, Bangladesh, Democratic Republic of the Congo, Gambia, Ghana, Haiti, Madagascar, Togo, Uganda
Improvement in the forest revenue system and tax law reform	Lao People's Democratic Republic, Liberia, Madagascar, Malawi
Access and creation of markets for forest products	Bangladesh, Gambia, Liberia, Madagascar, Malawi, Republic of the Congo, Zambia
Use of forests for tourism development	Albania, Bangladesh, Ghana, Kyrgyzstan, Liberia, Uganda
Involvement of private sector in sustainable management of natural resources, improved investments, provision of loans/ credits to sustainable forest-based enterprises	Albania, Bangladesh, Ghana, Kyrgyzstan, Lao People's Democratic Republic, Liberia, Malawi, Mali, Nicaragua, Republic of the Congo, Uganda, Zambia
NWFPs as income generator and food security	Bangladesh, Gambia, Liberia, Mali, Republic of the Congo, Uganda, Zambia
Decentralization and community forest management	Albania, Bangladesh, Democratic Republic of the Congo, Gambia, Ghana, Lao People's Democratic Republic, Liberia, Mali, Republic of the Congo, Togo
Promotion of energy from wood and carbon sequestration in forests	Bangladesh, Guinea, Haiti, Republic of the Congo, Rwanda
Increasing of employment and income generation from forests including through afforestation/reforestation	Afghanistan, Bangladesh, Gambia, Liberia, Mali, Republic of the Congo, Rwanda
Creation of new opportunities for women in the forest sector	Bangladesh, Liberia, Mali
Reforms in land policy, including forests	Bangladesh, Democratic Republic of the Congo, Liberia

490 million ha. About half of recently issued NFPs or policies directly address livelihoods and over three-quarters of countries (55 out of 72) addressed livelihoods in their reports to global or regional bodies. Many of the measures taken or planned aim explicitly at supporting livelihoods and diversifying income for the rural poor or local communities.

Measures to enhance local access to forest resources have been taken up in a majority of the 22 recently updated NFPs or forest policies

Governments take different approaches towards access rights to forest resources, in accordance with national laws and customs, although there is an overall tendency to expand access through forestry and land-use laws. Many countries are taking steps to increase or improve the rights of communities, households or individuals to access and use forest resources, and to strengthen their involvement in the management of publicly owned forests. A number of countries reported measures for granting forest tenure rights in order to improve livelihoods and control/ownership by tenure rights holders, e.g. in Gambia, Lao People's Democratic Republic, Nepal, Panama and Sri Lanka. Less than half of the countries focused on individual small-scale owners or indigenous peoples.

The broadest measure to enhance forest access is tenure reform, which includes granting rights, clarifying rights, revising concession agreements, establishing community forestry and extension services to enhance capacity to use access rights, and tenure-based economic incentives. Tenure reform often aims at reducing poverty, including in Brazil, Cameroon, China, Fiji, Mexico and Viet Nam (see also Box 7).

Countries targeting poverty reduction have often chosen to name particular groups to ensure that they would not be crowded out or ignored (the Honduran government, for example, has granted around 7 percent of its territory to the indigenous Miskito communities). Countries facing less domestic poverty have generally tried to increase the social value of forests by encouraging more public access, including for recreation (e.g. Australia, United States of America).

Box 7: Forest land allocation in Viet Nam

In Viet Nam, forest land allocation (FLA) policies have been further implemented in a number of provinces. As of December 2010 about 1.8 million Land Use Certificates (LUCs) had been issued to recognize users' rights to land, covering close to 9 million ha. The vast majority of these were issued to households, with an average size of around 3 ha. Land recipients can exercise land use rights for forest lands for 50 years or more.

Countries including Guyana, Kenya, Liberia, and Sudan have established or further expanded community forestry rights, often in tandem with extension programmes that support capacity development of rural communities. For example, Liberia's 2009 Community Rights Law aims to allow rural communities to access forest resources such as plants and plant material used for food, fuel, storage and fodder. The Sudan's extension programme has established over 369 community forests and registered cooperatives since 2007. In 2010, Guatemala's Instituto Nacional de Bosques, the forest authority of the country, established a programme of incentives for small-scale holders[19] of land with the potential to engage in natural forest management and agroforestry. In Brazil, the creation in 2009 of the Programa de Manejo Florestal Comunitário e Familiar introduced the concept of community and family forest management into the Brazilian legal system. Evidence of policy measures to expand community forest rights was also found in Cameroon, Nepal and the Philippines.

At least 26 countries have taken further measures to clarify unclear legal tenure rights and recognize customary tenure arrangements

Several countries, including Bolivia, Brazil, Cambodia, Costa Rica, Gambia, India, Kenya, Mongolia, Nepal, Nicaragua, and Sri Lanka, have taken measures to clarify forest tenure rights, including issues of encroachment. For example, Brazil passed land tenure legislation in 2009 granting some 67.4 million ha of land to squatters and illegal settlers. Sri Lanka completed a project in 2009 to survey and demarcate over 400 000 ha of natural forests that lack proper boundary demarcation and have suffered from clearing for housing and agriculture.

[19] Without legal ownership title.

Access for non-commercial harvesting and subsistence use improves livelihoods, in particular for vulnerable groups and local people. In many countries, customary rights have existed for centuries, including for grazing, timber, or limited access for subsistence use such as berry and mushroom picking. Many countries, especially in Africa and Europe, recognize extensive rights for local rural people to use or harvest specific products and quantities from forests owned by the state, communities or private holders. Some countries have also taken further steps to clarify and recognize these rights formally through policy and legal measures. For example, in 2008 the Government of Bolivia approved the Política Nacional para la Gestión Integral de los Bosques, the result of consultations with the main organized indigenous groups and other forest producer groups of Bolivia on integrated forest management. The purpose of this policy is to:

- support the well-being of all forest users, especially the poorest;
- improve the contribution of the forests to economic development; and
- guarantee forest conservation.

Several countries have amended concession agreements or legislation, expanding the rights of local and indigenous communities to access, use and co-manage forest resources

Cameroon, Indonesia, Peru and Slovenia are among the countries that have re-evaluated and amended concession agreements, requiring concessionaires to provide more explicitly defined benefits as a condition of their rights and to involve communities in negotiating those benefits. Malaysia reported in 2011 that timber concessionaires were required to designate community-use zones within licensed forest areas. In some areas this includes community access rights to collect a wide variety of forest products for subsistence including food and medicine. Liberia requires social agreements with concessionaires including funds for affected communities and infrastructure.

In Papua New Guinea, Forest Management Agreements require the consent of customary owners. The new concession law of Mongolia (2010) explicitly provides a range of public-private partnership agreements as well as security instruments. Guyana established community forestry associations able to acquire forest concessions from the State Forest Estate. In Indonesia, procedures are in place for allocating forest areas to logging and timber plantation companies to manage as long-term leaseholds, but equivalent regulations and procedures are still lacking for allocating state forest areas to communities (see also Box 8). National policies and laws amended since 2007 often require indigenous involvement in forest management (e.g. Fiji's 2007 forest policy and Guyana's 2009 Forestry Bill).

Box 8: Amending forest concessions – Brazil

Brazil opened up public forests to forest concessions through its public forest management law enacted in 2006 (Lei Nº 11.284). One of its aims is to provide the basis for ensuring a sustainable provision of legal and sustainably produced timber for domestic markets from public forest land. This policy change should help to add economic value to forests and complement other measures to enhance law enforcement and decrease illegal logging. By 2013, seven forest concessions had been granted (three on federal, four on state forests), a process that involves addressing a range of land tenure issues.

Guyana's 2009 Forestry Bill provides communities with a means of securing rights to benefit from their local forest while ensuring sustainability, stimulating income generation and fostering environmental stability. The Community Forestry Initiative allows communities to be awarded forest concessions to operate on a commercial basis to improve their livelihood. By the end of 2011, over 60 Community Forestry Organizations and over 400 State Forest Permissions were in operation, and the numbers continue to grow.

■ Brazil has taken a number of measures to open up public forests to forest concessions, and to strengthen the rights of poor and indigenous peoples.

© FAO/Veracel

Forest tenure reform is one area of forest policy where indigenous communities are explicitly mentioned

Tenure reform is one of the few areas of forest policy where indigenous communities are explicitly addressed. For example, Mexico recognizes thousands of land-owning indigenous communities with forestry as their primary economic activity. In 2007, the Philippines Department of Environment recognized indigenous peoples' "right to pursue their economic and cultural well-being and to enable equitable sharing of benefits from the natural resources found within their ancestral lands/domains".[20] In India, in 2009, implementation of the Recognition of the 2006 Forest Rights Act included issuing certificates of titles to tribal representatives. Such rights can also emerge from local efforts, such as Uganda's Batwa Pygmies taking back land they had lost to conservation. Guyana's Amerindian Act from 2006 empowers Amerindian communities to create and enforce protected areas on their lands, as well as to control access to their territory and traditional knowledge. In 2007, Brazil adopted its Política Nacional de Desenvolvimento Sustentável dos Povos e Comunidades Tradicionais (PNPCT).[21] Its main objective is to promote sustainable development for traditional peoples and communities with an emphasis on recognition and the strengthening and guaranteeing of territorial, social, environmental, economic and cultural rights.

[20] The Philippines Department of Environment and Natural Resources (DENR) – National Commission on Indigenous Peoples (NCIP) Administrative Order No. 2008-01.

[21] Presidential Decree No. 6.040 of 2007.

Peru, in 2011, passed a law requiring that indigenous groups be consulted prior to mining, logging, and oil and gas projects on their land, giving indigenous people free, prior and informed consent (FPIC) over such projects, although no power to veto projects. A range of decisions have been made at national and regional courts in recent years in favour of indigenous peoples and local community rights over forests, including rulings in Ecuador and Indonesia. Many countries are also pursuing issues of access in the context of the Nagoya Protocol on Access and Benefit Sharing, which addresses, but goes beyond, forest resource access issues.

A frequent measure taken to increase access to existing markets is to facilitate the formation of producer organizations and cooperative enterprises

Almost all countries reported on measures to strengthen access to markets, including removing legal restrictions on harvest permits (albeit mainly for NWFPs rather than wood), adjusting financial incentives, and supporting capacity development. Many countries have put considerable emphasis on allowing and supporting the development of producer organizations, a powerful catalyst for boosting the incomes of indigenous peoples, local communities and private smallholders (see Table 25). This often includes capacity building for small producers through producer associations, e.g. in Cameroon, China, Czech Republic, Ethiopia, Ghana, Guyana, Hungary, Montenegro, Mozambique, Nepal, Sudan and Viet Nam.

Table 25: Examples of countries that have substantively addressed producer organizations and forest small and medium enterprise development since 2007

Countries	Actions
Brazil	Support to forest producer organizations through economic incentives and capacity building, linking them with the private sector.
Burkina Faso	Government support for a coordinating structure at local, provincial and national level for key NWFPs.
China	Support for the formation of 115 000 Forest Farmers Cooperatives (by 2012); support for organizational capacity, business development and access to finance, including by enabling the use of forests as collateral for loans; new schemes for forest insurance; and investment in capacity development among forest farmers.
India	Government creation of a State Minor Forest Produce Federation to bring together local cooperatives and support the collection of non-timber forest products.
Morocco	Measures to establish and support forest cooperatives as a means of promoting SFM and NWFPs.
South Africa	Government creation of a Small Enterprise Development Agency (SEDA), which offers non-financial services to small businesses via a network of offices.
Uganda	Fostering of the formation of the Uganda Timber Growers' Association, an independent, private-sector lobby and support group.

A common pathway to support market access for community or small-scale enterprises is through capacity development (e.g. Cameroon, Democratic Republic of the Congo, Ghana, Liberia), advisory support (e.g. Bolivia, Brazil, Cameroon, Honduras) or other services (see Box 9). A range of development partners have enhanced support in this regard, including through FFF hosted by FAO. Bolivia, Brazil, Canada and Peru have taken steps to expand information on and access of small producer organizations to local small grants and microcredit schemes, including through capacity development of such organizations. The EU supports small producers in starting new businesses in the context of rural development via, for example, the capacity building of forest owner associations (supported notably by national programmes in France, Hungary, Italy, Sweden and the United Kingdom) or support to small enterprises (particularly in Bulgaria, Finland, Hungary, Poland and Romania). In Guatemala, the Tikonel association supports local and indigenous forest producer groups in building efficient and innovative forest enterprises. Community entrepreneurs are encouraged to develop prototype products and these are tested for market acceptance, cost and quality with the help of Tikonel.

Box 9: China – Forest Tenure Trade Centres and Forest Farmer Cooperatives

In the context of the on-going collective forest tenure reform in China, by 2011 about 88 million households had received certificates on their forest rights. These give farmers more freedom to manage their contracted forest land (around 0.73 ha on average) for a period of 70 years, including to subcontract, lease, transfer or mortgage forest plots.

For the purpose of issuing these certificates to households, some 1000 Forest Tenure Trade Centres were formed in 27 provinces. These provide a range of services including trading of tenure rights, subcontracting, and market information. Many households opt to subcontract forest management or to become part of Forest Farmer Cooperatives (FFC). By the end of 2011, some 12.6 million households had joined FFCs, many of which were created by owners of processing enterprises, village leaders and forest farmer entrepreneurs.

Source: China State Forestry Administration, 2012.

Many countries also adjust economic incentives to reduce the cost of accessing markets. Brazil, Ecuador, Guatemala, Peru and Venezuela support access to markets for NWFPs. Brazil guarantees minimum prices for non-wood products. Other countries, including Australia and China, promote trade in timber products through fiscal instruments and by expanding international market access through bilateral and multilateral trading relations.

At least five countries have taken measures to promote market development for specific products and services

Countries that have launched initiatives to strengthen markets for specific forest products include Canada, Gambia, Lithuania, Montenegro and the Russian Federation. For example, in 2013, the Russian Federation reiterated its intent to develop the domestic market for timber products and improve the competitiveness of the Russian forest industry by 2030 as part of its forest-related policy. Montenegro's Forest Administration is to "gradually establish a profitable and transparent market for round wood, semi-finished timber products and other products, as well as a market for non-timber products and services" (Government of Montenegro, 2008).

Africa and Europe in particular have seen many policy initiatives addressing wood energy. In Africa, policies focus on increasing fuelwood efficiency and preventing forest degradation (see for example Box 10). In many countries in Europe, wood is being promoted as a renewable energy source in energy policies, resulting in significantly growing volumes of national and international markets for biomass.

Box 10: Promoting more efficient energy markets: charcoal producer associations in Kenya

In Kenya, biomass accounts for 68 percent of total energy supply, with charcoal providing energy for 82 percent of urban and 34 percent of rural households. The large majority of charcoal comes from producers' own farms or private lands. The Forests (Charcoal) Regulations of 2009 empowers local communities to manage forests through Community Forest Associations and requires that commercial charcoal producers organize themselves and form Charcoal Producers Associations (CPA) to promote sustainable production and efficient marketing and utilization of woodfuel. Some 110 CPAs had been formed and registered by 2013.

Many countries have taken measures to support the development of new markets, such as ecotourism and NWFPs, or markets for certified wood through public procurement policies and other means. Some countries

focused on further developing markets for ecosystem services as a way to support livelihoods and income diversification, including in several countries in Latin America as well as Tanzania and Viet Nam.

Several countries have undertaken measures to improve accessibility and processing infrastructure, such as targeted programmes to improve roads, mills and harvesting mechanization in France, Liberia and New Zealand. Others support technology upgrades with a view to enhancing market access and transparency. For example, Belarus and Lithuania now conduct timber auctions online; Suriname and Uganda employ labels and permit systems to track chain-of-custody; and Morocco aims to use the Voluntary Partnership Agreement process to enhance NWFP markets in Europe.

Creating enabling environments to encourage investment and related involvement of local and indigenous communities

Key findings

1. Around half of the countries studied have taken measures to encourage forest investment in the past 5 years, although only limited attention is still paid to enabling and promoting local and indigenous community investment.
2. Countries with better and more stable policy environments are benefiting the most from international investment flows, including climate-related financing.
3. Limited national capacity to effectively utilize available investment funds remains a key bottleneck for increasing forest investments.

Enabling environments to encourage private and public investment are essential to SFM. Domestic smallholders are a major source of private investment in forestry, whereas larger scale investment can create employment and open up new sources of income. The latter frequently enhances expertise, productivity, the competitiveness of production goods and the provision of ecosystem services (e.g. through REDD+), while it can have adverse social and environmental impacts if not effectively managed. Both small and large investments are essential. Policies, laws and regulations must be well designed and effectively implemented to ensure that such investments bring sustainable economic and social benefits to the country.

Close to half of the countries that revised their NFP or forest policy since 2007 have strengthened measures to increase investment, but few examples exist where measures directly encourage investment by local communities or indigenous peoples

About 85 percent of countries (61 out of 72 countries) addressed investment issues in country reports. The level of action taken varies considerably, and includes many examples of measures intended to further encourage private-sector investment. There are few examples, however, where investment by local communities is explicitly encouraged. One example of the latter is Uganda's NFP 2012, which promotes small-scale tree growers and investment by local communities in the context of outgrower forest plantation schemes around large plantations. The Uganda Sawlog Production Grant Scheme (SPGS) has been the catalyst for private sector investment of over US$20 million in timber plantations, providing small grants to over 400 investors by 2013, and establishing over 37 000 ha of timber plantations. In Viet Nam, the government issued Decision 147 on the promotion of forests for productive purposes in 2007, giving households a central role in the related plan to establish 250 000 ha of new plantations per year until 2015, facilitated by low credit rates for smallholders.

Investment by indigenous peoples has received less explicit encouragement, apart from their involvement in consultations related to investment projects (see previous section). Canada is the only country to report policy explicitly supporting indigenous investments in forest resources. Local and indigenous investments are promoted indirectly through tenure reform, rural development, and capacity building, but income from forests is often insufficient to support significant investment in maintaining the resource. Broader initiatives and policies that target local and indigenous community investment, including through microfinance schemes, have yet to appear in national forest programmes or forest policies in most countries. Measures to increase local stakeholder participation in larger private investment such as forest concessions require substantial government actions, including support for participatory processes. For example, the government of Fiji provides funding for landowner involvement in logging contracts.

Investment policies of countries with a high percentage of public ownership of forests tend to focus attention on attracting foreign private and public direct investment, mainly through fiscal instruments

A range of countries with a high percentage of public ownership of forests are trying to mobilize private or public international investment, including through tax incentives (e.g. Brazil, Cameroon, China, Finland, Ghana, Indonesia, Latvia, Malaysia, Poland), low-interest loans or co-funding through grants (e.g. China, Japan, Madagascar, Viet Nam, and EU Member States), REDD+-related financing mechanisms (e.g. Bolivia, Brazil, Democratic Republic of the Congo, Guyana, Indonesia, Panama, Tanzania), measures aiming to further strengthen investor rights (Myanmar, Panama) or other. Larger-scale private investment is often a preferred approach to introduce new technology and for employment creation. For example, Guyana encourages foreign direct investment in priority areas identified as more capital intensive, higher technology projects linked to overseas marketing networks and value-added forest product development. In some countries, such as Myanmar, forest investment, other than extractive investment, comes from foreign publicly-funded projects.

Policies encouraging foreign investment in forestry are not without controversy. Forest investment in development projects can be disruptive to local rural communities and to the environmental values of forests. For example, Cameroon's invitation for foreign companies to expand palm plantations has witnessed controversy between those advancing the country's need for economic development and environmentalists who foresee the loss of important forests.

Some countries with large forest areas have attracted substantial public domestic investment

A number of countries have been successful in mobilizing treasury resources for dedicated investment in sustainable forestry measures. Examples include the American Recovery and Reinvestment Act of 2009, which channelled over US$1 billion into the forest sector in the United States of America; Canada's Community Adjustment Funds as stimulus to forestry-dependent communities; China's forestry investment which increased from US$10.4 billion in 2007 to US$42.5 billion in 2011; and the Sudan's National Agricultural Revitalization Program. The Russian Federation focuses on investment in forest-based products with more value added. In the European Union, the rural development programme 2014–2020 foresees a focus on knowledge transfer and innovation in agriculture, forestry and rural areas, enhancing competitiveness and resource efficiency. The Indonesia Climate Change Trust Fund is a national funding entity created by the government to develop innovative ways to link international financing with national investment strategies in SFM. Brazil has allocated increased public funds to support SFM.

Close to half of all countries surveyed report action to promote investment and facilitate private domestic investment

Many countries are promoting the bundling of small individual investments, given that forest incomes are often insufficient for local users to make investments with a longer-term horizon. A range of countries have taken up the topic in recently revised NFPs (see Table 26). Others, such as Bolivia, Brazil, Canada, Guatemala, Nicaragua and Peru, have taken steps to expand information on and access to local small grants and microcredit schemes, including by organizing and developing the capacities of small producer cooperatives, and providing opportunities for dialogue between banks and forest stakeholders.

Table 26: Countries with recent (2009–2013) NFPs or forest policies addressing investment in forest resources

	Private	Public	Local	Indigenous
Burundi	x		x	
Cambodia	x	x		
Canada	x	x	x	x
Costa Rica	x	x		
Côte d'Ivoire	x		x	
Finland	x	x	x	
Guyana	x			
Honduras	x	x		
Montenegro	x		x	
Niger	x			
Slovenia	x	x	x	
Uganda	x			

Interest rates, payback periods and guarantees for loans can all be used as incentives for private investment, along with means such as allowing growing stock to be used as collateral for loans. For example, Brazil has increased the payback period for forest loans and authorized the use of forest as a guarantee for loans. In the Russian Federation, as of 2013, interest rate subsidies on loans have been granted to organizations implementing priority investment projects aimed at developing high technology manufacturing facilities. Japan and the United States of America offer low-interest loans to promote investment in SFM. Ghana, Guyana and Togo have established or promoted the application of microcredit schemes for forest-related investments.

Some countries have set up new institutions tasked with supporting and facilitating domestic forest investment promotion and facilitation, including Honduras, Nicaragua, Niger, Paraguay, Peru and Uganda. In Latin America, in particular, efforts have been made to set up dedicated programmes to increase access to loans for small forestry producers, including via stronger collaboration with national banks servicing the agricultural sector. This includes PRONAF (Programa Nacional de Fortalecimento da Agricultura Familiar) in Brazil, PINFOR (Programa de Incentivos Forestales) and PINPEP (Programa de incentivos para pequeños poseedores de tierras de vocación forestal o agroforestal) in Guatemala, Banco Produzcamos in Nicaragua, PROFORESTAL (Financiamiento para Productos de Reforestación Comercial) in Paraguay and the Programa de Credito Forestal by Agrobanco in Peru. For example, in 2010, the National Congress of Guatemala passed the "PINPEP law", assigning incentives to small forest holders for reforestation and forest management activities. Over 400 000 people are expected to benefit directly from this scheme (FAO 2012c). Often, the problem is not lack of domestic financial resources, but rather access to finance, impeded by lack of knowledge on the part of potential recipients, and compounded by bureaucratic requirements and limited capacities.

About one-third of countries reported exploring public-private partnerships to build investment. Countries with large shares of state-owned land have notably explored partnerships with the private sector. For example, Saint Lucia commissioned a Strategic Business Plan to identify partnership opportunities and enhance private sector participation in forest management. Only a few examples of public-private partnership are characterized by true joint investment and management (e.g. in Canada and Finland) or the creation of joint enterprises (e.g. Côte d'Ivoire). Other countries (e.g. Guyana) report on public-private partnerships as private management of public land.

About half of all countries have reformed forest tenure to secure tenure rights for investors

An underlying factor for mobilizing investment is to secure tenure rights for investors (see previous section on improving access to forest resources and markets). This includes rules concerning land rights allocation, administration and protection at central and local levels. About half of countries surveyed have undertaken forest tenure reform. Bolivia, Guatemala and Nicaragua have established mechanisms to allow community forestry concessions. Brazil's forest law reform has created conditions for auctions of large areas of Amazon forest to be managed by private timber companies and cooperatives to help reduce demand for illegal logging (see also Box 8). Madagascar promotes private ownership and private investment through the implementation of "land for reforestation reserves".

Forty countries reported some measures on forest funds

Around 40 countries are known to have established national forest funds (FAO, 2013a) (see Table 27). Several countries, including Argentina, Gabon, Guatemala, Indonesia, Ireland, Kenya, Rwanda, Slovakia, Slovenia, Tanzania and Viet Nam, have adopted national-level legislation supporting investment promotion and the establishment or enhancement of forest funds. Some countries use or plan to use a mix of private investment and donor funds (e.g. Ecuador, Peru and Uganda) whereas others are heavily donor-dependent (e.g. Bhutan, Myanmar). Many international donor funds are connected to Clean Development Mechanism (CDM) and REDD+ processes (further explained later in this chapter). However, despite this broad reporting of forest funds, they were not highlighted in recent NFPs, even by countries reporting forest fund initiatives or legislation (e.g. Canada, Slovenia and Uganda).

Table 27: Examples of national forest funds established or strengthened since 2007

Country	Name	Comments
Argentina	Fondo Nacional para el Enriquecimiento y la Conservación de los Bosques Nativos (FNCBN)	Argentina's Law 26.331 (Ley de Presupuestos Mínimos de Protección Ambiental de los Bosques Nativos), issued in 2007, created the forest fund with public resources earmarked for the provinces that promote sustainable use of native forests and payment of environmental services, replenished by 2 percent retentions on agricultural primary export revenues. Around US$55 million has been transferred yearly into the fund in recent years.
Brazil	Fundo Nacional de Desenvolvimento Florestal (FNDF) and Fundo Amazônia	The national forest development fund is a public fund created in 2006 with regulatory specifications issued in 2010. Managed by the Brazilian Forest Service, the estimated budget for 2012 was US$3 million for supporting SFM-related projects. The Amazon fund, established in 2008, aims to attract donations for non-refundable investments in deforestation prevention.
India	Compensatory Afforestation Fund	This fund was constituted based on the Supreme Court of India's order dated 5 May 2006 and it was authorized to disburse funds in 2009, endowed with around US$5 billion.
Indonesia	Fund for REDD+ in Indonesia (FREDDI)	A fund of funds established on the basis of Presidential Regulation No. 80/2011 as a public trust fund. Presidential Regulation 62/2013 defines modalities. Expected to mobilize up to US$20 billion by 2020. Not yet operational.
Lao People's Democratic Republic	Forestry and Forest Resource Development Fund (FRDF)	Established in 2005: US$1 916 932 in 2012–2013.
Rwanda	Fund for Environment and Climate Change – FONERWA	Public institution established in 2012 by law N°16/2012 as a cross-sectoral financing mechanism. SFM supported under Window 1: Conservation & Sustainable Natural Resources Management.
Tanzania	Tanzania Forest Fund	A public conservation trust fund made operational in July 2011, established as a mechanism to provide long-term reliable and sustainable financial support to forest conservation and SFM.
Viet Nam	Forest Development and Protection Funds (FPDF)	Established in January 2008 through Decree N°05/2008/ND-CP. Size: approx. US$55 million in 2012.

One-quarter of countries mentioned tax instruments in reports, and 2 of the 22 most recent NFPs or forest policies addressed taxes as a means to encourage investments

Comparatively few countries seem to have established or significantly amended tax mechanisms as a way of stimulating forest investment. Only 18 percent of countries surveyed mentioned tax instruments in reports, and none of the 16 most recent NFPs addressed taxes. Since 2007, however, some countries have introduced taxes from timber or other sales revenues dedicated to re-investment for longer-term benefit such as roads or forest-management planning, including Brazil, Central African Republic, Croatia, Gabon and Norway. Countries such as Chile and Costa Rica have introduced water fees that capitalize funds used for forestry activities. In Japan, prefectural governments have introduced local taxation schemes exclusively used for the financing of forest management and conservation activities. Austria, Burundi, Finland, France, Gabon, Latvia, Morocco, New Zealand, Poland, Slovenia and Uganda aim at more economically viable private forestry through a mix of taxation strategies, reducing taxes on a range of aspects. Nepal's Ministry of Forests and Soil Conservation has been preparing to amend the existing law on community forest by increasing the revenue from community forest user groups from the existing 15 percent to 50 percent in a bid to reduce deforestation and forest degradation in community forest land.

Many countries lack the institutional and legal framework and capacities to effectively collect taxes and fees. Even if collected, in most instances forest-related taxes fail to return to forest users. Tanzania is exploring the use of technology to enhance tax collection by tracking revenues paid by forest products companies. A few countries, including Honduras, Kenya, Viet Nam and Zambia, have undertaken public expenditure reviews. However, as indicated by the lack of tax instruments in recent NFPs, relatively little seems to have been done to amend forest-related tax policy in recent years.

Countries apply a wide range of other measures to promote and facilitate investment, including innovations in funding administration, collaborative business planning, and insurance

Georgia's new regulations allow governing units to administer funds that might be used by local communities. France has established a forest insurance system, providing forest owners with the option to create a special account for funding afforestation costs after a natural crisis. Many countries provide support to small businesses (Bolivia, Finland, Indonesia, Latvia, Lithuania, Madagascar, Peru, Saint Lucia, Slovakia, Slovenia, Uganda).

Some countries have a deliberate policy of non-interference by government, based on free market principles. For example, New Zealand cites its lack of an investment promotion institution to support forest management as an example of treating "all sectors as evenly as possible".

Encouraging voluntary instruments as a means of developing and promoting forest products from sustainably managed forests and improving market transparency

Key findings

1. Voluntary certification is by now well established as a widely applied private instrument that complements public forest policy instruments.
2. Governments in developed countries are continuing to strengthen public procurement schemes and green building programmes, thus reinforcing demand-side incentives for products from sustainable sources.
3. Verification of the legality of timber harvested is slowly expanding, enhancing the role of the private sector in strengthening sustainable forest management.

The need to find effective and sustainable means of providing an array of benefits to a growing society is a central challenge. Governments have explored new governance mechanisms, as have non-governmental stakeholders. Increasingly, voluntary instruments complement more traditional regulatory approaches. In many countries, governments and the private sector also engage in forms of public-private partnership arrangements. Overall, the role of the private sector as a crucial partner in addressing issues such as unsustainable forest management or illegal logging continues to grow. Voluntary instruments were covered in three-quarters of all recently revised NFPs or forest policies, but by only 30 percent of countries in their reports to international bodies.

Forest certification and promotion programmes were mentioned in over two-thirds of recently revised NFPs and three-quarters of country reports, and as of 2013, public forests are certified in 61 countries

Forest certification is the most widely known voluntary instrument in the forest sector, with the proportion of global roundwood supply from certified forests estimated at 28.3 percent, i.e. 501 million m^3 (UNECE and FAO, 2013). National governments are often involved at various stages in the development and management of voluntary forest certification schemes. National standards for forest certification have been elaborated for the Forest Stewardship Council (FSC) in 39 countries worldwide, and 32 national standards have been endorsed by the Programme for the Endorsement of Forest Certification (PEFC). While there is no formal obligation by the FSC or PEFC to involve national government representatives in standard elaboration bodies, standards are required to meet national legislation, and in practice these bodies take into account relevant national public policies. In some countries, such as China and Indonesia, certification is part of state forest policy.

Governments can help promote certification as a voluntary instrument to encourage SFM. For example, Nicaragua's national forest policy promotes certification for SFM purposes. Canadian provincial governments provide funding to help companies attain chain-of-custody certification. Honduras's National Forest Policy includes a sub-programme for Economic Development in Forestry which aims to promote certification processes. In Peru, WWF coordinates forest certification development and the government promotes it as a tool for SFM.

Where certification is already developed it is often used as an "off the shelf" SFM policy for state-owned forests and protected areas. For example, the majority of Guatemala's FSC-certified area is in the Maya Biosphere Reserve; and Lithuania reports progress in SFM in FSC-certified state forests. As of 2013 there are 61 countries that have public forests certified by the Forest Stewardship Council and around 30 countries with public forests certified by PEFC, mostly in Europe and North America.

Some 20 countries – mainly developed market economies – continue to promote and strengthen green procurement and green building certification systems, including criteria that promote wood from sustainable sources

Governments in developed countries have promoted green procurement policies as a way of increasing demand for legal and sustainable timber and timber products. By end-2010, a total of 14 countries worldwide had operational public sector procurement policies at the central government level for wood and wood-based products (Austria, Belgium, Denmark, Finland, France, Germany, Japan, Mexico, Netherlands, New Zealand, Norway, Switzerland, United Kingdom) (EU Standing Forestry Committee, 2010). Countries where respective policies or laws exist by 2013 include Australia, China, India, Italy, Republic of Korea and Slovenia.

Similarly, voluntary green building programmes, building codes and standards promote legally and sustainably harvested wood products. For instance, the US NGO-led International Green Construction Code was finalized in March 2012 and has now been adopted in whole or in part by ten states in that country. The voluntary Leadership in Energy and Environmental Design (LEED) Green Building Certification Program is widely recognized in the United States of America, as is the Building Research Establishment Environmental Assessment Method (BREEAM) which has country-specific schemes in seven European countries (Austria, Germany, Netherlands, Norway, Spain, Sweden, United Kingdom).

Voluntary instruments other than forest certification were explicitly dealt with in only 4 of the 22 NFPs or forest policies issued since 2007, and by only 35 percent of country reports, while systems for verifying and certifying the legality of timber traded are increasingly being implemented in importing and exporting countries

The main instruments for verifying legality are the EU's FLEGT (Forest Law Enforcement, Governance and Trade) Action Plan, the United States of America's 2008 Amendments to the Lacey Act, and Australia's 2012 Illegal Logging Prohibition Act, which also outlaws the importation of illegal logged timber from abroad, with effect from November 2014.

As part of the EU's FLEGT Action Plan, legality verification is supported through Voluntary Partnership Agreement (VPA) processes in countries that wish to export to the EU. By 2013, six countries were at the stage of implementing a VPA (Cameroon, Central African Republic, Ghana, Indonesia, Liberia, Republic of the Congo), while nine were negotiating a VPA, and several others preparing for or consulting on it. The European Union Timber Regulation (EUTR) "due diligence" requirement, which came into effect in March 2013, prohibits the placing on the EU market of wood or wood products that are derived from wood harvested in contravention of the applicable legislation in the country of origin. Anyone placing wood on the market for the first time must exercise due diligence to minimize the risk of introducing illegal wood. Most EU Member States have by now nominated a competent authority responsible for implementing the EUTR. EUTR compliance is recognized for wood that carries a FLEGT licence – or a CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) permit. By 2013 no single FLEGT licence had been issued.

Exporting countries have begun incorporating legality assurance system elements such as tracking and verification in their NFPs or policies, including Canada, Côte d'Ivoire, Guyana, Honduras, Montenegro, New Zealand, Suriname and Uganda (see Box 11). Countries that are improving their organizational frameworks and information systems to track legally harvested timber through value-added chains and improve market transparency include Brazil, Ghana, Indonesia and Liberia.

Box 11: Guyana log-tracking system

In Guyana, significant advances have been made in forest legality, including the establishment of the Guyana Legality Assurance System (GLAS). This involves checking the legitimacy of forest operations and products via a log tracking system at key points along the production chain. In 2011, Guyana undertook national level independent forest monitoring (IFM). This activity preceded a first audit conducted in July 2012 to ensure transparent, independent, third-party verification of legal compliance, and to observe official forest law enforcement systems.

Source: Guyana's National Forest Policy Statement 2011, UNFF 10.

In August 2012, Australia and New Zealand signed an Arrangement on Combating Illegal Logging and Promoting Sustainable Forest Management, promoting, amongst other things, systems for verifying the legality of timber and wood products in Australia, New Zealand and the wider Asia-Pacific region.

Promoting efficient production and processing of forest products, and related waste reduction and recycling

Key findings

1. Around half of the countries that have revised their NFPs or forest policies since 2007 address efficiency of production. Countries emphasize the expansion of processing capacity rather than improvements in efficiency.
2. While the majority of countries endeavoured to increase the utilization of biomass and production capacity between 2007 and 2013, only a minority explicitly referred to waste reduction or recycling, mostly in Europe and Africa.
3. Low efficiency and waste issues remain largely ignored by policymakers in many countries with relatively abundant forest resources and weak processing capacities.

The global economy uses huge amounts of natural resources to function and relies heavily on natural resources to fuel its economic development. Enhancing productivity through more efficient and less wasteful extraction and processing of forest material is an important component of SFM. A large percentage of all wood harvested is wasted in the processing chain, wherever residues are not used for producing energy or for other purposes. In some tropical countries anecdotal evidence suggests that more than half the biomass harvested in a typical commercial operation is not ultimately consumed. Reducing waste has tremendous potential to provide benefits, including jobs, in forest-rich countries. This is in marked contrast to low forest cover countries, where every single piece of wood is often used as firewood.

Twelve countries that have revised their NFPs or forest policies since 2007 explicitly deal with production efficiency, while many countries report on promoting improved technologies and practices for extraction and processing

Out of the 22 NFPs or forest policies published between 2007 and 2013, 12 refer explicitly to efficiency, usually to be achieved by improving technologies and practices for extraction and processing. These include Burundi, Cambodia, Côte d'Ivoire, Croatia, Finland, Gambia, Germany, Guyana, Honduras, Montenegro, Slovenia and Uganda. In 2013, the EU adopted a new Forest Strategy, explicitly addressing aspects of the value chain. This new strategy establishes "resource efficiency, optimising the contribution of forests and the forest sector to rural development, growth and job creation" (European Commission, 2013, Ch. 3.1 Guiding principles) as a guiding principle, along with sustainable forest management.

Over half of all countries are attempting to expand forest product markets and promote biomass utilization. However, only about one-third mention efficiency in processing, with a greater emphasis on increasing output than reducing waste. Several countries focus on economic instruments that aim to improve processing capacity (e.g. Côte d'Ivoire, Fiji, France, Russian Federation) and the export of value-added products (e.g. Norway, Papua New Guinea, Uganda), but these measures are not explicitly linked to more efficient processing or better recycling.

About 20 percent of countries analysed reported changes in tax instruments. Many countries, including Côte d'Ivoire, Madagascar and Papua New Guinea, used tax reductions to promote faster industry development. However, there is no reporting that tax revenues are re-invested in efficiency saving measures or other public services or infrastructure such as roads.

Several countries have established measures to increase production efficiency by amending market rules and mechanisms concerning sales and auctions

Auction systems for the allocation of roundwood were introduced or strengthened in a range of countries, with potential for significantly improving production efficiency. For example, Ecuador recently created an independent body to increase transparency in the flow of forest products from the forest to the marketplace. Under Montenegro's NFP of 2008, long-term forest users who do not process the contracted volume will be obliged to offer that timber at auctions under the supervision of the Forest Administration. In Tanzania, a new directive issued in 2013 foresees that 70 percent of the soft wood from government-owned plantations should be sold through auction. In Canada, the Quebec government decided to make 25 percent of the annual wood supply available through auctions from 2013 onwards, introducing more flexibility into the supply of raw material to industry.

Many countries support producer cooperatives as one means to enhance market transaction efficiency. For example, France, Germany, Montenegro and Slovakia have created organizations of forest owners to group wood harvests to supply industries.

Thirty-nine countries indicated measures to increase biomass utilization

A majority of countries indicated measures to increase biomass utilization in their reports, and 9 out of the 22 that have published NFPs or forest policies since 2007 have addressed biomass utilization, mostly focusing on increasing biomass energy production, especially in Europe and Canada. Many of the more developed countries (especially in Europe) have stepped up the use of biomass for energy purposes to increase the share of renewable energy consumed and the share of waste burnt at the end of the life cycle, reducing landfill waste. For example, the EU Renewable Energy strategy sets a target of 20 percent renewable energy by 2020, with biomass foreseen as around 42 percent of this. If this is achieved, the amount of wood used for energy purposes in the EU would be equivalent to today's total wood harvest. Countries that have recently issued biomass energy-related strategies include Canada, Croatia, the Netherlands, Slovakia and the United Kingdom. The Republic of Korea has set an ambitious target for electricity capacity produced from forest bioenergy by 2030. China's white paper on the country's energy policy, issued in 2012, endeavours to increase the share of non-fossil fuels in installed generating capacity to 30 percent by the end of the 12th Five-Year Plan, including through woody biomass power generation.[22] Other countries that address energy from biomass in their NFPs include Costa Rica, Côte d'Ivoire, Gambia, Honduras and Uganda. Central African countries in particular have reported a focus on wood for domestic energy provision.

Countries use a multitude of policies and measures to promote renewable energy involving woody biomass. These frequently comprise financial incentives such as capital subsidies, grants or rebates, tax incentives or payment for energy production, regulatory policies such as feed-in tariffs, renewable energy quota and other obligations, and public financing and investment. For example, amongst many others, Switzerland increased its financial support for wood energy in 2010, in the wake of public campaigns to establish and strengthen markets for biomass energy. Countries that emphasize biomass for energy production have often developed economic incentive programmes, including the United States of America where Recovery Projects for Wood-to-Energy Grants and Biomass Utilization promote forest health protection where biomass removal can be used to provide raw materials for wood products and bioenergy.

■ Wood pellets, used in the Republic of Korea as renewable fuel in boilers. The Republic of Korea has set ambitious targets for the use of forest bioenergy.

Very few countries make explicit reference to waste reduction or recycling in their reports to international bodies, despite the potential importance of these topics for promoting SFM

While the majority of countries addressed increased utilization of biomass in their reports between 2007 and 2013, only about 25 percent of countries explicitly connected this to waste reduction, mostly in Europe and Africa. NFPs or forest policies do not generally address waste (except Burundi, Canada and New Zealand) or recycling (except for Germany and Nicaragua). This may be because it is often under the purview of different domestic agencies, and not necessarily seen as relevant for SFM policy.

Frequent measures used to address production and processing efficiency include information campaigns, innovation research, training and advisory services, and legislation

Information-based instruments addressing efficiency issues were mentioned in 34 country reports, most prominently by Belarus and Switzerland. These types

[22] Biomass magazine news, 8 January, 2013.

of instruments can include guidelines, consultancy and advisory services and improved access to information through information technology. Fewer than 25 percent of countries explicitly reported on support to research programmes to improve production and processing efficiency. In Europe, much recent research supported by governments focuses on wood energy opportunities from forests, reducing waste and better waste recycling at the end of a product's life cycle. New Zealand's wood industry is carrying out research on increasing the use of biomass, particularly forest residues. Canada reports measures for exploring new forest products, increasing competitiveness and promoting the development of a renewable bio-economy. Several countries, including Norway, have introduced programmes for innovative use of wood in construction.

Of the 22 recent NFPs or forest policies, three included references to efficiency regulations (Finland, Guyana, Honduras). Several countries, mostly European, reported additional forest waste and efficiency regulations. Examples of recent changes in primary or secondary legislation include Guyana's 2011 Law on Forests which addresses secondary and tertiary processing. Brazil introduced changes to the parameters of forest management on both public and private land, allowing the use of waste wood.

Promoting fair and equitable sharing of benefits from the utilization of traditional forest-related knowledge and practices

Key findings

1. Only a few countries have directly addressed traditional forest-related knowledge and practices (TFRK) in recently enacted national forest policies.
2. A range of countries have taken steps to better understand and document TFRK, including through the mechanisms established in the context of the Nagoya Protocol on access and benefit sharing.
3. Countries strengthen TFRK mostly via improved tenure rights and access to natural resources.

Despite their importance and contributions to socioeconomic and sociocultural benefits, traditional forest-related knowledge (TFRK) and practices are under pressure in many countries. The degree to which TFRK contributes to socioeconomic benefits is poorly understood. Likewise, the negative implications of the erosion of TFRK go largely unrecognized by policymakers.

Few countries reported on measures focusing on traditional forest-related knowledge and practices, but the importance of the sociocultural dimensions of SFM is widely recognized

Reference to significant use of TFRK was found in less than 25 percent of national policies and reports assessed, suggesting that a majority of countries have not tackled this area in national forest policies enacted between 2007 and 2013. Of the 22 most recent NFPs or forest policies, only Argentina, Australia, Costa Rica and Honduras mention protecting TRFK. Nevertheless, a wide range of policy measures and projects are linked to TFRK.

Benefit sharing was addressed in around three-quarters of NFPs or forest policies issued since 2007 and by close to three-quarters of countries in their reports to international bodies. However, almost none of these mentioned traditional forest-related knowledge explicitly. Several policies and programmes did claim to support "fair" or "equitable" benefit distribution, but definitions varied and implementation was often unclear.

Actions by countries tend to focus on documentation, protection and dissemination of TFRK, as a contribution to sociocultural sustainability

The aspects of TFRK most relevant for socioeconomic benefits relate to research, documentation and protection as well as dissemination/education/training. Table 28 shows which of these were reported in projects and policies by the countries surveyed.

Table 28: Countries addressing TFRK-related measures in policies or reports

	Research	Documentation	Protection	Education/ training
Austria		x		x
Canada		x		
China	x		x	x
New Zealand		x	x	x
Norway		x		x
Saint Lucia			x	x
United States of America	x			

China reports efforts to increase the application of TFRK in SFM and forest protection as well as the use of TFRK in forestry enterprises and research institutions. Similarly, Saint Lucia reported on a comparative study of harvesting of frankincense using traditional methods vs. new and improved methods. New Zealand reported on a project on medicinal plants to foster TFRK though the transfer of this knowledge to future generations by recording it using modern technology. The United States of America sponsors university research documenting indigenous wisdom related to traditional non-timber forest products as well as technical outreach to tribal communities.

Most actions to document and share traditional knowledge are part of special programmes (as in New Zealand), including forest museums (as in Austria), forestry extension and teaching programmes that communicate knowledge to children and young people (as in Norway), and integration of TFRK and indigenous participation into management plans (e.g. on indigenous land and in partnership with forest companies as in Canada). The Republic of Korea has established, together with other East Asian countries, the Asian Center for Traditional Forest-related Knowledge as an institutional approach to the preservation of TFRK. Table 29 lists a range of other measures reported.

Several countries envisage the documentation and sharing of traditional knowledge, particularly through their national biodiversity strategies and plans made in accordance with the Convention on Biological Diversity and its related work in the context of the Access and Benefit-Sharing Clearing-House. As an example, indigenous communities from central Africa have been engaged in community mapping initiatives (supported by local and international NGOs) that document their knowledge in the form of land use maps.

The involvement of traditional users in forest policies and planning is featured in over half of the NFPs or forest policies revised since 2007 and in new legislation in a range of countries

Forty-two countries reporting to international bodies included measures regarding the involvement of traditional users. As an example, the Central African Republic's 2008 Forest Code recognizes the traditional rights of local users in protected areas and stipulates that local people living in or adjacent to concessions must be involved in the process of establishing permits. Sri Lanka recently changed its Forest Ordinance by introducing forest agreements for participatory management of forests and benefit sharing. The charter of the French Guyana Amazonian Park uses the principle of prior consent of traditional knowledge holders to ensure the conservation and sustainable use of natural resources guaranteed by a Decree from 2007. Myanmar strengthened participation rights in the conservation of forest resources and newly established forest plantations. Honduras's NFP states that further regulation of the sustainable use of biodiversity will be based on both scientific studies and knowledge from local communities.

Table 29: TFRK measures reported by countries to international bodies

Countries	Measures reported
Austria	Establishment of the Austrian alliance platform to implement the transfer of forest and wood-based knowledge as part of the NFP.
Canada	Desired outcome in the NFP: Aboriginals participate meaningfully in an innovative forest sector, including use of their insights and expertise.
Gambia	Translation of forest policy into local languages to mobilize rural communities to assume greater responsibility for sustainable preservation, conservation, exploitation and utilization of natural resources.
Guyana	Policy recognizes sociocultural services that forests provide to Amerindian people.
Montenegro	NFP prescribes fair distribution of benefits (including fees paid to owners of state and private forests) through involvement and participation of forest users and owners in monitoring and protection of forest resources.
New Zealand	Government Mātauranga Māori fund, designed to "increase iwi and hapu participation in managing biodiversity (including on Māori forestland) in ways that are consistent with customary knowledge and practices".
Niger	NFP prescribes translation into local languages of forest management plans and inclusion of the local population in management.

Box 12 provides information on policy action in Peru and Ecuador.

Box 12: Recognizing rights of indigenous peoples and their cultural and spiritual values – Peru and Ecuador

In Peru, the new forest and wildlife law (Ley Forestal y de Fauna Silvestre) enacted in 2011 recognizes the concept of indigenous peoples' forests and respects their traditional knowledge of forest and wildlife use and management. It also states that indigenous knowledge will be incorporated in the technical regulations regulating community forest management. The law foresees forest management by native communities that is carried out in an autonomous way, in accordance with their world view and with guidelines incorporating their cultural and spiritual values.

The Constitution of Ecuador (2008) guarantees the participation of indigenous peoples and communities in decision-making on activities to be carried out in their territories. The codified forest law and the environmental management law state that indigenous and Afro-Ecuadorian peoples will have priority in the use of community lands and forest products, and that the local authorities must consult these peoples before issuing environmental policies and policies for demarcation, management or administration of conservation areas and ecological reserves.

Revenue and benefit-sharing mechanisms between concessionaires and local communities were addressed by 17 NFPs or forest policies issued since 2007, and by 54 countries in reports to international bodies

Many countries require logging companies or protected area management agencies to share the revenues and benefits from their activities with local communities. However, less than a third of countries mentioned "fair" or "equitable" distribution of benefits in their reports. One benefit-sharing mechanism used is an independent Trust Board to promote the transparent use of funds. For example, in 2011, Liberia's Forestry Development Authority (FDA) created a benefit-sharing trust board to enable transparent distribution of 30 percent of land rental fees to affected communities. In Guatemala, municipalities keep 50 percent of the revenues from concessions and harvesting licences after a process of decentralization in 2004. Equitable distribution of benefits to stakeholders is also taken up in Nicaragua's 2008 NFP.

Many governments, on the basis of international commitments, intend to develop access and benefit-sharing measures for resources as well as protection for intellectual property rights, but progress often remains limited. The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity (CBD) significantly advances the Convention's third objective by providing a basis for stronger legislation and greater transparency for both providers and users of genetic resources. A related clearinghouse mechanism provides information on access and benefit sharing in countries that have ratified the CBD and developed national biodiversity strategies.

Recognizing the range of values derived from forest-related goods and services and reflecting them in the marketplace

Key findings

1. The range of values and benefits provided by forests is widely recognized in NFPs and policies as integral part of sustainable forest management, but few countries have taken concrete measures to deal with this issue in operational planning.
2. Determining a broader range of forest values and recognizing them in national accounting frameworks is being pursued by at least 13 countries. Some countries have established and many have amended their government compensation schemes for providing public goods unrecognized by markets.
3. Payment for ecosystem services through markets continues to be used by some countries, and is being explored and piloted by several others, particularly for recreation, water and carbon.

Recognizing a wide range of forest values is central to achieving SFM. While the value of forest goods, especially wood products, is comparatively well known and often reflected in markets, many forest services are not. Table 30 presents a commonly used classification of services and types of policy measures taken. As long as the value of benefits provided is not measured and not recognized, economic and policy decisions are made on the basis of incomplete and biased information. This is a critical issue for forests, where the value of assets and ecosystem services provided is substantially higher than is currently recognized, particularly in the context of overall governmental planning and budgeting.

Table 30: Types of measures to recognize the range of values of forests and trees, and to reflect them in the market place

Ecosystem services[1]		Types of measures
Supporting services (e.g. nutrient dispersal and cycling, seed dispersal, primary production)		Determining type and magnitude of values of goods and services
Regulating services (e.g. carbon sequestration and climate regulation, waste decomposition and detoxification, purification of water and air, crop pollination, pest and disease control)	<--->	Recognizing values in accounting frameworks and compensation schemes
Provisioning services (e.g. food, water, minerals, biochemical, energy)		Establishing markets where these do not exist
Cultural services (e.g. recreational experiences (including ecotourism), cultural, intellectual and spiritual inspiration)	<--->	Strengthening markets where these are not well developed or functioning

[1] The Millennium Ecosystem Assessment reports (see hyperlinked to WWW.) define ecosystem services as the benefits people obtain from ecosystems and distinguish four categories of ecosystem services, as shown in the table.

Fourteen NFPs or forest policies issued since 2007 explicitly address ecosystem values, but only a few specify concrete action

Most countries have policies, legal frameworks and fiscal mechanisms in place to promote and protect at least some of the non-market benefits that forests provide. For example, almost every country has policies and measures to promote soil and water protection. These programmes are usually managed under specific regimes, paid through specific governmental fiscal or budgeting arrangements, e.g. with regard to hydrological services. Policies thus usually make reference to and recognize that forests protect water catchment areas, help prevent soil erosion, protect infrastructure, etc. and emphasize the importance of forest ecosystem services for community development and reduction of poverty.

The NFPs or forest policies issued by Niger, Panama and Peru refer explicitly to ecosystem values. A range of others address them via specific measures. This includes Cambodia, whose NFP (2009) foresees paying for the conservation of healthy forests through state revenue gained through payments for environmental services such as water supply, infrastructure protection, biological diversity and potential income from carbon sequestration. Uganda's NFP (2011) aims to develop financial instruments for funding the provision of ecosystem services, including in urban and suburban areas to increase aesthetic and environmental values, and provide opportunities for environmental education. The EU Biodiversity Strategy 2011 aims to improve knowledge of ecosystems and their services, including forests, in the EU Member States by assessing the economic value of services, and by promoting the integration of these values into accounting and reporting systems at the EU and national level by 2020 (European Commission, 2011). Australia has published a vision document aiming at greater recognition of forest values and maintaining values through use.

Several countries have taken measures to enhance and promote recreation and ecotourism to provide valuable socioeconomic benefits to citizens

Numerous examples of the promotion of recreational activities are provided in country reports and national

Box 13: Forest tourism as an economic pillar – China

In 2009, the State Council of China announced plans to develop the tourism industry into a strategic pillar of the national economy. Forest-related tourism has developed dramatically since 2001, attracting some 300 million visitors and entry fees (direct income to forest parks) of RMB 22.6 billion (US$3.3 billion) in 2009. According to the Chinese State Forest Administration, a total of 3 000 forest parks will be established, with an estimated expected number of forest tourists of around 500 million in 2015 (Chen and Nakama, 2012). Estimated to have employed some 140 000 full-time workers in 2008, Forest Parks and National Forest Parks are forecasted to directly employ some 273 000 full-time workers in 2015.

Source: Pan, Ma and Zhang, 2011.

■ Cloud forest canopy walk, Costa Rica. Costa Rica's forest strategy prioritizes both climate change mitigation and ecotourism.

© FAO/L. Hamilton

documents. Mostly, countries either take measures to increase physical and/or legal access to forests (see earlier), or to promote forest-based tourism, especially ecotourism. Governments in many countries are increasingly recognizing the relevance of forest-related recreation and tourism, including local tourism around urban conglomerates. For example, Costa Rica is building its forestry strategy on a combination of climate change mitigation and ecotourism. Ecotourism in Madagascar, which contributes 13 percent of national GDP, funds a set of new protected areas within national parks. Niger's recent NFP prescribes support for ecotourism, and Finland has set itself the target of a 25 percent increase in tourism and recreation services in rural areas from 2004 to 2015. Gambia, Germany, Kenya and New Zealand are other countries that have reported measures for promoting ecotourism.

Tourism offers the potential to provide economic development and plays an important role, through the provision of increased income and employment, in conserving nature and generating funding for the maintenance of national parks, as in China (see Box 13), Costa Rica and Madagascar. Countries such as Finland, Germany and New Zealand have emphasized tourism's contribution to the economic diversification of specific regions through the establishment of ecologically sustainable tourism and recreational areas and activities.

Advanced national-level research programmes to classify and quantify ecosystem services exist in at least 6 countries, and 13 or more have made further progress in recognizing forests in their national systems of accounts

As ecosystem services have become politically more relevant, initiatives at the national and international levels have aimed to assess and make explicit the human values provided by certain ecosystem functions.

A few countries have developed national-level research programmes to classify and quantify ecosystem services, such as Israel's National Ecosystem Assessment Program, the UK National Ecosystem Assessment, and the more recent Australian Environmental-Economic Accounts, as well as a review undertaken by the Government of India. The NFP of Cambodia (2009) foresees a full economic assessment of forest products and services to support land-use decisions, including ecosystem functions in relation to water supply, infrastructure protection, biological diversity and potential income from carbon sequestration. Burundi's NFP promotes research for the socioeconomic and ecological values of forest resources.

Costa Rica is one of the first countries to have tackled this area, and is planning to pilot natural capital accounting, including on forests (see Box 14).

Box 14: Costa Rica – natural capital accounting

Costa Rica has started setting up asset accounts for forest and water resources and promotes the valuation of natural capital, ecosystem services, and integrated economic-environmental accounting to generate accurate information on the current use of natural resources for national policy planning. Outcomes will include forest accounts that incorporate physical and monetary values of ecosystem services to inform policy decisions on forest management (including the REDD+ Strategy).

Source: World Bank, 2013.

Colombia has made progress towards renewable resource accounting, with forestry as a priority, focusing on three pilot watersheds. The government of Peru recently produced a first version of a guide to implementing satellite environmental accounts, including pilot physical accounts for forestry. Another pioneer in the 1990s in environmental accounting in Asia, the Philippine government is now working to strengthen environmental and natural capital accounting, with ecosystem accounts that include mangrove forest ecosystems. In India, work on forest accounts is ongoing in the state of Himachal Pradesh. Botswana, one of Africa's leading pilot countries in national environmental and natural resource accounting, is working on natural capital accounts, including for land/ecosystems. Madagascar has undertaken technical studies on the creation of natural capital accounts including forestry. Tunisia undertook an economic valuation of forest goods and services in 2012, with the aim of estimating the total economic value of forests. In Georgia, a leading country in Central Asia, the environment and natural resources are part of the national accounting system.

The Australian Bureau of Statistics began compiling environmental accounts in the early 1990s for a number of environmental assets, including forests and land. These are now an established part of the System of National Accounts. Statistics Canada has worked on integrating natural resource wealth, specifically timber, into the Canadian National Balance Sheet Accounts and into the annual estimates of national wealth. The Government of the United Kingdom has committed to capturing natural values in the nation's balance sheet and its Office of National Statistics published a study in 2013 on measuring natural capital related to forests and water. In 2005, Statistics Norway calculated Norwegian national wealth per capita by using statistics from both the national accounts and the natural resource accounts, including forests.

Many countries continue to use government payment programmes to compensate private providers for the costs of public services not recognized by the market, often in the context of biodiversity protection schemes

Countries with significant private or non-state community-owned or managed forest lands have in particular devised mechanisms to compensate owners of such lands for some of the costs deriving from legal or contractual obligations that restrict forest ownership rights or require actions to ensure the maintenance and provision of public goods. The government acts as a third party, "buying" services on behalf of the public as service consumers. Both the Forest Biodiversity Programme METSO II (2008–2016) in Finland and the KOMET Programme in Sweden provide compensation for limitations placed on forest management in the interests of nature conservation. In industrialized countries, forest-related compensation programmes often form part of agri-environmental schemes or biodiversity protection schemes, including the EU Rural Development Programme 2007–2013 and the US Conservation Stewardship Programme. In developing countries many such schemes focus on reforestation, avoiding deforestation, and SFM more broadly, including Proambiente in Brazil, the Natural Forest Conservation Program and the Sloping Land Conversion Program in China, and Pro-Árbol in Mexico.

Market-based payment for ecosystem services is being further piloted and explored by some countries, particularly for services related to water and carbon

Payment schemes based on bilateral negotiation and contracts between providers and users remain comparatively few. Attention has focused mainly on payment for water services and carbon sequestration, aiming to link international buyers with local providers.

The United Kingdom commissioned a research project on PES that contribute to climate change adaptation, which produced recommendations on incentives for water catchment management. The United States of America aims to facilitate landowner participation in emerging markets for ecosystem services by establishing technical guidelines and a new Office of Environmental Markets (OEM) under the Department of Agriculture, tasked with catalysing the development of markets for ecosystem services.

Payments for carbon sequestration in the context of REDD+ are still in the piloting phase

Market-based systems for carbon have suffered from the prolonged financial and economic crises in Europe, political obstacles in the United States of America, slow progress in negotiations on the United Nations Framework Convention on Climate Change, and the absence of full operational details for REDD+ until late in 2013. However, since 2007 more than 100 REDD+ pilot projects have been implementing, testing and piloting

designs of payment schemes and implementation mechanisms, many of which are located in Indonesia. By late 2013, 17 countries with forest land eligible to receive REDD payments had issued national policies or adopted national REDD+ strategies, and 31 countries had undertaken REDD pilot projects. Some 44 countries have taken legal action (based on case law or civil law) on the definition of carbon rights, and thereby rights to carbon credits. Around seven countries have taken action on safeguards or made efforts to inform and consult with indigenous peoples and local communities on REDD+ as part of the work on establishing REDD payment schemes.

More countries have been establishing national carbon market emission trading schemes (ETS) in recent years, including Australia, China, Costa Rica (in 2013), and the Republic of Korea. Large corporate offset buyers are also active in the Voluntary Carbon Market (VCM), where forestry projects are common. The two first REDD projects to issue credits under the Voluntary Carbon Standard in 2011 were in Belize and Kenya. The first REDD temporary carbon emission reduction (CER) credits were issued in Brazil in 2012.

In a range of countries, forest-related payment schemes have integrated climate change aspects. Guatemala has developed a strategic plan that includes financial mechanisms such as incentive payments for reforestation (PINPEP), afforestation/reforestation under the Clean Development Mechanism, and payments for environmental services, especially water. In Mexico, Pro-Árbol is supporting the incorporation of more land into both community forest management and REDD+. In Brazil, any project funded through the Amazon Fund must comply with Brazil's National Plan on Climate Change, and the Brazilian state of Acre has an environmental service incentive system that includes a REDD+ programme.

PES programmes are often faced with challenges such as incomplete scientific information, difficult contractual contexts, dependence on external funding, and difficulties in identifying providers and users. Many countries have therefore explored and piloted a variety of PES programme designs at different administrative levels, aiming to ensure adequate funding for essential services.

© FAO/E.E. Vaides López

Chapter 5

5 Strengthening the links between policies and benefits

Based on an extensive review of statistics, national reports, policy statements and other documents, *SOFO 2014* presents a considerable amount of information about the socioeconomic benefits derived from forests and the policy decisions that governments have taken during the period 2007–2013 to enhance those benefits. On the basis of the findings of this analysis, recommendations can be made about how to strengthen the links between policies and benefits in the future. In particular, a more concerted effort will be needed to improve the availability of relevant information, including evidence of policy implementation and, ultimately, improvements to well-being.

Key findings and messages

The socioeconomic benefits from forests are mostly derived from the consumption of forest goods and services

The number of people that use forest outputs to meet their needs for food, energy and shelter is in the billions. In addition, large (but currently unknown) numbers may benefit indirectly from the environmental services provided by forests. The number of people that benefit from income and employment generation is relatively small although, if informal activities are included, this nevertheless reaches the tens – if not hundreds – of millions.

Forest policies must explicitly address forests' role in providing food, energy and shelter

Many countries have made great progress in strengthening forest tenure and access rights and supporting forest user groups. Yet there still appears to be a major disconnect between a policy focus on formal forest sector activities and the huge numbers of people using forests to meet their needs for food, energy and shelter.

Many of the socioeconomic benefits from forests are compatible with the development of greener and more sustainable economies

Most people using forest outputs to provide food, energy and shelter live in less developed countries, but the same uses are also increasing in developed countries that aspire towards greener economies. The main difference between the two is the efficiency and sustainability of these uses. Countries should address some of these weaknesses through policy reforms and knowledge and technology transfer, so that the potential for forests to contribute to sustainable development can be realized at a larger scale.

More reliable information about the socioeconomic benefits from forests may help to raise awareness and monitor progress towards sustainable forest management

Information about the socioeconomic benefits from forests available to policymakers is often weak. There is a lack of quantitative information in particular about the socioeconomic benefits from forests provided by services, or indirect benefits. Stronger efforts will be needed to collect data and monitor trends, in collaboration with specialized national agencies.

To meet rising and changing demands, sustainable forest management must include more efficient production

Demand for many of the benefits derived from the consumption of forest products is likely to continue to increase as populations increase, and change as lifestyles change, whether due to the emerging middle class, the global shift to predominantly urban living, or other factors. These demands will have to be met from a static or declining resource. To avoid significantly degrading this resource, more efficient production techniques must be adopted, including in the informal sector.

Summary of the main socioeconomic benefits from forests

This report began by describing how socioeconomic benefits are related to the welfare or well-being of people and noted that forests can increase this in two main ways. The first is through the generation of income in the sector (production benefits) and the second is where the consumption of forest outputs meets a basic human need or contributes to quality of life in other ways (consumption benefits). The remainder of the analysis has then tried to measure some of these benefits in two dimensions, namely the amount of benefits generated and the number of people that receive those benefits.

Table 31 summarizes the socioeconomic benefits from forests, based on the information that is currently available in the results of national censuses, large-scale surveys or other data sources, where there is a reasonable level of confidence in the quality of the data. In the case of production benefits, the figures shown in the table should be considered as minimum estimates, because of a lack of information for some products and countries. The figures for consumption benefits are generally more reliable, but are quite limited in scope. In particular, although they demonstrate how forests contribute directly to meeting basic needs, they do not include many of the less tangible benefits from forests (e.g. environmental services) that may also contribute to these needs or other improvements in quality of life.

Income and income beneficiaries

The table shows that income generated in the formal forest sector was about US$606 billion in 2011, accounting for about 0.9 percent of global GDP. Including income from informal production activities raises this to US$730 billion or 1.2 percent, although it is likely that the estimates of informal income presented here are significant underestimates of the true amounts, due to the lack of available data.

At the regional level, the forest sector makes the highest contribution to GDP in the three less developed regions, with income from outside the formal sector making a significant contribution in Africa and in Asia and Oceania. In Africa in particular, informal income is higher than income generated in the formal sector, resulting in the highest contribution of the forest sector to GDP of all five regions.

It should also be noted that income is likely to be higher than shown here, due to the payment of subsidies to forest owners (which are not included in the calculation of GDP). One such source of income is payments for environmental services (PES), which amounted to about US$2.4 billion in 2011.

The next part of the table shows the numbers of people that benefit from the income generated in the sector. Employment in the formal sector amounts to 13.2 million people in full-time equivalents (FTE), or about 0.4 percent of the global workforce. However, the number of people employed in informal activities is far higher and is estimated to be at least 41 million people. This brings total employment to 54.3 million, or about 1.7 percent of the global workforce.

Employment in commercial production of NWFPs cannot be estimated reliably from the data currently available, so the estimate of informal employment presented here is largely an estimate of informal employment in woodfuel production. However, considering that the estimated value of NWFP production is three times higher than the value of woodfuel production (and that the former is only a partial estimate), it seems possible that informal employment in NWFP production could represent at least an additional 100 million people, giving a total about three times higher than shown here.

Table 31: Summary of the socioeconomic benefits from forests in 2011

	AFR	ASO	EUR	NAM	LAC	World
PRODUCTION BENEFITS						
Income generation (billion US$)						
• Formal sector (value added)	16.6	260.4	164.1	115.5	49.4	606.0
• Informal production (for construction and fuel)	14.4	9.9	-	-	9.0	33.3
• Medicinal plants	0.1	0.2	0.4	n.s.	n.s.	0.7
• Plant-based NWFPs (exc. medicinals)	2.1	63.7	5.5	2.6	3.0	76.8
• Animal-based NWFPs	3.2	3.5	2.1	1.0	0.6	10.5
• Payments for environmental services (PES)	n.s.	1.2	n.s.	1.0	0.2	2.4
Total	**36.3**	**338.8**	**172.2**	**120.1**	**62.2**	**729.6**
(as percent of GDP)	*2.0%*	*1.4%*	*0.9%*	*0.7%*	*1.2%*	*1.1%*
Beneficiaries (millions)						
• Formal sector employment	0.6	6.9	3.2	1.1	1.3	13.2
• Informal employment (for construction and fuel)	19.2	11.6	-	-	10.3	41.0
Total employees	**19.8**	**18.5**	**3.2**	**1.1**	**11.7**	**54.3**
(as percent of workforce)	*4.8%*	*0.9%*	*0.9%*	*0.6%*	*4.1%*	*1.7%*
• Forest owners (families and individuals)	8.2	4.7	7.2	3.3	5.7	29.0
Total beneficiaries (including employees)	**28.0**	**23.2**	**10.4**	**4.4**	**17.3**	**83.3**
(as percent of population)	*2.7%*	*0.5%*	*1.4%*	*1.3%*	*2.9%*	*1.2%*
CONSUMPTION BENEFITS						
Food security: availability (kcal/person/day)						
• Food supply from plant-based NWFPs (kcal/person/day)	2.4	18.8	4.9	6.2	12.4	13.7
• Food supply from animal-based NWFPs (kcal/person/day)	4.7	1.8	4.7	4.6	3.3	2.8
Total food supply from forests	**7.0**	**20.6**	**9.6**	**10.9**	**15.7**	**16.5**
(as percent of total food supply)	*0.3%*	*0.8%*	*0.3%*	*0.3%*	*0.5%*	*0.6%*
Food security: utilization (millions)						
• Number of people using fuelwood to cook	555.1	1 571.2	19.0	n.s.	89.6	2 234.9
• Number of people using charcoal to cook	104.5	59.0	0.2	n.s.	5.4	169.1
Total	**659.6**	**1 630.3**	**19.2**	**n.s.**	**95.0**	**2 404.0**
(as percent of population)	*63.1%*	*38.4%*	*2.6%*	*n.s.*	*15.9%*	*34.5%*
Energy supply (MTOE)						
• From forests	165.7	202.2	41.4	11.0	75.6	495.9
• From forest processing	15.6	91.2	86.7	49.8	33.1	276.5
Total	**181.2**	**293.4**	**128.1**	**60.8**	**108.8**	**772.4**
(as percent of TPES)	*26.9%*	*4.8%*	*4.9%*	*2.5%*	*13.4%*	*6.1%*
Shelter (millions of people using forest products)						
• Use of forest products for house walls	94.0	831.0	32.7	-	68.5	1 026.1
• Use of forest products for house floors	20.2	194.0	28.7	-	25.3	268.3
• Use of forest products for house roofs	124.6	313.6	-	-	43.6	481.8
Use of forest products in any part of housing	**148.2**	**996.6**	**61.5**	**-**	**73.4**	**1 279.6**
(as percent of population)	*14.2%*	*23.5%*	*8.3%*	-	*12.3%*	*18.3%*
Health (millions of people)						
• Use of woodfuel to boil and sterilize water	81.9	644.5	-	-	38.6	765.0
• Use of herbal/home remedies to treat children's diarrhea	232.6	630.8	-	-	169.5	1 032.9
• Deaths due to indoor air pollution (from woodfuel use)	0.5	1.2	n.s.	-	n.s.	1.7

Note: AFR = Africa; ASO = Asia and Oceania; EUR = Europe; NAM = North America; LAC = Latin America and the Caribbean; n.s. = not significant; - = data not available.
This analysis assumes that all income and employment in wood and woodfuel production in Europe and North America is captured in official statistics and recorded as part of the formal sector.

Informal employment is particularly important in the three less developed regions, where it accounts for about 80 percent of the 50 million people employed in forest-related activities. After taking this into account, forest-related activities employ over 4 percent of the workforce in Latin America and the Caribbean and almost 5 percent in Africa. In Asia and Oceania, the estimated share is much lower but, considering that most NWFPs are produced in this region, the true contribution of the sector to employment could be similarly high.

The information available about numbers of private forest holdings suggests that about 29 million people may also receive some of the income generated in the sector as owners of the resource. However, this figure is, again, a large underestimate of the total number of forest owners in the world (due to a lack of data for many countries). In addition, not only is it a partial estimate, but it also excludes the possibly large numbers of people that benefit from communal ownership of forests or other benefit-sharing mechanisms. Data from the FRA about areas of forests where communities have ownership and management rights suggest that this number could be in the hundreds of millions.

Consumption benefits

The lower half of the table above presents estimates of some of the socioeconomic benefits from the consumption of forest outputs showing, in particular, how these outputs meet some of the basic needs of people for food, water, energy, shelter and health.

For food security, the figures above show how forest outputs contribute to two of the four dimensions of food security, namely the availability and utilization of safe and nutritious food. In terms of availability, forests are not a major source of food supply at the global level, with edible NWFPs accounting for only about 0.6 percent of total food consumption (measured in kilocalories). This figure is, no doubt, an underestimate because of missing data, but even if the true figure was three or four times higher, the contribution measured in this way would still be minimal. What may be much more important is the contribution of edible NWFPs to nutrition. NWFPs may provide significant benefits in terms of specific nutrients and improvements in diets, but statistics about this aspect of food supply are unfortunately not available at the national, regional or global level.

At the regional level the situation is similar, although at a higher level of detail the importance of edible NWFPs does start to appear in some cases. For example, in Africa, there are a number of countries where bushmeat makes a significant contribution to meat consumption at the national level (over 25 percent). Moreover, the figures for bushmeat consumption are likely to be underestimates in many cases and are missing for many countries. Edible NWFPs may also be relatively more important than implied here in some localities within countries (e.g. in rural areas and, specifically, for indigenous people living in forested areas).

With respect to utilization, the socioeconomic benefits from forests are much clearer and the data more reliable. Based on the results of national censuses and other recent large-scale surveys, it is estimated that about 2.4 billion people or about one-third of the global population use woodfuel as their main source of energy for cooking. Almost all of this woodfuel use occurs in the three less developed regions, with 1 630 million people using woodfuel for cooking in Asia and Oceania (38 percent of the regional population) and 660 million people or 63 percent of the population in Africa. Data was not available for most developed countries, but it can be safely assumed that the use of woodfuel as the main source of fuel for cooking is likely to be minimal in most of these countries, so the estimated total shown here is probably close to the true amount.[23]

The contribution of forests to the stability of food supply cannot be assessed from national level statistics on the consumption of edible NWFPs, but ample anecdotal evidence suggests that food from forests can play an important role at times when other sources of food are scarce. The role of forests in soil and water conservation is another important contribution of forests to the stability of food supply, although it is currently not possible to quantify this benefit at the global level. The income generated in the sector (described above) also plays a key role in providing economic access to food (i.e. the income to purchase food), which is probably the second most important contribution of forests to food security after the use of woodfuel.

[23] For developed countries, the use of woodfuel for heating is a more relevant measure of how wood is used to meet a basic need for energy. Information about this is incomplete, but the available figures suggest that at least about 90 million people in Europe and North America use woodfuel as their main source of domestic heating.

A broader measure of the contribution of forests to the need for energy is the share of wood energy in total primary energy supply (TPES). At the global level, forests account for about 6 percent of TPES, with about two-thirds of this coming directly from the use of woodfuel and charcoal and one-third from the production of energy (as a by-product) in the forest processing sector. At the regional level, wood energy makes a significant contribution to TPES in Africa (27 percent) and is also quite important in Latin America and the Caribbean. It also currently accounts for five percent of TPES in Europe and this is likely to continue increasing as these countries aim to meet targets for the use of renewable energy.

As an indicator of the way that forests contribute to the need for shelter, statistics were collected about the number of households living in homes made from different materials. Much less information was available about this use of forest products, so it was not possible to create a complete dataset (even for the less developed countries) and the figures shown in the table should be considered a minimum estimate.

The table shows that at least 1.3 billion or 18 percent of the global population live in homes that are made, at least partly, out of forest products. One billion live in homes where the walls are made out of forest products and 500 million live in homes where they are used for roofs. This suggests that maybe 500 million live in homes made mostly out of forest products and the other 800 million live in homes partly made out of forest products.

At the regional level, the largest number and highest proportion of people using forest products for shelter appears in Asia and Oceania (1 billion people or about one-quarter of the population). The use of forest products for the provision of shelter is lower in Africa and Latin America and the Caribbean (partly due to less complete datasets in these regions), but forest products have been used in the construction of 14 percent of African homes and 12 percent of homes in Latin America and the Caribbean.

This measure is a somewhat imprecise indicator of the way that forests contribute to the need for shelter, because forest products are often combined with other materials in house construction. However, it does give a general indication of the importance of forest products for the provision of shelter, especially in less developed regions.[24]

With respect to forests and health, it is not possible to produce a reliable measure of the overall socioeconomic benefits from forests because of the many different ways that forests may contribute to the improvement of human health. Furthermore, while there are very general estimates of the numbers of people relying on traditional medicine as their main source of primary healthcare, the derivation of these numbers is unclear and the figures are so broad that it is difficult to estimate how much of these benefits come from forests. Thus, the figures presented in the table above focus on three specific examples of where good data is available and links between forests and health might be clearly established.

The first figure shows that about 765 million people probably use woodfuel to boil and sterilize water. This is based on the woodfuel figures presented earlier and results from the same surveys showing the numbers of people that treat their drinking water (and how they do this). A number of these surveys also asked about the use of herbal remedies, and the answers to these surveys suggest that over 1 billion people are using herbal and home remedies to treat children's diarrhea. Although the source of these remedies is unknown, medicinal plants from forests will account for a share of this number.

Both of these studies present estimates of the numbers of people using forest products to improve their health but they do not present results in terms of health impacts. At present, the only study that has done this has examined the negative impacts of the use of woodfuel on human health (from smoke inhalation), which has shown that about 1.7 million people might die from this each year. Although this is not a socioeconomic benefit, this figure is presented as an example of how more valid statistics about the links between forests and health might be calculated in the future if the right data were collected.

[24] The analysis presented here is focused on the less developed regions because it is assumed that forest products are used in most cases because they are the only or only affordable source of building materials. Thus, they make a valid contribution to the need for shelter. Wood is also often used in house construction in developed countries, but further work would be required to establish a valid measure of the socioeconomic benefit from this.

The importance of forest benefits for specific groups

The statistics collected for this analysis mostly show how forests and forest products are used to meet various needs at the national level. It is more difficult to quantify exactly how forests contribute to the well-being of specific groups. It is, however, possible to show the correlation between average income in countries and the contribution of forests to various needs and, in several cases, the comparisons show that forests contribute more to income or the satisfaction of needs in poorer countries than they do elsewhere.

It should also be noted that the aggregated figures presented here mask the differences between countries within each region. For example, if the results for each different type of need are combined, there are a number of relatively poor countries (mainly in Africa) where forests meet an overwhelming majority of all basic human needs. Furthermore, if the data was to be analysed at the sub-national level (e.g. at the household level), this correlation between the use of forest products and income levels seems likely to become even stronger. This is actually implicit in the design of many of the large-scale social surveys used as a source of data in this report, where a lot of the information collected about the use of woodfuel or use of wood in construction is collected specifically because it is an indicator of poverty.

With respect to gender, the availability of gender-disaggregated statistics is generally quite high for activities in the formal sector. For informal activities, information is available from small-scale surveys and case studies and, while this is not systematically collected, the results show similar tendencies. Overall, the data collected for this report suggests that women play a relatively minor role in the formal forest sector and in informal activities that generate income. There may be a few exceptions (e.g. income generation from some NWFPs such as shea nuts), but the role of women in production appears to be largely confined to the collection of forest products for subsistence use.

The consumption of forest products (especially NWFPs) is also likely to be important for some population groups, such as: hunter gatherers; forest dwellers and nearby residents; and the disenfranchised and landless who are seeking sustenance from exploiting forest resources as a last resort. There are many small-scale case studies showing how such groups benefit from forests in specific locations, but relevant data is not systematically collected at the national level. Thus, it is not possible to quantify these benefits at the regional or global scale.

Women using leaves for fuel to prepare food, India.

© FAO/S. Karmakar

Summary of the main policy developments since 2007

Virtually every country with significant forest resources has an NFP or similar regime of policies and programmes that address a number of critical forest issues. Countries also usually have policies and instruments in place that address socioeconomic benefits. The number of policies and measures that have been introduced by countries to promote sustainable forest management since 2007 is impressive.

The shifting policy landscape

Over the last few decades, some areas of forestry policy have witnessed substantive shifts in approaches in many countries. These include the adoption of a broader concept of SFM, more emphasis on participation in policy processes and forest management, and more openness to voluntary and market-based approaches as a complement to command-and-control instruments. The continuation of these long-term trends during the 2007–2013 period was largely confirmed by this analysis.

Countries that amend NFPs or forestry policies tend to include SFM as a broad national goal, which is an essential step if the provision of socioeconomic benefits is to be sustained over time. Many countries have taken measures to strengthen the role of stakeholders in developing and implementing such policies, reflecting a broader trend from exclusive state control to governance encouraging stakeholder involvement. This trend also reflects efforts to balance the economic, ecological and social aspects of sustainability.

Relatively few countries specifically address poverty when amending NFPs or forestry policies. This indicates a still dominant technical paradigm of forest management, rather than a people-oriented (social) one. On the other hand, the integration of forestry into wider national poverty reduction strategies has improved. While forests feature in many rural development strategies, alignment of NFPs and forest policies with national strategies for development, energy and food security seems to remain weak.

In many countries, inadequate capacity to implement goals and intentions expressed in NFPs and forestry policies seems to be a major bottleneck when trying to achieve changes on the ground. Comparatively few measures are reported that explicitly address adjustments of institutional frameworks to new needs and modes of governing. New and different capacities are needed to implement SFM with increasingly diverse stakeholders, using a broader range of instruments than in the past.

Policy focus

Many of the measures reported by countries indicate a focus on short- to medium-term measures, particularly in areas where countries are exploring new ways to gain experience. Government administrations are using an increasingly broad range of approaches and instruments to govern forests, including legislative, fiscal, economic and informational instruments, and voluntary agreements with stakeholders. The information available suggests that few countries set goals with specific and measurable targets, define target groups for measures and results chains, or have the capacities to monitor implementation of policies and measures.

Direct benefits through creating employment and income are usually not systematically tackled or explicitly addressed as goals. The absence of concrete goals and the weakness of data on forest-related income and employment are obstacles to a better incorporation of forests into wider rural and other national development strategies. Gender issues and issues of decent employment in a context dominated by the informal economy are often neither acknowledged nor addressed. Improving working conditions for forest workers, especially for those working in informal occupations, is crucial to increase the productivity and sustainability of the sector. Efforts are needed to promote opportunities for skills development, eliminate discrimination and ensure minimum living wages, equal opportunities for women and men, and the elimination of child and forced labour. Extending access to social protection and creating employment opportunities for local people, e.g. through job opportunities in lean seasons through afforestation/reforestation programmes, can substantially enhance the contribution of forests to rural development.

Overall, policies and measures tend to focus on primary products, whereas the development of higher value wood (and to some extent non-wood) products is often absent from the policy agenda. This may reflect a still dominant paradigm of the role of the state as producer rather than facilitator of production, and a lack of policy thinking with respect to processing value chains. Benefits provided through services also tend to remain weakly understood, recognized, or governed.

Some countries promote increased production capacities as a way to strengthen the added value of forest products and thus socioeconomic benefits. In comparison, the promotion of efficient production and processing of forest products is not addressed by many governments, although it is a cost-effective way of increasing the added value of forests. Producing more with less will be an important component in the quest to provide more socioeconomic benefits to a growing society without destroying the resource base. The current situation indicates that progress towards a green economy based on sustainable resource input still has a long way to go, as NFPs and forest policies are seldom designed with forest products value chains in mind.

In Viet Nam, a farmer carries acacia tree seedlings to the forest for planting as part of an afforestation effort. Once planted, the seedlings take five years to grow before they can be cut and converted to lumber for the construction and manufacture of furniture.

Emerging developments in measures and instruments

While forests have largely remained in formal state ownership, there has been a discernible trend over the last few decades to provide more access to forest resources to non-state actors, including local communities, to manage and benefit from resources, particularly in the Latin America and Caribbean region and a few countries in Asia (e.g. China and Viet Nam). Providing access to resources is a strong way to enhance socioeconomic benefits at local levels, including through subsistence use and access to non-cash incomes. In a number of countries where a large part of public forests are managed through concessions, steps have been taken to adjust the modalities of relationships between commercial concessionaires and local communities.

Many countries are supporting access to markets through various types of producer organizations. Allowing and facilitating producer organizations is a powerful way to provide socioeconomic benefits and market access more efficiently. Access to markets often means taking part in the informal economy, which constitutes a large share of the forest products market, particularly at local levels. The absence of references to the informal economy in policies and measures suggests that governments have yet to find ways to address this reality constructively.

Financing SFM by promoting investment has been high on the international political agenda. One mechanism attracting particular attention is the establishment of national forest funds, acknowledging the overarching importance of attracting domestic finance, big and small. At the same time, affordable and reliable access to sources of finance for local and indigenous communities remains an issue to be addressed by policymakers.

Voluntary instruments such as forest certification are increasingly accepted as a useful tool to support and complement government policies towards SFM. They also help strengthen the role of the private sector as an accountable partner. However, many policy challenges remain, including the high cost of certification for small-scale producers, addressing the lack of domestic demand for products that are costlier than products from exploitation, using the purchasing power of governments on markets, and fighting deforestation and illegal logging.

The sociocultural benefits of forests are often of high importance to local and indigenous communities. One way of addressing this is by preserving traditional forest-related knowledge and practices (TFRK) and sharing the tangible and intangible benefits from their utilization. Many countries have taken measures to enhance the involvement of traditional users in forest management, but only a few have addressed TFRK specifically, in which case they have focused on improving the understanding and documentation of TFRK and on adjusting tenure rights to take TFRK into account more effectively.

A small but growing number of countries are starting to highlight the contribution of forests to national wealth (and the negative effects of deforestation) by, for example, developing economic and environmental accounting frameworks. Several countries, particularly in Latin America, are also developing and refining PES schemes (although PES for REDD+ is still largely in the testing and exploration phase). However, many of the services provided by forests (e.g. erosion control, pollination, natural pest and disease control mechanisms) are still largely unrecognized in national policies and measures and, more importantly, very few countries address several of the major benefits highlighted here such as woodfuel, bushmeat and medicinal plant production.

Opportunities to enhance the socioeconomic benefits from forests

The analysis of socioeconomic benefits has shown that many people benefit from the production and consumption of forest products and that the magnitude of those benefits varies greatly depending on the different ways that people use forests to improve their well-being. Thus, for example, at the global level, where an approximate number of the people benefiting from income generation in the formal sector is in the tens of millions, the number benefiting from activities in the informal sector is probably in the hundreds of millions, and the numbers using forest products to meet some of their basic needs is in the billions.

The analysis of policies has shown that there has been an improvement in the recognition of some socioeconomic aspects of forest management (e.g. increased public participation in the sector) as countries have adopted broader approaches to SFM. However, the generation of socioeconomic benefits from forests is rarely a focus of these policies, which still tend to concentrate on the technical aspects of forest management. Where the

benefits of production are addressed in forestry policies, most countries focus on activities in the formal sector (where the number of beneficiaries is relatively low) and very few countries address informal activities or the consumption of forest products in their policies and measures.

These differences between the scale of socioeconomic benefits and the attention given to different socioeconomic aspects of forest management suggest that there are a number of opportunities to enhance the socioeconomic benefits from forests through changes in forestry policies and measures.

Increasing the emphasis on socioeconomic benefits in forestry policies and measures

Countries are taking an increasingly broad view of SFM in their national policies and measures. However, they are often vague with regard to the benefits that people receive from the use of forests. An important step forward would be to adjust forestry policies and strategies so that the ways that people use forests are recognized more explicitly in forestry policy visions, goals, programmes and plans of action. This requires a change in perspective, with less focus on the state as a guardian of forest resources (often defending forests from the people) and more on the needs and preferences of people and society. With respect to the benefits from income and employment, countries should also do more to address gender and decent employment issues, particularly in informal activities that are the dominant source of livelihoods in many rural areas.

Many countries have already taken important steps in this direction. This includes better access to resources, stronger rights for people to manage and extract certain forest products (although often only for subsistence use) and the provision of secure long-term tenure and access to forests, land and trees for indigenous peoples, local communities and private smallholders. Some countries have also helped to improve access to markets (for income and employment generation) by, for example, strengthening legal frameworks and capacities for small-scale forest enterprise and producer organizations. These developments must now be consolidated to ensure that they become real drivers of rural development and growth.

Addressing the sustainability of production

In many respects, the reluctance of forestry administrations to address some of the socioeconomic benefits from forests may be rooted in concerns about the impact of numerous small-scale producers on the sustainability of forest management. Thus, for example, three of the most significant benefits derived from the consumption of forest products are the use of bushmeat as an important source of animal protein, the use of forest products as local building materials and the use of woodfuel for cooking. But, in many countries, hunting is largely banned (or at least highly restricted), the local production of sawnwood (by chainsaw or pit sawing) is often prohibited and even woodfuel collection may be restricted in some cases. Thus, three of the most important uses of forests are technically illegal in many places.

Attempts to strengthen the sustainability of forest management through the prohibition of certain activities not only fail to recognize the importance of these socioeconomic benefits, but are also unlikely to succeed. Such approaches are also very simplistic when compared to the significant efforts that countries are making to improve the sustainability of production in the (often much smaller) formal forest sector.

Replacing the current emphasis on prohibition with one of sustainable production will be a major challenge for forestry administrations in many places due to the large numbers of people involved in informal activities. However, the measures already taken to strengthen property rights and local control over forest resources has already given local producers more of a stake in the long-term sustainability of the resource, and improvements in organization (producer cooperatives, etc.) may provide a mechanism for more effective engagement with informal producers. What is now required is technical assistance and extension on a large scale, in collaboration with the private sector and non-governmental and civil society organizations, to strengthen the sustainability of these activities. This has already been done in some cases, and the challenge for countries and development agencies is now to take the best of these examples and apply the lessons learned at a larger scale.

Increasing the efficiency of production and consumption

One important aspect of the sustainability of the socioeconomic benefits from forests is the efficiency of their production and use. Demand for many of the benefits derived from the consumption of forest products is likely to continue to increase in the future as populations increase. These demands will have to

be met from a static (or more often declining) resource base at the same time as other demands on forests are increasing. If these demands are to be met without significantly degrading the resource, then informal producers will have to be supported in adopting more efficient production techniques.

Another related factor that needs to be taken into account is the amount of time that people spend on informal production of forest outputs, either for sale or for their own subsistence use. This is presented in the analysis here as an indicator of the importance of these benefits (i.e. the numbers of people engaged in different activities), but time is really a cost of production that should be reduced, if possible, to allow people to engage in other activities. Increasing the efficiency of production by reducing labour and material inputs could lead to significant benefits both in terms of the sustainability of resource use and the possibility of freeing up time for income generation in other activities. This is particularly important in the case of woodfuel collection, where hundreds of millions of people (mostly women) spend large amounts of their time trying to meet their basic need for energy.[25]

A more ambitious aspiration would be to go beyond simply reducing costs to improve the level of benefits derived from some of these activities. For example, developed countries are increasingly interested in the benefits of greener economies, notably regarding quality of life and living environment. Many less developed countries' economies already share various characteristics of a green economy (high use of renewable materials, bioenergy and natural products, and high numbers of people engaged in the production of these materials), but their production processes and value chains are not well developed. There may be an opportunity for less developed countries to move towards more highly developed green economies in some areas, rather than following the more traditional development path that often results in greater recourse to fossil fuels and other non-renewable resources as well as social and environmental problems.

The potential to move along a path of development that is both green and economically rewarding will differ among countries and some forest outputs can contribute better to this than others. Wood energy, however, is a promising area for many countries. Its supply can often be increased sustainably through tree planting in small woodlots and agroforestry; improved technologies and techniques for charcoal making are relatively easy to introduce; and there may be untapped potential to generate energy by using wood residues from the processing industry. In terms of utilization, there are also likely to be opportunities for improvements through, for example, better cookstoves that would reduce both the amount of wood required to meet energy needs and the negative health effects of cooking with wood. Similarly, forest products could contribute better to food security, shelter and health through a clearer understanding of how they really benefit people and how they can be utilized more effectively.

Measuring performance and raising awareness

Many of the ideas presented above are ambitious and likely to require shifts in the focus of forestry policies. This needs to be backed by significant investments in developing the capacities of forestry administrations to deliver and implement these policies and programmes, jointly with other bodies, public and private. A central challenge for many countries is how to redirect and strengthen the capacity of institutions to ensure the sustainable use of forests by multiple stakeholders with differing needs. This raises the question of financing. Making a case for investing in capacities to manage forests for people requires evidence of the benefits they provide and, ultimately, evidence that amended policies have resulted in improvements to human well-being.

As shown earlier, information is already available about many of the socioeconomic benefits from wood production (formal income and employment generation and the use of wood for energy and shelter). However, forestry administrations rarely produce information about the numbers of people that benefit concretely and in different ways from forests. Given that development policies tend to be people-focused, collecting data and reporting on the numbers of people that receive socioeconomic benefits is crucial.

One area where these statistics are deficient concerns the numbers of people engaged in different informal activities in the sector. This information could feasibly be improved. At a minimum, forestry administrations should improve their reporting of benefit sharing to show the benefits received through revenue sharing and similar

[25] For example, a reduction of one percent in the amount of woodfuel required to meet energy needs (e.g. through improved cookstoves) would increase the availability of labour for other activities by an amount equivalent to about one million people in full-time employment.

arrangements in production forest areas. It should also be feasible to improve the measurement of benefit sharing through community forests and other areas where local people have access and management rights. For all of the above, the numbers of people benefiting should be a priority for measurement and reporting rather than the areas of forests where such arrangements exist.

Another priority should be to try to improve statistics on the distribution of benefits between men and women and produce information about activities that are particularly important for disadvantaged groups such as indigenous people and the rural poor.

To measure the importance of other informal activities in the sector it will be necessary to collaborate with other statistical efforts, such as population and agricultural censuses and surveys of household incomes and living standards. Such surveys do exist in many countries and, depending on how important forest-based activities are for local livelihoods, the agencies in charge of such surveys may be interested in collecting this information to get a more complete picture of socioeconomic developments in a country.

For the benefits from the consumption of forest products for food security and health, existing information is limited and weak, so a more concerted effort will be required to strengthen the availability of relevant information. However, there are also many existing surveys of health and nutrition in countries (often supported by international donors) and if the potential benefits can be clearly identified then there may be scope for collaboration. As a first step in this direction, countries would be encouraged to define the most important issues in these areas and how forests may contribute in addressing them.

Better evidence is needed to help re-direct policies towards more effectively enhancing the socioeconomic benefits of forests. Implementation of policies can be substantively and efficiently enhanced by strengthening monitoring of their implementation. Ultimately, evidence is also needed that amended policies have resulted in improvements to human well-being. All of this requires amendments to existing monitoring and information systems that countries use to inform policymaking.

Securing funding to improve information on the socioeconomic benefits from forests is likely to remain a challenge in many places. However, as experiences from data collection on health, nutrition and education have shown, focusing on measuring people rather than forest areas is likely to be a more attractive proposition for national and international agencies that support these types of surveys. In addition, where resources are available to measure forest resources or other activities in the sector, countries might consider how they can collect information of more relevance to the measurement of socioeconomic benefits as part of this process.

■ Boat builders in Nouhoun-Bozo, Mali, shape wood to be used in the construction of large boats. They are a major supplier of boats to the large river port town of Mopti, about 75 km downriver.

Building a better future with forests

The analysis presented here has shown how large numbers of people benefit from forests in a variety of ways. Although it has focused mainly on forests' contribution to meeting basic needs (which are more important in less developed countries), it should also be noted that the socioeconomic benefits from forests change as countries develop. Thus, for example, in developed countries there is almost no reliance on woodfuel for cooking, but there is growing interest in using wood products in green buildings, because of their reduced environmental impact and the contribution that this makes to improved quality of life. Similarly, the benefits of forests for health are being increasingly recognized, with rising demand for medicinal plants and natural organic food, not to mention growing numbers of people visiting forests for exercise, recreation and entertainment. These have not been studied in detail here due to a lack of information, but these other forest uses are receiving increasing attention in developed countries, with their emphasis on multiple-use forestry and the management of forest areas for outputs usually classified as forest services.

As countries work towards a more sustainable and greener future, demands will increase for many of the benefits that can be produced by forests. There is therefore a potential for forests to make an even greater contribution to socioeconomic development in the future.

A common theme throughout this publication has been the importance of putting people at the centre for both the measurement of socioeconomic benefits and the development of policies and measures to enhance these benefits. If this is done, it seems likely that the socioeconomic benefits from forests can be developed to meet the growing demands of society while maintaining the integrity of the forest resource base. This will improve the prospects for sustainable forest management and demonstrate how forests should be conserved for the multiple benefits that they provide. This publication has suggested some ways that this might be done and it is now up to countries to take action.

References

Arora, A. & Tiwari, G. 2007. *A handbook for socio-economic impact assessment (SEIA) of future urban transport (FUT) projects*. Transportation Research and Injury Prevention Program (TRIPP). New Delhi, India, Indian Institute of Technology (available at http://tripp.iitd.ernet.in/publications/paper/SEIA_handbook.pdf).

Bannerman, R.H. 1982. Traditional medicine in modern health care. *World Health Forum*, 3:8–13.

Byron, N. & Arnold, J.E.M. 1997. *What futures for the people of the tropical forests?* CIFOR Working Paper No. 19. Bogor, Indonesia, CIFOR (available at http://www.cifor.org/ntfpcd/docs/pub-owp.htm).

CEPF. 2013. *Family forestry*. Article published on CEPF website (available at http://www.cepf-eu.org/side.cfm?ID_kanal=2).

Chao, S. 2012. *Forest peoples: Numbers across the world*. Moreton-in-Marsh, United Kingdom, Forest Peoples Programme (available at www.forestpeoples.org).

Chen, B. & Nakama, Y. 2012. Thirty years of forest tourism in China. *Journal of Forest Research*, June. DOI 10.1007/s10310-012-0365-y.

China State Forestry Administration. 2012. *China Forestry Development Report*. Beijing, China State Forestry Administration.

Cushion, E., Whiteman, A. & Dieterle, G. 2009. *Bioenergy development: Issues and impacts for poverty and natural resource management*. Agriculture and Rural Development Series. Washington DC, World Bank (available at http://elibrary.worldbank.org/doi/book/10.1596/978-0-8213-7629-4).

Damm, O. & Tribel, R. 2008. *A synthesis report on biomass energy consumption and availability in South Africa*. A report prepared for ProBEC, GTZ.

European Commission. 2011. *Communication from the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions – Our life insurance, our natural capital: an EU biodiversity strategy to 2020* (available at: http://ec.europa.eu/environment/nature/biodiversity/comm2006/pdf/2020/1_EN_ACT_part1_v7%5B1%5D.pdf).

European Commission. 2013. *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – A new EU Forest Strategy: for forests and the forest-based sector* (available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2013:0659:FIN:en:PDF).

EU Standing Forestry Committee. 2010. *Public procurement of wood and wood-based products*. Final Report to the Standing Forestry Committee by the Standing Forestry Committee Ad Hoc Working Group IV on Public Procurement of Wood and Wood-based Products 2010 (available at http://ec.europa.eu/agriculture/fore/publi/wg4-112010_en.pdf).

FAO. 2001. Synthesis of country reports prepared for the regional forestry meeting “Reform of fiscal policies in the context of national forest programmes in Africa”, Abuja, Nigeria, 13-16 November 2001. Forest Finance Working Paper – FSFM/MT/01. Rome (available at http://www.fao.org/forestry/finance/67775/en).

FAO. 2005. *A system of integrated agricultural censuses and surveys. Volume 1 – World Programme for the Census of Agriculture 2010*. FAO Statistical Development Series No. 11. Rome (available at www.fao.org/docrep/009/a0135e/A0135E00.htm).

FAO. 2010. *Global Forest Resources Assessment 2010: Main Report*. FAO Forestry Paper 163. Rome (available at http://www.fao.org/docrep/013/i1757e/i1757e.pdf).

FAO. 2012a. *FRA 2015 Terms and Definitions*. Forest Resources Assessment Working Paper 180. Rome (available at http://www.fao.org/docrep/017/ap862e/ap862e00.pdf).

FAO. 2012b. *Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security*. Rome (available at http://www.fao.org/docrep/016/i2801e/i2801e.pdf).

FAO. 2012c. *Unlocking national opportunities: New insights on financing sustainable forest and land management*. FAO, Global Mechanism, Tropenbos International, National Forest Programme facility, ITTO.

FAO. 2013a. FAOLEX – FAO's online database of national laws and regulations on food, agriculture and renewable natural resources. URL: http://faolex.fao.org.

FAO. 2013b. FAOSTAT – FAO's online database for food and agriculture statistics. URL: http://faostat.fao.org.

FAO. In press. *Contribution of the forest sector to national economies, 1990-2011*. Forest Finance Working Paper – FSFM/ACC/09. Rome.

FAO. N.d. National forest programme/forest policy document database. URL: http://www.fao.org/forestry/country/61838/en/.

Farnsworth, N.R., Akerele, O. & Bingel, A.S. 1985. Medicinal Plants in Therapy. *Bulletin of the World Health Organization,* 63: 965–981.

FOREST EUROPE. 2011. *State of Europe's forests 2011: Status and trends in sustainable forest management in Europe*. Oslo, Norway, FOREST EUROPE Liaison Unit (available at http://www.foresteurope.org/reporting_SFM).

Global Land Cover Facility. N.d. MODIS Vegetation Continuous Fields (dataset). URL: http://glcf.umd.edu/data/vcf.

Government of Montenegro. 2008. *National Forest Policy of Montenegro: Forests for the Future of Montenegro.* National Forest and Forest Land Administration Policy. Document adopted by the Government of Montenegro (Ref No:03-3982), April 2008.

Government of Nepal. 2013. Leasehold Forestry and Livestock Programme website (available at http://www.lflp.gov.np/).

IEA. 2013. *2013 Key World Energy Statistics*. Paris, IEA (available at http://www.iea.org/publications/freepublications/publication/KeyWorld2013_FINAL_WEB.pdf).

ILO. 2013a. ILOSTAT – International Labour Organization database on labour statistics. URL: www.ilo.org/ilostat.

ILO. 2013b. *Measuring informality: A statistical manual on the informal sector and informal employment*. Geneva, ILO (available at http://www.ilo.org/global/publications/ilo-bookstore/order-online/books/WCMS_222979/lang--en/index.htm).

ITTO. 2005. *Revised ITTO criteria and indicators for the sustainable management of tropical forests including reporting format*. ITTO Policy Development Series No. 15. Yokohama, Japan, ITTO (available at http://www.itto.int/policypapers_guidelines).

ITTO. 2011. *Status of tropical forest management 2011*. ITTO Technical Series No. 38. Yokohama, Japan, ITTO (available at http://www.itto.int/news_releases/id=2663).

Lambert, J., Srivastava, J. & Vietmeyer, N. 1997. *Medicinal plants – Rescuing a global heritage*. Washington, DC, International Bank for Reconstruction and Development/World Bank.

Landscan. 2010. Landscan Global Population Database. URL: http://www.eastview.com/online/landscan.

Lebedys, A. 2008. *Contribution of the forest sector to national economies 1990-2006*. Working Paper FSFM/ACC/08. Rome (available at http://www.fao.org/forestry/finance/52843/en).

Lynch, O.J. & Talbott, K. 1995. *Balancing acts: Community-based forest management and national law in Asia and the Pacific*. Washington DC, World Resources Institute.

Madubansi, M, & Shackleton, C M. 2007. Changes in fuelwood use and species selection following electrification in the Bushbuckridge Lowveld, South Africa. *Journal of Environmental Management*, 83: 416–26.

Maslow, A.H. 1943. A theory of human motivation. *Psychological Review*, 50(4): 370–96.

MCPFE. 2003. *Relevant definitions used for the improved pan-European indicators for sustainable forest management*. Ministerial Conference for the Protection of Forests in Europe, Liaison unit, Vienna, Austria (available at http://www.foresteurope.org/docs/reporting/CI_Definitions_used.pdf).

MEA. 2005. *Ecosystems and human well-being. Findings of the Scenarios Working Group.* Washington DC, Island Press (available at http://www.unep.org/maweb/en/index.aspx).

Montréal Process. 2009. *Criteria and indicators for the conservation and sustainable management of temperate and boreal forests*. Fourth edition, October 2009 (available at http://www.montrealprocess.org/Resources/Publications/index.shtml).

Pan, J., Ma, H. & Zhang, Y. 2011. *Green economy and green jobs in China: Current status and potentials for 2020*. Worldwatch Report No. 185. Washington DC, Worldwatch Institute (available at http://www.worldwatch.org/system/files/185%20Green%20China.pdf).

Peters-Stanley, M., Gonzalez, G., Yin, D. 2013. *Covering new ground: State of the forest carbon markets 2013*. Washington DC, Forest Trends' Ecosystem Marketplace (available at http://www.forest-trends.org/fcm2013.php).

Rates, S.M.K. 2001. Plants as source of drugs. *Toxicon,* 39: 603–613.

Republic of Kenya, Ministry of Environmental and Natural Resources. 2007. *Sessional Paper N°1 on Forest Policy* (available at http://theredddesk.org/sites/default/files/government_of_kenya_2007_forest_policy.pdf).

RRI. 2013. *Landowners or laborers: What choice will developing countries make?* Rights and Resources Initiative Annual Review 2012–2013. Washington DC, RRI.

Ruiz Pérez, M. & Arnold, J.E.M., eds. 1996. *Current issues in non-timber forest products research*. Bogor, Indonesia, CIFOR-ODA (available at: http://www.cifor.org/publications/ntfpsite/pdf/NTFP-current.pdf).

Sheya, M.S., & Mushi, S.J. 2000. The state of renewable energy harnessing in Tanzania, *Applied Energy*, Vol. 65: 257–71.

Schure, J., Ingram, V., Sakho-Jimbira, M.S., Levang, P. & Wiersum, K.F. 2013. Formalization of charcoal value chains and livelihood outcomes in Central and West Africa. *Energy for Sustainable Development*, 17(2): 95–105.

UN. 2000. *Charting the progress of populations*. ST/ESA/SER.R/151. New York, United States of America, UN Department of Economic and Social Affairs: Population Division (available at http://www.un.org/esa/population/publications/charting/charting.htm).

UN. 2008. *Non-legally binding instrument on all types of forests*. United Nations General Assembly Resolution A/RES/62/98. New York, United States of America, UN (available at http://www.un.org/en/ga/search/view_doc.asp?symbol=A/RES/62/98&Lang=E).

UN. 2010. *2010 Energy Balances and Electricity Profiles*. New York, United States of America, UN Statistics Division (available at http://unstats.un.org/unsd/energy/balance).

UN. 2012a. National Accounts Main Aggregates Database. New York, United States of America, UN Statistics Division (available at http://unstats.un.org/unsd/snaama).

UN. 2012b. *Compendium of Housing Statistics 2011*. New York, United States of America, UN Statistics Division (available at http://unstats.un.org/unsd/default.htm).

UN. In press. *The value of forests: Payment for ecosystem services in a green economy*. Geneva Timber and Forest Study Paper No. 34. ECE/TIM/SP/34, Geneva, UN.

UNECE & FAO. 2013. *Forest products annual market review 2012–2013* (available at http://www.unece.org/fileadmin/DAM/timber/statsdata/fpamr-tables-2013.pdf).

UNIDO. 2013. INDSTAT4 – 2013 edition at the 3- and 4-digit level of ISIC Revision 3. Vienna, Austria, UNIDO. URL: http://www.unido.org/en/resources/statistics/statistical-databases/indstat4-2013-edition.html.

University of Reading. 2000. *Numbers of forest dependent people: A feasibility study*. Reading, United Kingdom, Calibre Consultants and the Statistical Services Centre, University of Reading (available at http://r4d.dfid.gov.uk/Output/177117/Default.aspx).

Vermeulen, S.J., Campbell, B.M., & Mangono, J.J. 2000. Shifting patterns of fuel and wood use by households in rural Zimbabwe. *Energy and Environment*, Vol. 11: 233–54.

WCFSD. 1997. *Our future our forests: Final report of the World Commission on Forests and Sustainable Development*. Geneva, WCFSD (summary available at http://www.iisd.org/pdf/wcfsdsummary.pdf).

Whiteman, A., Broadhead, J., & Bahdon, J. 2002. The revision of woodfuel estimates in FAOSTAT. *Unasylva*, 53(211): 41–45 (available at ftp://ftp.fao.org/docrep/fao/005/y4450e/y4450e07.pdf).

Whiteman, A. 2005. *A review of the forest revenue system and taxation of the forest sector in Fiji*. Forest Finance Working Paper – FSFM/MISC/10. Rome, FAO (available at http://www.fao.org/forestry/finance/52843/en).

Whiteman, A. 2013. Global trends and outlook for forest resources. *In* T. Fenning, ed., *Challenges and opportunities for the world's forests in the 21st century*. Forestry Sciences 81. Dordrecht, Netherlands, Springer Science and Business Media.

WHO. 2002. *Traditional Medicine Strategy 2002–2005*. Geneva, WHO.

WHO. 2007. *Indoor air pollution: National burden of disease estimates*. Report No. WHO/SDE/PHE/07.01 rev, Geneva, WHO (available at http://www.who.int/indoorair/publications/indoor_air_national_burden_estimate_revised.pdf).

WHO & UNICEF. 2010. *Progress on sanitation and drinking-water: 2010 update*. WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation. Geneva, WHO (available at http://www.unicef.org/eapro/JMP-2010Final.pdf).

World Bank. 2002. *A revised forest strategy for the World Bank Group*. Washington, DC, World Bank (summary available at http://go.worldbank.org/3RTJP883K0).

World Bank. 2013. *The Global Partnership on Wealth Accounting and the Valuation of Ecosystem Services (WAVES) Annual Report 2013*. Washington, DC (available at http://documents.worldbank.org/curated/en/2013/04/17938923/wealth-accounting-valuation-ecosystem-services-global-partnership-2013-annual-report/).

Zulu, L.C. & Richardson, R.B. 2013. Charcoal, livelihoods, and poverty reduction: evidence from sub-Saharan Africa. *Energy for Sustainable Development*, 17: 127–37.

Annexes

Annex 1. Data sources used to assess the socioeconomic benefits from forests

Most of the data used in this report was obtained from national censuses, national accounts statistics and other large-scale surveys implemented by international agencies such as the World Bank, UNICEF, WHO, FAO and USAID. In addition, literature reviews and internet searches were used to provide information on specific benefits such as payments for environmental services (PES), benefit sharing and income and employment in informal activities.

This annex describes how data and other information about socioeconomic benefits can be assessed, then provides details about the data sources and estimation methodologies used for the analysis presented in this report.

Assessment of data quality

Any measure of socioeconomic benefits should be evaluated against the quality criteria set out in statistical theory, as well as practical considerations such as the costs of data collection and the ease with which the data can be analysed, presented and understood. Data quality is usually assessed against three main criteria (reliability, precision and validity) and these are briefly explained as follows.

Reliability: In statistics, reliability reflects the extent to which the data collected is representative of the population. If the data is not representative, then the measure based on that data is said to be biased. There are a number of different ways that data can be biased, most commonly due to problems with sample selection (e.g. where data is collected from firms or individuals that are not representative of the population). For example, industrial production and employment surveys often collect data only from firms above a minimum size, so if there is a large informal sector (as there is in forestry in some countries) then the data will not be representative of the sector as a whole.

Similarly, correlation between the collection of data and the nature of production can lead to other problems of bias. For example, honey and mushrooms are non-wood forest products (NWFPs) that can be collected "in the wild" from forests or can be produced commercially by farmers. Data on income and employment from the production of these NWFPs is more likely to be collected from the latter group because they are easier to survey. However, production outside forest areas cannot really be counted as a socioeconomic benefit of forests (a "system boundary" problem).

A third problem occurs when estimates of socioeconomic benefits are derived from literature reviews. For example, it is quite common for studies to collate results from numerous village-level case studies and, on that basis, produce estimates for a country or region. Another example is where socioeconomic data is collected as part of forest inventories, where the sampling scheme has been designed to represent the forests in a country but is highly unlikely to represent the population. In both cases, estimates will probably be biased upwards if the data is collected from people that are more likely to be engaged in forest-related activities than the general population.

Precision: The level of precision of any estimate reflects the variability in the underlying data and the amount of data used to produce the estimate (i.e. sample size). Precision increases if the data is less variable or sample sizes are larger (i.e. there is less chance that the estimate is incorrect due to random error). Thus, data collected from large-scale surveys or censuses is likely to be more precise than data collected from smaller ad hoc data

collection exercises.[26] Similarly, measures calculated from subjective estimates (e.g. expert opinion) rather than objective data are usually less precise, because they introduce a second source of random error (i.e. the expert) into the calculation. An ideal measure of socioeconomic benefits should be accurate, meaning that it is both reliable (unbiased) and precise.

Validity: Validity is a broader concept than reliability and precision and there are three main types:

- Construct validity refers to the extent to which a measurement reflects the variable of interest. For example, if public recreation is a socioeconomic benefit from forests, then quantification of that use (e.g. forest visitor numbers) is a better indicator than the area of forests managed for recreation because it is a better indicator of how forests are actually used to improve the quality of life.
- Content validity is similar to this and is concerned with whether a measure covers all aspects of the underlying concept. For example, as already noted, income and employment in agriculture may not be valid measures of the socioeconomic benefits of agriculture on their own, because they do not reflect whether a country has an adequate food supply. Given the multiple outputs from forests and the many different ways that they may contribute to socioeconomic well-being, it is likely that a combination of measures will be required to reflect all of the socioeconomic benefits from forests.
- Convergent validity is the third type of validity and reflects whether a measure is consistent with other similar measures and theory. For example, estimates of employment in a country from a business survey and a population census should be similar or this would indicate a problem in survey methodology. Alternatively, within a country it might be expected that woodfuel use should be correlated with forest cover in different areas, but if this correlation does not appear then this could indicate problems with the survey methodology (or some other factor that should be taken into account in the analysis). Convergent validity is important when data is collected and synthesized from many different sources, as the lack of a standardized approach means that the figures may reflect different definitions, methodologies and techniques. If the data points collected in this way are close (convergent) or the differences can be explained by theory, then the calculations based on that data have a high degree of convergent validity.

The data currently collected about socioeconomic benefits (see Chapter 2) and the data collected for this report (described below) have been assessed against these criteria to try to improve the information available about the different socioeconomic benefits from forests.

Income and employment benefits

Forest sector value added: Information about gross value added (GVA) in 2011 was obtained from the United Nations Statistics Division (UN, 2012a), which collects the data from national statistical agencies.[27] As this takes place as part of the compilation of national income accounts, the data quality is generally very high. The availability of information was also very high, corresponding to 99 percent of the global production of forest products in 2011.

In countries where information was not available (mostly in Africa), GVA was estimated using the value added per unit of production in neighbouring countries, to give a complete data set for the whole world. The other main problem with this data was the exclusion of value added from small-scale and informal production in some countries. Some countries do not collect information on value added from enterprises below a certain size (e.g. China and India), so these figures underestimate the total value added in the production of roundwood, sawnwood, panels, pulp and paper.

Benefit sharing: As most benefit-sharing schemes are found in tropical countries, information was collected mainly from the ITTO (2011) report on criteria and indicators and an earlier study of forest revenue systems in Africa (FAO, 2001). These reports presented qualitative information about benefit-sharing mechanisms but no quantitative information about the value or amount of benefit transfers or even the numbers of people receiving such benefits, and were therefore not useful for further analysis.

Payments for environmental services (PES): Information about PES in forestry was collected through a literature search and from a number of online databases.

[26] A similar issue occurs when data is available from a number of countries and these results are used to produce global estimates by interpolating results for missing countries. This will result in less precise estimates and can lead to bias if the procedures used to interpolate data are not considered carefully. The same is true if a mixture of recent and older data from countries is used to produce regional or global estimates.

[27] The forest sector corresponds to Divisions 2, 16 and 17 of the International Standard Industrial Classification of All Economic Activities, Rev.4.

The search was limited to schemes that have been making payments since 2005. In many cases, details of PES schemes referred to payments over several years, so it was assumed that payments were spread evenly over the different years of the scheme. The results presented in the report may underestimate the total income generated by PES because of the limitations of the data sources. In particular, very little information was discovered about PES in Europe, where it is likely that the total amount of income generated from such payments is higher than shown.

A total of 31 national forest-related PES schemes were identified, including 3 in Africa, 7 in Asia, 5 in North America and 16 in Latin America. Within the regions, a small number of countries accounted for many of the schemes (e.g. China, Costa Rica, Mexico and the United States of America) and the size of individual schemes was variable, from many millions of dollars (US) spent on PES in China to only a few thousand dollars in some places. In addition to these national schemes, information was also collected about forest carbon payments in each region.

Income from informal wood production: Income from informal wood production was estimated for the production of woodfuel and charcoal as well as for the unrecorded production of forest products used in house construction. The analysis was restricted to less developed regions where it is likely that income from these activities is not included in the national accounts due to difficulties in collecting this information (Schure *et al.*, 2013).

Information about woodfuel collection (production) time and the time taken to make charcoal was collected from a literature search of over 90 peer reviewed journals, workshop proceedings, book chapters and project documents. The information was critically reviewed and results from secondary or desk research were filtered out to avoid double-counting and potential problems of reliability. From this search, the results of 74 studies from 33 countries were used to calculate the time spent on woodfuel collection and charcoal production, with countries from all three less developed regions represented in this sample.[28]

[28] About 35 percent of the data came from surveys implemented during the last decade, one-quarter came from the 1990s and another quarter from the 1980s, with a few results from the 1970s. Although some of these figures are now dated, they were included because of the scarcity of available information.

The results of these studies were then converted into a common unit of labour productivity (the number of hours required to produce 1 m^3 of woodfuel or 1 kg of charcoal) and regional averages were used to estimate employment in woodfuel production from the production statistics for countries in each region. The data collected about woodfuel use (see below) was used to estimate production for both urban and rural areas and it was assumed that income and employment is only generated from woodfuel produced for urban areas (as woodfuel used in rural areas is mostly collected for subsistence use and cannot be counted as an income-generating activity). This procedure also involved calculating the respective share of labour inputs for men and women, to enable the subsequent production of gender-disaggregated estimates.

The final stage of the analysis was to estimate the income that might be generated from this employment. Detailed information on woodfuel production costs and prices (to calculate net income) is not generally available, so the information about value added in formal forestry activities and woodfuel prices (from FAOSTAT) was examined to get a general indication of the income that might be generated from the production of woodfuel. This gave estimates of daily income from fuelwood production of about US$3.00 in Africa and US$2.50 in the other two regions, with daily income from charcoal production estimated at US$3.00 in Africa and US$5.00 in the other two regions. These estimates were combined with the estimates of total employment to calculate total income generated from woodfuel production.

For income from the production of forest products used for domestic house construction, information collected about housing materials was used to estimate the size of the domestic market for forest products in each country. As already noted, informal production is often omitted in national income account statistics, and FAOSTAT statistics for domestic consumption of forest products also appear to underestimate the size of the domestic market, resulting in unrealistically low estimates of per capita wood product consumption in some countries.

Annual consumption of forest products used for house construction was estimated from the average floor area per person in countries (UN, 2000), the proportion of the housing stock where forest products are used for walls, floors and roofs, estimates of the amount of forest products used in each of these components of a house and an estimate of how often these components have

to be replaced (depreciation). The end result was an estimate of consumption that was compared with the FAOSTAT statistics for each country. In any country where this estimate was more than half of the total domestic consumption shown in FAOSTAT, it was assumed that informal production accounted for the difference and the value added per cubic metre of production (in the formal sector) was used to estimate the income generated from this production.

Income from production of non-wood forest products (NWFPs): Estimates of the income from the production of medicinal plants were based on the results of FAO's Global Forest Resources Assessment (FRA) (FAO, 2010). The FRA reported the total value of medicinal plant collection in 2005 and these figures were used as the estimate of income. The figures could not be updated to 2011 and, as they do not take into account production costs, represent a very imprecise estimate of income. Examination of the literature on medicinal plant production also showed that income could be far greater than reported in the FRA, depending on how much of the income and employment generated along the value chain is counted as a socioeconomic benefit from forests. This lack of a clearly defined system boundary is a major uncertainty in all of the figures presented in the literature on medicinal plants.

For bushmeat (or game) and other NWFPs, statistics on gross production value in 2011 were taken from FAOSTAT and used as estimates of income. Statistics for agricultural production in FAOSTAT include about 90 products that may, in some cases, be collected from forests. However, many of these products are likely to be produced mostly on agricultural land (i.e. cultivated production rather than collection from forests). Thus, the data collected and analysed here was restricted to 11 products that either come from forest tree species or are likely to be produced in significant amounts in forest areas.[29]

As noted above, gross production value is not the same as income, and the difficulty of drawing the line between production from forests and production from other areas means that the estimates are imprecise. It also appears, from a comparison between these figures and similar data reported in the FRA (for 2005), that the global value and volume of NWFP production (estimated from this data source) may be significantly underestimated due to a lack of data for many countries.

Formal sector employment: Information about employment in the forest sector in 2011 was collected from the International Labour Organization (ILO) labour statistics database (ILO, 2013a) and the Industrial Statistics Database (INDSTAT 4) of the United Nations Industrial Development Organization (UNIDO, 2013). National statistical sources were used to obtain information for countries not covered by these two global databases and the quality of this information is likely to be good.

The availability of information was also high, with information available for countries accounting for 96 percent of global industrial roundwood production and 99 percent of the production of other forest products. To fill gaps and avoid underestimation, the procedures used to impute values for countries with no available data were the same as those used to complete the dataset on value added (see above).

Informal employment: A major weakness of official statistics is their exclusion of activities in the informal sector. Estimates of informal employment were therefore generated wherever possible, using estimates of labour productivity (employment per unit of output) and production statistics. In addition, because informal employment is often only part-time, estimates of informal employment were converted to full-time equivalents (FTE) for comparability with official statistics and to avoid overestimation. This is important to note, as studies that discuss the importance of forestry for rural income and employment generation often fail to convert figures to FTE and thereby present misleading figures.

Estimates of informal employment in woodfuel and charcoal production were produced as described above. The number of people collecting woodfuel for subsistence use was also estimated (both in total and converted to FTE). In addition, employment in the informal production of construction materials was also estimated as described above, using labour productivity in the formal sector and estimates of unrecorded production.

Unfortunately, little information could be obtained about labour productivity or employment in the collection of NWFPs or other minor wood products (e.g. handicrafts). Therefore, employment in these activities could not be estimated and the figures presented are likely to be

[29] The products included are: Brazil nuts; bushmeat (game); chestnut; coconuts and copra; karite nuts (sheanuts); kola nuts; mushrooms and truffles, natural gums; natural honey; natural rubber; and walnuts.

a large underestimate of the total number of people employed in informal activities.

Forest ownership: Information about private forest ownership was collected from two main sources. For Europe, it was collected primarily from the State of Europe's Forests report (FOREST EUROPE, 2011). In addition to this, information was collected from the results of agricultural censuses published since 2000 plus, in a few cases, other national statistical sources (e.g. websites of forest owner organizations). As the sources report on the number of forest holdings rather than the number of households that own forests, the former was assumed to be a good proxy for the latter. However, it should be noted that agricultural censuses report on forest ownership solely in the context of agricultural holdings, so estimates based on this data may underestimate the total number of households that own forests.

Information on forest ownership was available for 42 countries covering almost 200 million ha of privately-owned forest or 27 percent of the global area of privately-owned forest reported in the FRA (FAO, 2010). The figures for Europe are the most complete (covering about 62 percent of privately-owned forest in this region), but relatively little information was available for the other regions, particularly Africa and Asia and Oceania.

An attempt was also made to estimate the numbers of people that may benefit from communal ownership of forests, by combining detailed statistics about the areas of forest in different ownership categories (from the FRA) with statistics on population density (i.e. to estimate the numbers of people living in forests in different ownership categories). However, a comparison of the results for private individuals owning forests calculated by this method with the numbers of forest holdings (in countries where this information was available) suggested that the approach would not produce reliable estimates. Thus, in the absence of any other reasonable methodology for estimation or any other suitable data, it was not possible to produce estimates for this group of people and the estimated numbers of people that benefit from forest ownership (presented later) are likely to represent a significant underestimate of the true number.

Consumption benefits

To measure the socioeconomic benefits that people receive from the consumption of forest outputs, two different approaches were taken. For some types of benefit, the number of people that use forest outputs to meet a specific human need was estimated (e.g. the number of people cooking with woodfuel). For other benefits, where the use of forest outputs contributes only partially to meeting a need, the amount of consumption was estimated as well as its contribution to meeting that need (e.g. the share of wood energy in total energy consumption). Due to a lack of data, it was not possible to go beyond showing how forest outputs are used to meet basic needs (for food, energy, shelter, etc.), so the results given present a limited view of the consumption benefits provided by forests, which are, in many cases, of relevance only for less developed regions.

Consumption of food from forests: Statistics for the production and trade of edible NWFPs in 2011 were taken from FAOSTAT. These were used to calculate food supply in kg per person per year and were then converted to food supply in kilocalories per person per day (kcal/person/day) to assess their contribution to total food intake (from FAO's food balance sheets). As noted previously (with respect to the value of this production), the available information appears to be far from complete and figures presented later probably underestimate significantly the global consumption of food from forests.

Wood energy consumption: To assess the contribution of wood energy to meeting energy needs, the share of wood energy in the total primary energy supply (TPES) in countries was calculated. TPES is the total amount of energy used in a country (from all sources) and is measured using a common unit. In this case, TPES and wood energy consumption were measured in million tonnes of oil equivalent (MTOE), where one MTOE equals approximately 3.8 million m^3 of wood.

Information about TPES was collected from the energy statistics produced by the International Energy Agency (IEA) and the United Nations Statistics Division (UNSD). IEA statistics report TPES in 2011 for 134 countries and the UNSD statistics show TPES in 2010 for another 81 countries. The latter were used as estimates of TPES in 2011 and, with the addition of statistics for another 7 countries (from national sources), information about TPES was obtained for every country in the world.

For wood energy consumption, woodfuel consumption statistics were taken from FAOSTAT. These statistics cover every country in the world, but are estimated in many cases (for further explanation, see Whiteman, Broadhead and Bahdon, 2002), which affects their accuracy. In addition to this, estimates of the amount

of wood energy produced and used as a by-product of the forest processing industry were taken from a recent study produced by the World Bank and FAO (Cushion *et al.*, 2009). The data in this study was originally collected from the IEA database and referred to the year 2005, but this was updated to produce estimates for 2011 by taking into account changes in the level of production of forest products from 2005 to 2011.

Numbers of people using wood energy: The measurement unit chosen for this benefit was the proportion (and number) of people using woodfuel as their main source of fuel for cooking.

Information about the proportion of households using woodfuel for cooking was taken from the results of national population censuses and a number of other large-scale surveys. The latter included: Living Standards Measurement Studies (LSMS) supported by the World Bank; UNICEF's Multiple Indicator Cluster Surveys (MICS); WHO's World Health Survey (WHS); and the Demographic and Health Surveys (DHS) supported by USAID. The majority of the data used in the analysis came from surveys implemented in 2005 or later and all of the figures used were converted to an estimate for 2011, by multiplying the survey results by changes in per capita woodfuel consumption between 2011 and the survey year (calculated from FAOSTAT and UN population statistics).[30]

From the sources mentioned above, estimates of the proportion of households using woodfuel for cooking were available for 134 countries, accounting for 83 percent of the global population. Most of the countries where data was unavailable were in developed regions (where this information is probably not collected due to the insignificant numbers of people using woodfuel for cooking) whereas for the few less developed countries where data was not available, regional averages were used as estimates. The final data set is therefore likely to be representative of the world as a whole.

Numbers of people using forest products for shelter: The proportion (and number) of people using forest products for their housing was used here as a measure of this socioeconomic benefit. This is most relevant for people living in less developed countries, where informal production and collection of forest products for construction is likely to be more common. However, information was collected for developed countries as well (where available) and is presented in the analysis.

Information about the proportion of households living in properties made from forest products was taken from the results of censuses and other large-scale surveys (described previously). Many of these surveys include questions about the main type of materials used for the floor, walls and roof of the place where each household lives, because this is an indicator of household wealth. Wood and other forest products are frequently included among the possible answers to these questions and the results of these surveys provide a large dataset that can be used to estimate the numbers of households and people that live in buildings made partly or wholly from forest products.

From these surveys, estimates of the use of forest products for house construction were available for 90 countries, accounting for 75 percent of the global population, with almost all of the information coming from less developed countries. Again, most of the data came from surveys implemented in 2005 or later but, in this case, it was not possible to adjust the data so the latest available figure was used as an estimate for 2011. The results varied considerably among the different countries, so no attempt was made to produce estimates for countries without any data and the results presented later are minimum estimates for each region and the world as a whole. However if information was available in a country about the use of forest products in only one or two parts of a building (i.e. floor, walls and roof), regional averages were used to produce estimates for the missing data so that figures were available for all three parts of a building.

Impacts of forest products on human health: Information about the use of medicinal plants was collected from a literature search focusing, in particular, on studies produced or supported by WHO. Many of these studies quote estimates of the numbers of people using medicinal plants as a source of primary health care, although the evidence to support the numbers quoted is weak. However, in the absence of other figures, some of these numbers are presented in the text. In addition, the results of large-scale surveys (from the MICS and DHS) were also examined to see if more

[30] The validity of this conversion was confirmed in the countries where census results were available for two different years. For example census results were available for India in 2001 and 2011 and for China in 2000 and 2010 and the declines in the proportion of households using woodfuel for cooking (reported in the two censuses) matched almost exactly the declines in per capita woodfuel production in both of these countries.

reliable figures could be obtained and two very specific benefits could be identified and measured. These were the numbers of households using woodfuel to boil and sterilize water and the number of households where a home remedy or herbal medicine had been used to treat a child's diarrhea.

Overall, apart from the lack of any systematic collection of data on this subject, there are two other major problems with the data that is generally available on the use of medicinal plants. The first is that the product being measured is often not clearly defined in such studies. So, for example, some studies refer to traditional medicine while others refer to home remedies or herbal medicines. Some studies refer to specific products that can be clearly identified as medicinal plants coming from forests, but these are usually small pharmacological studies examining the efficacy of these products. The latter highlights the second problem, which is that medicinal plants lead to benefits for human health only if they are effective and, given the vast number of different products used, it is difficult to measure these benefits precisely.

In light of the difficulties of definition and measurement mentioned above, the accuracy and validity of the figures relating to health that are presented in the report are likely to be low and it seems unlikely that it will be possible to improve the measurement of these benefits without a more systematic approach to data collection.

Annex 2. Contribution of the formal forest sector to employment and GDP, 2011

Country / area	Employment					Gross value added				
	Roundwood production	Wood processing	Pulp and paper	Total for the forest sector		Roundwood production	Wood processing	Pulp and paper	Total for the forest sector	
	(1 000)	*(1 000)*	*(1 000)*	*(1 000)*	*(% of total labour force)*	*(US$ million)*	*(US$ million)*	*(US$ million)*	*(US$ million)*	*(% contribution to GDP)*
Burundi	1	0	0	2	0.0	12	58	0	71	3.2
Cameroon	11	9	2	22	0.3	519	108	68	695	2.82
Central African Republic	4	2	0	6	0.3	61	10	1	72	3.5
Chad	1	0	–	1	0.0	73	0	–	73	0.7
Congo	7	3	0	9	0.5	47	102	–	149	0.9
Democratic Republic of the Congo	15	1	–	16	0.1	29	56	–	85	0.6
Equatorial Guinea	1	0	–	1	0.2	33	3	–	36	0.3
Gabon	14	6	0	21	3.4	74	347	1	422	1.8
Rwanda	2	1	–	2	0.0	140	8	–	148	2.5
Saint Helena, Ascension and Tristan da Cunha	–	–	–	–	–	–	–	–	–	–
Sao Tome and Principe	–	–	–	–	–	–	–	–	–	–
Total Central Africa	**55**	**23**	**3**	**80**	**0.1**	**988**	**693**	**71**	**1 752**	**1.6**
Comoros	–	–	–	–	–	26	–	–	26	3.9
Djibouti	–	–	–	–	–	0	–	–	0	0.0
Eritrea	0	0	0	0	0.0	0	0	0	1	0.0
Ethiopia	2	2	4	9	0.0	860	4	30	894	3.2
Kenya	1	10	7	18	0.1	251	25	89	365	1.2
Madagascar	4	41	1	45	0.4	371	23	8	401	4.3
Mauritius	1	1	1	2	0.3	6	2	18	26	0.3
Mayotte	–	–	–	0	0	–	–	–	0	0
Réunion	0	0	0	0	0.1	5	16	16	36	0.2
Seychelles	0	–	–	0	0	0	–	–	0	0.0
Somalia	0	1	–	1	0.0	24	0	–	24	2.6
South Sudan	–	–	–	–	–	–	–	–	–	–
Uganda	3	8	1	12	0.1	570	15	5	590	3.4
United Republic of Tanzania	3	1	3	7	0.0	598	13	2	613	2.7
Total East Africa	**14**	**64**	**17**	**94**	**0.1**	**2 713**	**97**	**167**	**2 977**	**2.1**
Algeria	1	11	2	13	0.1	40	122	68	229	0.1
Egypt	12	3	24	39	0.1	77	22	344	443	0.2
Libya	1	1	0	2	0.1	33	10	3	46	0.1
Mauritania	0	0	0	0	0.0	2	0	–	2	0.1

Country / area	Employment					Gross value added				
	Roundwood production	Wood processing	Pulp and paper	Total for the forest sector		Roundwood production	Wood processing	Pulp and paper	Total for the forest sector	
	(1 000)	*(1 000)*	*(1 000)*	*(1 000)*	*(% of total labour force)*	*(US$ million)*	*(US$ million)*	*(US$ million)*	*(US$ million)*	*(% contribution to GDP)*
Morocco	12	9	4	25	0.2	106	85	138	330	0.3
Sudan	1	3	1	5	0.0	26	34	57	117	0.2
Tunisia	3	17	3	23	0.6	62	175	99	337	0.8
Western Sahara	–	–	–	–	–	–	–	–	–	–
Total Northern Africa	**29**	**44**	**33**	**107**	**0.1**	**346**	**447**	**710**	**1 504**	**0.2**
Angola	1	1	0	2	0.0	33	18	1	51	0.1
Botswana	1	1	0	2	0.2	90	0	8	97	0.7
Lesotho	0	0	–	0	0.0	19	–	–	19	0.8
Malawi	1	1	0	3	0.0	42	5	6	53	0.8
Mozambique	19	3	0	22	0.2	305	9	17	330	2.8
Namibia	0	0	0	0	0.1	–	9	0	10	0.1
South Africa	63	43	41	147	0.8	1 386	989	1 326	3 702	1.0
Swaziland	2	2	2	6	1.4	10	10	44	65	2.0
Zambia	2	1	2	5	0.1	851	192	159	1 203	6.2
Zimbabwe	1	2	6	9	0.1	182	21	63	266	3.4
Total Southern Africa	**89**	**56**	**52**	**197**	**0.3**	**2 917**	**1 254**	**1 624**	**5 795**	**1.1**
Benin	2	0	–	2	0.0	129	16	0	145	2.2
Burkina Faso	2	15	0	17	0.2	308	0	–	309	3.5
Cabo Verde	1	1	–	1	0.6	8	1	–	10	0.6
Côte d'Ivoire	21	11	1	33	0.4	146	187	44	377	1.7
Gambia	2	0	0	2	0.3	5	0	0	5	0.6
Ghana	8	27	1	37	0.3	1 025	249	13	1 287	3.5
Guinea	9	1	–	10	0.2	206	14	–	220	4.3
Guinea-Bissau	1	0	–	1	0.1	19	2	–	21	2.4
Liberia	2	1	–	3	0.2	144	16	–	160	15.2
Mali	1	0	–	1	0.0	423	0	–	423	4.4
Niger	1	0	–	1	0.0	149	0	–	149	2.5
Nigeria	30	3	11	44	0.1	906	14	72	992	0.4
Senegal	13	0	1	14	0.3	130	16	16	162	1.3
Sierra Leone	1	0	0	1	0.0	224	1	0	225	7.9
Togo	1	1	–	1	0.0	43	9	–	53	1.6
Total West Africa	**94**	**60**	**13**	**168**	**0.2**	**3 864**	**527**	**146.5**	**4537**	**1.3**
Total Africa	**282**	**246**	**118**	**646**	**0.2**	**10 828**	**3 018**	**2 719**	**16 565**	**0.9**

Country / area	Employment					Gross value added				
	Roundwood production	Wood processing	Pulp and paper	Total for the forest sector		Roundwood production	Wood processing	Pulp and paper	Total for the forest sector	
	(1 000)	*(1 000)*	*(1 000)*	*(1 000)*	*(% of total labour force)*	*(US$ million)*	*(US$ million)*	*(US$ million)*	*(US$ million)*	*(% contribution to GDP)*
Armenia	3	1	1	5	0.3	8	2	8	17	0.2
Azerbaijan	2	2	1	4	0.1	1	5	10	16	0.0
Georgia	8	3	1	11	0.5	49	7	6	61	0.5
Kazakhstan	7	1	3	11	0.1	86	40	48	173	0.1
Kyrgyzstan	3	1	0	4	0.2	3	2	3	9	0.2
Tajikistan	2	0	0	2	0.1	2	4	0	5	0.1
Turkmenistan	9	0	–	9	0.4	1	0	–	1	0.0
Uzbekistan	7	0	0	7	0.1	5	2	6	14	0.0
Total Central Asia	**41**	**8**	**5**	**54**	**0.1**	**155**	**61**	**81**	**297**	**0.1**
China	1 021	1 304	1 516	3 841	0.5	32 386	41 120	53 013	126 519	1.6
Democratic People's Republic of Korea	11	2	1	14	0.1	340	74	42	456	2.9
Japan	70	124	181	375	0.6	1 995	9 247	28 757	39 999	0.7
Mongolia	0	1	0	2	0.2	5	8	3	16	0.2
Republic of Korea	31	17	53	101	0.4	1 246	1 309	5 632	8 186	0.8
Total East Asia	**1 132**	**1 449**	**1 751**	**4333**	**0.5**	**35 972**	**51 758**	**87 446**	**175 176**	**1.2**
Bangladesh	1	23	20	44	0.1	1 349	60	49	1 458	1.3
Bhutan	1	2	–	3	0.7	58	8	–	67	3.8
India	246	246	215	707	0.1	28 097	352	2 509	30 958	1.7
Maldives	–	–	–	–	–	–	–	–	–	–
Nepal	12	4	3	20	0.1	55	14	37	105	0.6
Pakistan	32	4	17	53	0.1	539	110	670	1 319	0.6
Sri Lanka	15	3	5	23	0.3	326	24	46	395	0.7
Total South Asia	**307**	**282**	**262**	**851**	**0.1**	**30 424**	**568**	**3 311**	**34 302**	**1.6**
Brunei Darussalam	1	0	–	2	0.8	2	8	–	10	0.1
Cambodia	0	7	0	7	0.1	338	10	43	390	3.2
Indonesia	103	211	131	445	0.4	5 904	1 805	6 860	14 570	1.7
Lao People's Democratic Republic	5	3	0	8	0.2	162	3	0	164	2.1
Malaysia	43	104	63	210	1.7	3 051	1 613	1 038	5 702	2.0
Myanmar	27	6	3	36	0.1	223	24	7	254	0.5
Philippines	10	24	14	49	0.1	89	191	248	529	0.2
Singapore	0	2	4	6	0.2	–	67	190	258	0.1
Thailand	31	125	79	235	0.6	308	1 168	1 693	3 169	0.9
Timor-Leste	–	–	–	–	–	4	–	–	4	0.1
Viet Nam	29	129	93	251	0.5	843	598	915	2 356	1.7
Total Southeast Asia	**249**	**613**	**387**	**1249**	**0.4**	**10 923**	**5 487**	**10 995**	**27 406**	**1.2**

Country / area	Employment					Gross value added				
	Roundwood production	Wood processing	Pulp and paper	Total for the forest sector		Roundwood production	Wood processing	Pulp and paper	Total for the forest sector	
	(1 000)	*(1 000)*	*(1 000)*	*(1 000)*	*(% of total labour force)*	*(US$ million)*	*(US$ million)*	*(US$ million)*	*(US$ million)*	*(% contribution to GDP)*
Afghanistan	–	1	–	1	0	32	3	–	35	0.2
Bahrain	–	0	0	0	0.0	–	1	7	9	0.0
Cyprus	1	3	1	4	0.7	1	84	26	111	0.5
Iran (Islamic Republic of)	6	10	19	35	0.1	429	295	473	1 197	0.2
Iraq	–	0	5	5	0.1	–	11	11	22	0.0
Israel	1	5	7	13	0.4	–	203	538	741	0.3
Jordan	0	4	4	8	0.5	–	34	96	129	0.5
Kuwait	–	1	2	4	0.3	–	24	91	115	0.1
Lebanon	0	1	4	6	0.4	1	37	118	155	0.4
Occupied Palestinian Territory	–	2	1	3	0.3	–	32	29	61	0.7
Oman	–	3	1	3	0.3	–	52	59	111	0.2
Qatar	–	7	0	7	0.5	–	117	12	130	0.1
Saudi Arabia	1	20	17	38	0.4	–	306	2 414	2 720	0.4
Syrian Arab Republic	2	25	4	30	0.5	6	197	50	253	0.4
Turkey	37	68	48	152	0.6	3 077	1 058	1 497	5 632	0.8
United Arab Emirates	–	1	6	7	0.1	–	–	480	480	0.1
Yemen	–	15	3	19	0.3	–	96	45	141	0.5
Total Western Asia	**48**	**166**	**122**	**337**	**0.3**	**3 545**	**2 550**	**5 946**	**12 041**	**0.4**
Total Asia	**1 778**	**2 518**	**2 527**	**6 823**	**0.3**	**81 019**	**60 424**	**107 780**	**249 222**	**1.1**
Albania	2	1	0	3	0.2	59	8	17	83	0.7
Andorra	–	0	0	0	0.7	–	–	–	–	–
Austria	17	33	15	65	1.5	1 716	3 017	2 411	7 143	1.9
Belarus	36	47	29	113	2.5	286	195	94	575	1.1
Belgium	3	13	13	28	0.6	160	1 066	1 441	2 667	0.6
Bosnia and Herzegovina	7	5	1	13	0.9	159	81	14	254	1.6
Bulgaria	18	22	10	50	1.4	135	151	196	482	1.0
Croatia	10	12	3	26	1.3	336	302	143	782	1.5
Czech Republic	27	64	19	109	2.1	1 453	1 257	767	3 477	1.8
Denmark	5	9	5	19	0.7	378	652	481	1 511	0.5
Estonia	6	15	1	21	3.1	310	460	77	847	4.3
Faroe Islands	0	–	–	0	0	0	–	–	0	0
Finland	25	27	23	75	2.8	4 019	1 581	4 045	9 645	4.3
France	29	69	63	161	0.6	3 509	4 736	6 310	14 555	0.6
Germany	48	134	135	317	0.7	3 044	9 189	13 901	26 135	0.8

Country / area	Employment					Gross value added				
	Roundwood production	Wood processing	Pulp and paper	Total for the forest sector		Roundwood production	Wood processing	Pulp and paper	Total for the forest sector	
	(1 000)	*(1 000)*	*(1 000)*	*(1 000)*	*(% of total labour force)*	*(US$ million)*	*(US$ million)*	*(US$ million)*	*(US$ million)*	*(% contribution to GDP)*
Gibraltar	–	–	–	–	–	–	–	–	0	0
Greece	4	21	8	33	0.6	71	654	313	1 038	0.4
Guernsey	–	–	–	–	–	–	–	–	–	–
Holy See	–	–	–	–	–	–	–	–	–	–
Hungary	19	22	15	56	1.3	280	288	436	1 005	0.9
Iceland	0	0	0	0	0.3	0	26	3	29	0.2
Ireland	3	5	2	10	0.5	218	295	230	744	0.4
Isle of Man	–	–	–	0	0	–	–	–	0	0
Italy	27	149	82	258	1.0	821	7 127	7 063	15 011	0.8
Jersey	–	–	–	–	–	–	–	–	–	–
Latvia	17	23	2	41	3.5	863	741	53	1 657	6.5
Liechtenstein	0	0	0	0	2.1	2	12	–	14	0.2
Lithuania	8	17	3	29	1.7	225	517	173	916	2.4
Luxembourg	0	1	0	1	0.5	17	62	60	139	0.3
Malta	0	0	0	1	0.3	0	5	10	15	0.2
Monaco	–	–	–	0	0.0	–	–	–	0	0
Montenegro	0	1	0	2	0.6	2	13	4	18	0.5
Netherlands	2	15	19	36	0.4	79	1 453	2 003	3 535	0.5
Norway	6	14	5	24	0.9	846	1 349	239	2 434	0.6
Poland	48	147	57	251	1.4	1 826	2 919	2 325	7 070	1.6
Portugal	10	41	12	63	1.1	956	1 075	1 251	3 281	1.6
Republic of Moldova	5	0	1	6	0.5	12	11	6	29	0.5
Romania	22	76	14	112	1.1	917	1 806	357	3 079	1.9
Russian Federation	228	261	111	600	0.8	2 767	5 108	5 200	13 075	0.8
San Marino	–	0	0	0	2.2	–	–	–	–	–
Serbia	6	15	14	36	0.9	85	113	202	401	1.1
Slovakia	25	30	7	62	2.2	731	894	421	2 046	2.4
Slovenia	11	10	4	25	2.4	269	306	214	788	1.8
Spain	33	75	54	162	0.7	1 554	3 242	4 800	9 596	0.7
Svalbard and Jan Mayen Islands	–	–	–	–	–	–	–	–	–	–
Sweden	33	35	32	100	2.0	5 894	2 681	5 266	13 841	2.9
Switzerland	5	33	10	48	1.1	401	3 460	1 313	5 175	0.8
The former Yugoslav Republic of Macedonia	3	2	2	7	0.7	30	14	17	61	0.7
Ukraine	65	48	29	142	0.6	439	423	646	1 508	1.0
United Kingdom	18	58	58	134	0.4	479	3 416	5 593	9 488	0.4
Total Europe	**828**	**1 550**	**860**	**3 238**	**0.9**	**35 347**	**60 705**	**68 095**	**164 147**	**0.9**

Country / area	Employment					Gross value added				
	Roundwood production	Wood processing	Pulp and paper	Total for the forest sector		Roundwood production	Wood processing	Pulp and paper	Total for the forest sector	
	(1 000)	*(1 000)*	*(1 000)*	*(1 000)*	*(% of total labour force)*	*(US$ million)*	*(US$ million)*	*(US$ million)*	*(US$ million)*	*(% contribution to GDP)*
Anguilla	–	–	–	–	–	0	–	–	0	0.0
Antigua and Barbuda	–	–	–	–	–	–	–	–	–	–
Aruba	–	0	0	0	0.3	–	–	–	–	–
Bahamas	0	0	0	0	0.1	0	0	3	3	0.0
Barbados	0	0	1	2	1.1	0	10	46	56	1.5
Bermuda	–	0	0	0	0.1	0	1	–	1	0.0
Bonaire, Sint Eustatius and Saba	–	–	–	–	–	–	–	–	–	–
British Virgin Islands	–	–	–	0	0	0	–	–	0	0.0
Cayman Islands	–	–	–	0	0	–	–	–	0	0
Cuba	15	8	2	25	0.5	15	87	2	104	0.2
Curaçao	–	–	–	–	–	–	–	–	–	–
Dominica	–	–	–	–	–	1	–	–	1	0.3
Dominican Republic	0	2	9	11	0.2	6	–	15	21	0.0
Grenada	0	0	0	0	0.3	2	–	–	2	0.2
Guadeloupe	–	–	–	–	–	0	0	–	0	0.0
Haiti	1	0	0	1	0.0	6	1	1	8	0.1
Jamaica	0	1	1	2	0.2	4	3	58	64	0.5
Martinique	0	–	–	0	0.0	0	0	–	0	0.0
Montserrat	–	–	–	–	–	0	–	–	0	0
Puerto Rico	–	1	2	3	0.2	–	55	72	128	0.1
Saint Barthélemy	–	–	–	–	–	–	–	–	–	–
Saint Kitts and Nevis	0	–	–	0	0	0	–	–	0	0.1
Saint Lucia	–	–	–	0	0	0	0	4	5	0.4
Saint Martin (French part)	–	–	–	–	–	–	–	–	–	–
Saint Vincent and the Grenadines	–	–	0	0	0.2	0	–	–	0	0.1
Sint Maarten (Dutch Part)	–	–	–	–	–	–	–	–	–	–
Trinidad and Tobago	1	2	2	4	0.6	17	8	62	87	0.4
Turks and Caicos Islands	–	–	–	0	0	–	–	–	–	–
United States Virgin Islands	–	0	0	0	0.1	–	–	–	–	–
Total Caribbean	**17**	**14**	**18**	**49**	**0.3**	**52**	**165**	**263**	**479**	**0.2**

Country / area	Employment					Gross value added				
	Roundwood production	Wood processing	Pulp and paper	Total for the forest sector		Roundwood production	Wood processing	Pulp and paper	Total for the forest sector	
	(1 000)	*(1 000)*	*(1 000)*	*(1 000)*	*(% of total labour force)*	*(US$ million)*	*(US$ million)*	*(US$ million)*	*(US$ million)*	*(% contribution to GDP)*
Belize	0	2	0	2	1.4	4	10	1	15	1.1
Costa Rica	2	5	7	15	0.7	136	53	202	391	1.0
El Salvador	9	6	4	19	0.7	172	2	171	345	1.6
Guatemala	13	1	2	15	0.3	403	8	51	462	1.0
Honduras	2	9	2	13	0.4	87	34	25	146	0.8
Nicaragua	15	1	–	16	0.7	104	28	8	140	1.6
Panama	2	1	2	5	0.3	53	7	32	92	0.3
Total Central America	**44**	**25**	**17**	**85**	**0.5**	**958**	**143**	**491**	**1 592**	**1.0**
Canada	47	112	75	234	1.2	5 759	6 679	7 351	19 789	1.2
Greenland	0	–	–	0	0	–	–	–	–	–
Mexico	9	19	15	43	0.1	1 180	1 866	3 908	6 954	0.6
Saint Pierre and Miquelon	0	–	–	0	0.0	–	–	–	–	–
United States of America	122	327	378	827	0.5	20 264	22 100	53 300	95 664	0.6
Total North America	**177**	**458**	**469**	**1 104**	**0.5**	**27 203**	**30 645**	**64 559**	**122 407**	**0.7**
Total North and Central America	**238**	**497**	**503**	**1 239**	**0.5**	**28 213**	**30 952**	**65 314**	**124 479**	**0.7**
American Samoa	–	–	–	–	–	–	–	–	–	–
Australia	11	40	15	67	0.6	1 119	3 975	2 587	7 682	0.9
Cook Islands	–	–	–	–	–	–	–	–	–	–
Fiji	1	1	1	4	1.0	22	24	15	62	2.0
French Polynesia	0	0	0	0	0.2	–	–	–	–	–
Guam	0	–	–	0	0.0	–	–	–	–	–
Kiribati	–	–	–	–	–	0	–	–	–	–
Marshall Islands	–	–	–	–	–	–	–	–	–	–
Micronesia (Federated States of)	–	–	–	–	–	–	–	–	–	–
Nauru	–	–	–	–	–	–	–	–	–	–
New Caledonia	0	0	0	0	0.1	4	1	–	5	0.1
New Zealand	7	16	5	28	1.2	1 147	1 066	706	2 919	2.7
Niue	–	–	–	–	–	–	–	–	–	–
Norfolk Island	–	–	–	–	–	–	–	–	–	–
Northern Mariana Islands	–	–	–	–	–	–	–	–	–	–
Palau	–	–	–	–	–	–	–	–	–	–
Papua New Guinea	7	4	–	11	0.4	328	30	–	358	2.8

Country / area	Employment					Gross value added				
	Roundwood production	Wood processing	Pulp and paper	Total for the forest sector		Roundwood production	Wood processing	Pulp and paper	Total for the forest sector	
	(1 000)	*(1 000)*	*(1 000)*	*(1 000)*	*(% of total labour force)*	*(US$ million)*	*(US$ million)*	*(US$ million)*	*(US$ million)*	*(% contribution to GDP)*
Pitcairn Islands	–	–	–	–	–	–	–	–	–	–
Samoa	0	0	–	0	0.2	2	0	–	2	0.3
Solomon Islands	8	0	–	9	3.9	93	6	–	99	11.5
Tokelau	–	–	–	–	–	–	–	–	–	–
Tonga	0	0	0	0	0.2	3	0	0	3	0.7
Tuvalu	–	–	–	–	–	–	–	–	–	–
Vanuatu	0	1	–	1	0.7	8	3	–	11	1.6
Wallis and Futuna Islands	0	0	–	0	0	0	0	–	0	0
Total Oceania	**36**	**63**	**21**	**120**	**0.6**	**2 726**	**5 106**	**3 308**	**11 140**	**1.1**
Argentina	17	32	21	70	0.4	290	312	1 453	2 055	0.5
Bolivia (Plurinational state of)	3	4	2	9	0.2	218	145	69	431	2.2
Brazil	133	434	205	772	0.7	7 036	5 802	9 676	22 513	1.1
Chile	42	27	16	85	1.0	1 500	2 057	4 039	7 596	3.3
Colombia	24	7	18	48	0.2	542	186	1 098	1 826	0.6
Ecuador	13	6	7	26	0.4	856	563	322	1 741	2.3
Falkland Islands (Malvinas)	–	–	–	–	–	–	–	–	–	–
French Guiana	1	0	0	1	0.9	11	10	–	21	0.5
Guyana	5	4	–	9	2.8	67	28	–	96	4.1
Paraguay	3	2	1	5	0.2	337	128	101	566	2.4
Peru	37	14	10	61	0.4	212	192	912	1 316	0.8
Suriname	4	6	0	9	4.5	41	37	1	79	2.0
Uruguay	11	4	2	17	1.0	194	94	441	730	1.8
Venezuela (Bolivarian Republic of)	3	25	28	56	0.4	49	371	1 009	1 430	0.5
Total South America	**295**	**564**	**309**	**1 168**	**0.6**	**11 355**	**9 926**	**19 119**	**40 400**	**1.1**
TOTAL WORLD	**3 456**	**5 439**	**4 339**	**13 233**	**0.4**	**169 488**	**170 131**	**266 334**	**605 953**	**0.9**

Source: FAO (in press).

Annex 3. Indicators of the socioeconomic benefits from forests, 2011

Country / area	Employment		Gross value added		Food security		Energy		Shelter	
	Total for the formal and informal sector		Total for the formal and informal sector		Number of people using woodfuel to cook		Primary energy supply from wood		People in homes made partly from forest products	
	(1 000)	*(% of total labour force)*	*(US$ million)*	*(% of total GDP)*	*(1 000)*	*(% of total population)*	*(MTOE)*	*(% of TPES)*	*(1 000)*	*(% of total population)*
Burundi	56	1.3	112	5.1	7 892	92.0	3	99.0	86	1.0
Cameroon	483	209.4	1 450	5.9	13 610	67.9	3	41.4	–	–
Central African Republic	129	6.1	164	7.9	4 050	90.3	1	84.0	–	–
Chad	273	6.0	278	2.8	9 580	83.1	2	97.6	–	–
Congo	36	2.1	172	1.1	2 848	68.8	0	22.6	1 006	24.3
Democratic Republic of the Congo	1 995	7.7	1 626	10.6	61 554	90.8	20	83.4	44 923	66.3
Equatorial Guinea	10	2.8	46	0.3	455	63.1	0	6.6	–	–
Gabon	67	11.1	457	2.0	374	24.4	0	16.7	25	1.6
Rwanda	68	1.3	227	3.8	9 077	82.9	1	100.0	–	–
Saint Helena, Ascension and Tristan da Cunha	–	–	–	–	–	–	–	–	–	–
Sao Tome and Principe	5	8.8	4	1.5	23	13.6	0	39.7	115	68.7
Total Central Africa	**3 123**	**6.9**	**4 536**	**4.0**	**109 463**	**84.3**	**30**	**70.8**	**46 155**	**35.5**
Comoros	21	8.6	42	6.3	570	75.6	0	50.0	–	–
Djibouti	26	8.7	20	1.8	112	12.3	0	36.2	–	–
Eritrea	97	3.6	73	2.9	2 427	44.8	0	43.1	–	–
Ethiopia	2 735	6.5	3 041	10.9	68 389	80.7	27	79.2	678	0.8
Kenya	586	3.7	917	3.0	29 817	71.7	11	55.1	21 970	52.8
Madagascar	738	7.0	939	10.1	21 004	98.5	4	97.9	4 860	22.8
Mauritius	2	0.3	27	0.3	56	4.3	0	0.1	358	27.4
Mayotte	0	0.5	–	–	133	63.1	–	–	67	31.8
Réunion	–	–	–	–	540	63.1	0	0.5	–	–
Seychelles	0	0.3	–	–	55	63.1	0	0.3	–	–
Somalia	669	22.3	526	56.0	9 508	99.5	4	96.6	–	–
South Sudan	0	0.0	–	–	–	–	–	–	–	–
Uganda	614	4.4	1 026	6.0	30 268	87.7	11	99.0	17 497	50.7
United Republic of Tanzania	974	4.3	1 346	6.0	41 390	89.6	7	32.5	12 756	27.6
Total East Africa	**6 464**	**5.7**	**7 956**	**5.6**	**204 271**	**82.5**	**63**	**65.3**	**58 186**	**23.5**
Algeria	13	0.1	259	0.1	425	1.2	2	5.2	–	–
Egypt	39	0.1	505	0.2	169	0.2	6	7.2	–	–
Libya	61	2.6	90	0.2	6 024	93.8	0	1.9	–	–
Mauritania	102	8.9	83	2.0	2 197	62.0	0	45.4	–	–

Country / area	Employment		Gross value added		Food security		Energy		Shelter	
	Total for the formal and informal sector		Total for the formal and informal sector		Number of people using woodfuel to cook		Primary energy supply from wood		People in homes made partly from forest products	
	(1 000)	*(% of total labour force)*	*(US$ million)*	*(% of total GDP)*	*(1 000)*	*(% of total population)*	*(MTOE)*	*(% of TPES)*	*(1 000)*	*(% of total population)*
Morocco	91	0.8	657	0.7	2 442	7.6	2	10.3	–	–
Sudan	683	4.7	626	0.8	31 890	71.4	5	30.0	–	–
Tunisia	194	5.0	470	1.1	39	0.4	1	6.1	–	–
Western Sahara	–	–	–	–	–	–	–	–	–	–
Total Northern Africa	**1 182**	**1.6**	**2 689**	**0.4**	**43 187**	**19.9**	**16**	**8.9**	**–**	**–**
Angola	163	2.2	172	0.2	10 273	52.4	1	7.9	59	0.3
Botswana	45	4.3	130	0.9	875	43.1	0	8.9	–	–
Lesotho	56	6.1	60	2.6	1 116	50.9	1	95.0	601	27.4
Malawi	298	4.3	274	4.1	12 582	81.8	1	61.7	4 216	27.4
Mozambique	350	3.1	654	5.6	16 652	69.6	4	43.1	526	2.2
Namibia	34	3.6	57	0.5	1 213	52.2	0	13.7	637	27.4
South Africa	540	2.9	4 237	1.2	7 424	14.7	8	5.6	2 271	4.5
Swaziland	30	7.2	83	2.5	643	53.4	0	26.9	330	27.4
Zambia	551	9.6	1 614	8.3	10 905	80.9	3	30.9	13	0.1
Zimbabwe	57	0.8	302	3.8	8 786	68.9	3	27.0	153	1.2
Total Southern Africa	**2 125**	**3.5**	**7 584**	**1.4**	**70 468**	**49.2**	**21**	**11.2**	**8 807**	**6.1**
Benin	219	5.9	307	4.6	7 611	83.6	2	44.3	2 494	27.4
Burkina Faso	462	5.9	673	7.6	15 726	92.7	3	99.8	4 650	27.4
Cabo Verde	16	0.2	26	1.6	187	37.4	0	30.9	–	–
Côte d'Ivoire	386	4.8	1 576	7.1	16 039	79.6	2	22.1	5 524	27.4
Gambia	45	5.8	41	4.8	1 484	83.6	0	51.6	–	–
Ghana	1 237	11.6	2 678	7.3	21 179	84.8	10	97.1	6 843	27.4
Guinea	296	7.0	453	8.9	8 947	87.5	3	97.2	51	0.5
Guinea-Bissau	49	7.3	57	6.6	1 470	95.0	1	99.0	–	–
Liberia	179	12.5	290	27.6	3 934	95.3	2	99.0	2 077	50.3
Mali	154	3.5	651	6.8	13 824	87.3	1	94.0	16	0.1
Niger	359	6.8	486	8.2	13 058	81.3	1	53.7	–	–
Nigeria	2 921	5.7	5 341	2.2	110 961	68.3	20	17.0	13 353	8.2
Senegal	195	3.5	304	2.4	7 002	54.8	1	42.7	51	0.4
Sierra Leone	267	11.5	425	14.8	5 548	92.5	2	89.0	18	0.3
Togo	146	4.8	178	5.5	5 274	85.7	1	42.3	–	–
Total West Africa	**6 930**	**5.9**	**13 487**	**3.7**	**232 243**	**75.2**	**50**	**30.6**	**35 078**	**11.4**
Total Africa	**19 825**	**4.8**	**36 252**	**2.0**	**659 632**	**63.1**	**181**	**26.9**	**148 225**	**14.2**

Country / area	Employment		Gross value added		Food security		Energy		Shelter	
	Total for the formal and informal sector		Total for the formal and informal sector		Number of people using woodfuel to cook		Primary energy supply from wood		People in homes made partly from forest products	
	(1 000)	*(% of total labour force)*	*(US$ million)*	*(% of total GDP)*	*(1 000)*	*(% of total population)*	*(MTOE)*	*(% of TPES)*	*(1 000)*	*(% of total population)*
Armenia	84	5.8	95	1.0	1 348	43.5	1	25.1	2 647	85.4
Azerbaijan	4	0.1	106	0.2	799	8.6	0	0.0	8 310	89.3
Georgia	17	0.7	95	0.8	1 735	40.1	1	14.9	–	–
Kazakhstan	13	0.2	186	0.1	605	3.7	0	0.1	856	5.3
Kyrgyzstan	5	0.2	22	0.4	1 790	33.2	0	0.3	–	–
Tajikistan	2	0.1	17	0.3	1 844	26.4	0	1.0	–	–
Turkmenistan	11	0.5	23	0.1	987	19.3	0	0.0	4 145	81.2
Uzbekistan	7	0.1	14	0.0	4 069	14.7	0	0.0	–	–
Total Central Asia	**143**	**0.4**	**558**	**0.2**	**13 177**	**16.9**	**1**	**0.8**	**15 959**	**20.4**
China	6 092	0.7	152 694	1.9	442 853	32.1	58	2.1	521 142	37.8
Democratic People's Republic of Korea	221	1.5	636	4.1	11 526	47.1	2	8.3	–	–
Japan	375	0.6	40 540	0.7	–	–	6	1.3	–	–
Mongolia	33	2.7	41	0.6	924	33.0	0	5.6	–	–
Republic of Korea	101	0.4	8 802	0.9	–	–	5	2.1	–	–
Total East Asia	**6 821**	**0.7**	**202 713**	**1.4**	**455 303**	**28.8**	**71**	**2.0**	**521 142**	**33.0**
Bangladesh	734	1.0	2 011	1.7	59 445	39.5	7	22.8	301	0.2
Bhutan	318	84.7	273	15.6	265	35.9	1	91.9	115	15.5
India	4 751	1.0	36 511	2.0	625 712	50.4	96	12.8	191 190	15.4
Maldives	–	–	–	–	44	13.6	0	1.1	135	42.1
Nepal	125	0.8	212	1.2	19 507	64.0	3	31.5	7 774	25.5
Pakistan	380	0.6	1 560	0.8	101 124	57.2	12	14.3	59 210	33.5
Sri Lanka	47	0.5	1 298	2.2	14 484	68.8	1	12.9	–	–
Total South Asia	**6 355**	**1.0**	**41 864**	**1.9**	**820 582**	**50.6**	**121**	**13.6**	**258 724**	**16.0**
Brunei Darussalam	2	0.8	10	0.1	3	0.6	0	0.3	–	–
Cambodia	80	1.0	531	4.4	11 962	83.6	2	45.2	10 543	73.7
Indonesia	1 482	1.2	24 154	2.9	93 378	38.5	37	17.7	91 611	37.8
Lao People's Democratic Republic	106	3.3	235	3.0	4 450	70.8	2	100.0	–	–
Malaysia	395	3.2	9 955	3.5	183	0.6	2	2.4	7 307	25.3
Myanmar	576	2.0	646	1.2	42 736	88.4	11	80.0	–	–
Philippines	427	1.1	5 560	2.5	37 123	39.1	7	17.8	36 328	38.3
Singapore	6	0.2	259	0.1	–	–	–	–	–	–
Thailand	1 014	2.5	18 135	5.0	22 076	31.8	12	9.8	4 241	6.1
Timor-Leste	1	0.3	5	0.1	445	38.5	0	31.7	71	6.1
Viet Nam	440	0.8	5 213	3.8	46 695	52.6	14	23.5	21 310	24.0
Total Southeast Asia	**4 529**	**1.5**	**64 702**	**2.9**	**259 049**	**43.2**	**88**	**15.5**	**171 410**	**28.6**

Country / area	Employment		Gross value added		Food security		Energy		Shelter	
	Total for the formal and informal sector		Total for the formal and informal sector		Number of people using woodfuel to cook		Primary energy supply from wood		People in homes made partly from forest products	
	(1 000)	*(% of total labour force)*	*(US$ million)*	*(% of total GDP)*	*(1 000)*	*(% of total population)*	*(MTOE)*	*(% of TPES)*	*(1 000)*	*(% of total population)*
Afghanistan	68	0.8	114	0.6	17 842	55.1	0	13.6	32	0.1
Bahrain	–	–	9	0.0	1	0.1	–	–	70	5.3
Cyprus	4	0.7	131	0.6	–	–	0	6.2	–	–
Iran (Islamic Republic of)	35	0.1	3 890	0.7	17 952	24.0	1	0.2	–	–
Iraq	6	0.1	22	0.0	1 038	3.2	0	0.1	4 638	14.2
Israel	13	0.4	828	0.4	6	0.1	0	0.5	–	–
Jordan	8	0.5	135	0.5	5	0.1	0	1.8	32	0.5
Kuwait	4	0.3	115	0.1	2	0.1	–	–	–	–
Lebanon	6	0.4	200	0.5	4	0.1	0	1.1	–	–
Occupied Palestinian Territory	3	0.3	68	0.8	–	–	–	–	–	–
Oman	3	0.3	111	0.2	2	0.1	–	–	–	–
Qatar	7	0.5	130	0.1	2	0.1	–	–	–	–
Saudi Arabia	38	0.4	2 721	0.4	23	0.1	–	–	–	–
Syrian Arab Republic	30	0.5	253	0.4	77	0.4	–	–	–	–
Turkey	195	0.7	7 776	1.1	14 234	19.3	3	3.0	24 080	32.7
United Arab Emirates	7	0.1	–	–	7	0.1	–	–	–	–
Yemen	49	0.7	256	0.8	24 674	99.5	0	1.7	–	–
Total Western Asia	**477**	**0.4**	**17 239**	**0.5**	**75 868**	**23.2**	**5**	**0.6**	**28 853**	**8.8**
Total Asia	**18 325**	**0.9**	**327 076**	**1.4**	**1 623 979**	**38.6**	**286**	**4.8**	**996 088**	**23.7**
Albania	3	0.2	119	1.0	1 848	57.5	0	18.8	228	7.1
Andorra	0	0.7	–	–	–	–	–	–	–	–
Austria	65	1.5	7 266	1.9	–	–	4	12.5	–	–
Belarus	113	2.5	613	1.1	325	3.4	1	3.7	2 270	23.7
Belgium	28	0.6	2 758	0.6	–	–	2	3.4	–	–
Bosnia and Herzegovina	13	0.9	304	2.0	1 803	48.1	0	4.9	–	–
Bulgaria	50	1.4	524	1.1	392	5.3	1	6.6	–	–
Croatia	26	1.3	810	1.5	537	12.2	1	8.8	–	–
Czech Republic	109	2.1	3 537	1.8	100	1.0	2	4.7	1 643	15.6
Denmark	19	0.7	1 567	0.5	–	–	2	10.8	–	–
Estonia	21	3.1	854	4.3	214	16.0	1	18.6	–	–
Faroe Islands	–	–	–	–	–	–	0	0.0	–	–
Finland	75	2.8	9 669	4.3	–	–	9	25.3	–	–
France	161	0.6	14 891	0.6	–	–	19	7.7	–	–
Germany	317	0.7	26 772	0.8	–	–	15	4.7	–	–

Country / area	Employment		Gross value added		Food security		Energy		Shelter	
	Total for the formal and informal sector		Total for the formal and informal sector		Number of people using woodfuel to cook		Primary energy supply from wood		People in homes made partly from forest products	
	(1 000)	*(% of total labour force)*	*(US$ million)*	*(% of total GDP)*	*(1 000)*	*(% of total population)*	*(MTOE)*	*(% of TPES)*	*(1 000)*	*(% of total population)*
Gibraltar	–	–	–	–	–	–	–	–	–	–
Greece	33	0.6	1 362	0.5	–	–	2	6.2	–	–
Guernsey	–	–	–	–	–	–	–	–	–	–
Holy See	–	–	–	–	–	–	–	–	–	–
Hungary	56	1.3	1 104	0.9	–	–	2	6.9	20	0.2
Iceland	0	0.3	31	0.3	–	–	0	0.0	–	–
Ireland	10	0.5	917	0.4	–	–	1	4.3	–	–
Isle of Man	–	–	–	–	–	–	–	–	–	–
Italy	258	1.0	17 258	0.9	–	–	5	3.1	–	–
Jersey	–	–	–	–	–	–	–	–	–	–
Latvia	41	3.5	1 665	6.5	272	12.1	2	39.5	399	17.8
Liechtenstein	0	2.1	–	–	–	–	0	4.0	–	–
Lithuania	29	1.7	948	2.4	174	5.3	1	16.1	703	21.3
Luxembourg	1	0.5	141	0.3	–	–	0	0.1	–	–
Malta	1	0.3	15	0.2	–	–	0	2.7	–	–
Monaco	0	0.0	–	–	–	–	–	–	–	–
Montenegro	2	0.6	–	–	–	–	0	15.7	–	–
Netherlands	36	0.4	4 054	0.5	–	–	2	2.6	–	–
Norway	24	0.9	2 457	0.6	–	–	2	5.6	–	–
Poland	251	1.4	7 482	1.7	2 018	5.3	6	6.2	–	–
Portugal	63	1.1	3 376	1.6	–	–	3	14.1	–	–
Republic of Moldova	6	0.5	192	3.2	410	11.6	0	2.5	2 301	64.9
Romania	112	1.1	3 343	2.1	1 129	5.3	4	10.6	1 801	8.4
Russian Federation	600	0.8	13 649	0.8	4 086	2.9	11	1.5	25 853	18.1
San Marino	0	2.2	–	–	–	–	–	–	–	–
Serbia	36	0.9	495	1.3	3 158	32.1	2	10.3	–	–
Slovakia	62	2.2	2 065	2.4	133	2.4	1	3.2	5	0.1
Slovenia	25	2.4	812	1.9	149	7.3	1	10.5	27	1.3
Spain	162	0.7	10 040	0.8	697	1.5	8	6.0	–	–
Svalbard and Jan Mayen Islands	–	–	–	–	–	–	–	–	–	–
Sweden	100	2.0	13 909	3.0	–	–	10	21.0	–	–
Switzerland	48	1.1	5 361	0.9	–	–	1	4.3	–	–
The former Yugoslav Republic of Macedonia	7	0.7	95	1.0	530	25.7	0	4.9	–	–
Ukraine	142	0.6	1 981	1.4	1 179	2.6	3	2.0	26 210	58.0
United Kingdom	134	0.4	9 711	0.4	–	–	5	2.8	–	–
Total Europe	**3 238**	**0.9**	**172 175**	**0.9**	**19 157**	**2.6**	**128**	**4.9**	**61 461**	**8.3**

Country / area	Employment		Gross value added		Food security		Energy		Shelter	
	Total for the formal and informal sector		Total for the formal and informal sector		Number of people using woodfuel to cook		Primary energy supply from wood		People in homes made partly from forest products	
	(1 000)	*(% of total labour force)*	*(US$ million)*	*(% of total GDP)*	*(1 000)*	*(% of total population)*	*(MTOE)*	*(% of TPES)*	*(1 000)*	*(% of total population)*
Anguilla	–	–	–	–	–	–	–	–	–	–
Antigua and Barbuda	0	0.0	–	–	–	–	0	0.5	39	44.2
Aruba	0	0.3	–	–	0	0.3	0	0.3	31	28.7
Bahamas	0	0.1	3	0.0	1	0.3	0	1.8	–	–
Barbados	2	1.1	59	1.6	1	0.3	0	0.5	–	–
Bermuda	0	0.1	1	0.0	–	–	–	–	–	–
Bonaire, Sint Eustatius and Saba	–	–	–	–	–	–	–	–	–	–
British Virgin Islands	0	0.0	–	–	–	–	0	1.3	–	–
Cayman Islands	0	0.0	–	–	–	–	0	0.1	–	–
Cuba	25	0.5	–	–	–	–	1	9.6	3 095	27.5
Curaçao	–	–	–	–	–	–	–	–	–	–
Dominica	0	0.0	1	0.3	0	0.3	0	7.1	–	–
Dominican Republic	25	0.5	89	0.2	959	9.5	1	13.2	2 675	26.6
Grenada	0	0.3	2	0.2	–	–	0	1.0	–	–
Guadeloupe	–	–	–	–	–	–	0	1.7	–	–
Haiti	27	0.6	32	0.5	8 952	88.4	2	60.5	–	–
Jamaica	9	0.7	125	1.0	372	13.5	1	17.7	516	18.7
Martinique	0	0.0	–	–	–	–	0	1.0	–	–
Montserrat	–	–	–	–	–	–	0	0.8	–	–
Puerto Rico	3	0.2	129	0.1	–	–	0	6.5	–	–
Saint Barthélemy	–	–	–	–	–	–	–	–	–	–
Saint Kitts and Nevis	–	–	0	0.1	–	–	0	0.7	–	–
Saint Lucia	–	–	5	0.4	20	11.4	0	3.1	–	–
Saint Martin (French part)	–	–	–	–	–	–	–	–	–	–
Saint Vincent and the Grenadines	0	0.2	0	0.1	12	11.4	0	4.7	–	–
Sint Maarten (Dutch Part)	–	–	–	–	–	–	–	–	–	–
Trinidad and Tobago	4	0.6	118	0.5	4	0.3	0	0.0	–	–
Turks and Caicos Islands	0	0.0	–	–	0	0.3	0	0.9	–	–
United States Virgin Islands	0	0.1	–	–	–	–	–	–	–	–
Total Caribbean	**95**	**0.5**	**669**	**0.2**	**10 322**	**24.7**	**5**	**8.3**	**6 356**	**15.2**

Country / area	Employment		Gross value added		Food security		Energy		Shelter	
	Total for the formal and informal sector		Total for the formal and informal sector		Number of people using woodfuel to cook		Primary energy supply from wood		People in homes made partly from forest products	
	(1 000)	*(% of total labour force)*	*(US$ million)*	*(% of total GDP)*	*(1 000)*	*(% of total population)*	*(MTOE)*	*(% of TPES)*	*(1 000)*	*(% of total population)*
Belize	3	2.0	17	1.2	48	15.0	0	12.6	–	–
Costa Rica	156	6.9	537	1.4	476	10.1	1	19.0	624	13.2
El Salvador	77	2.9	406	1.8	1 334	21.4	1	30.1	–	–
Guatemala	275	4.7	631	1.4	8 835	59.9	5	47.6	–	–
Honduras	115	3.7	220	1.3	3 522	45.4	2	47.3	1 128	14.5
Nicaragua	132	5.4	217	2.5	3 375	57.5	2	55.6	1 585	27.0
Panama	22	1.3	111	0.4	450	12.6	0	8.2	329	9.2
Total Central America	**780**	**4.3**	**2 139**	**1.3**	**18 040**	**41.7**	**11**	**36.2**	**3 666**	**8.5**
Canada	234	1.2	20 195	1.2	–	–	11	4.2	–	–
Greenland	–	–	–	–	–	–	–	–	–	–
Mexico	578	1.1	8 404	0.7	16 193	14.1	11	6.1	10 838	9.4
Saint Pierre and Miquelon	–	–	–	–	–	–	0	0.7	–	–
United States of America	827	0.5	99 928	0.6	–	–	50	2.3	–	–
Total North America	**1 638**	**0.7**	**128 527**	**0.7**	**16 193**	**3.5**	**72**	**2.7**	**10 838**	**2.3**
Total North and Central America	**2 513**	**0.9**	**131 335**	**0.7**	**44 555**	**8.1**	**88**	**3.2**	**20 859**	**3.8**
American Samoa	–	–	–	–	–	–	–	–	–	–
Australia	67	0.6	8 069	1.0	–	–	5	3.7	–	–
Cook Islands	–	–	2	0.7	–	–	–	–	–	–
Fiji	5	1.4	87	2.8	390	44.9	0	1.8	–	–
French Polynesia	0	0.2	–	–	177	64.7	0	0.4	–	–
Guam	–	–	–	–	–	–	–	–	–	–
Kiribati	–	–	15	8.9	–	–	0	3.3	–	–
Marshall Islands	–	–	–	–	–	–	–	–	–	–
Micronesia (Federated States of)	–	–	–	–	58	52.2	0	2.7	–	–
Nauru	–	–	–	–	–	–	–	–	–	–
New Caledonia	0	0.1	–	–	165	64.7	0	0.3	–	–
New Zealand	28	1.2	3 077	2.9	–	–	1	5.2	–	–
Niue	–	–	–	–	0	24.5	–	–	–	–
Norfolk Island	–	–	–	–	–	–	–	–	–	–
Northern Mariana Islands	–	–	–	–	–	–	–	–	–	–
Palau	–	–	–	–	–	–	–	–	8	38.0
Papua New Guinea	60	1.9	396	3.1	4 680	66.7	1	57.3	–	–

Country / area	Employment		Gross value added		Food security		Energy		Shelter	
	Total for the formal and informal sector		Total for the formal and informal sector		Number of people using woodfuel to cook		Primary energy supply from wood		People in homes made partly from forest products	
	(1 000)	*(% of total labour force)*	*(US$ million)*	*(% of total GDP)*	*(1 000)*	*(% of total population)*	*(MTOE)*	*(% of TPES)*	*(1 000)*	*(% of total population)*
Pitcairn Islands	–	–	–	–	–	–	–	–	–	–
Samoa	1	1.3	2	0.4	74	40.0	0	25.7	62	33.7
Solomon Islands	11	4.7	102	11.8	494	89.4	0	23.7	341	61.8
Tokelau	–	–	–	–	–	–	–	–	–	–
Tonga	0	0.2	3	0.7	41	39.0	0	1.2	68	64.6
Tuvalu	–	–	–	–	–	–	–	–	–	–
Vanuatu	2	1.9	12	1.7	199	81.0	0	33.4	23	9.5
Wallis and Futuna Islands	–	–	–	–	–	–	–	–	–	–
Total Oceania	**174**	**0.9**	**11 771**	**1.2**	**6 278**	**16.9**	**7**	**4.8**	**502**	**1.4**
Argentina	257	1.4	2 485	0.6	2 573	6.3	3	4.2	–	–
Bolivia (Plurinational state of)	42	0.9	560	2.9	2 778	27.5	1	10.6	1 468	14.5
Brazil	7 590	7.4	30 279	1.4	20 558	10.5	60	22.1	37 758	19.2
Chile	841	10.3	8 240	3.6	2 519	14.6	5	14.6	5 441	31.5
Colombia	493	2.2	2 429	0.8	6 454	13.8	4	13.8	4 430	9.4
Ecuador	73	1.0	1 829	2.4	1 461	10.0	1	10.1	–	–
Falkland Islands (Malvinas)	–	–	–	–	–	–	0	0.8	–	–
French Guiana	5	5.4	26	0.6	25	10.4	0	23.3	–	–
Guyana	49	15.9	146	6.2	79	10.4	1	71.7	466	61.6
Paraguay	329	10.4	970	4.1	2 211	33.7	2	48.5	–	–
Peru	255	1.6	1 497	0.9	8 461	28.8	2	10.8	2 852	9.7
Suriname	9	4.5	91	2.3	55	10.4	0	3.3	–	–
Uruguay	144	8.4	883	2.1	165	4.9	1	14.6	100	3.0
Venezuela (Bolivarian Republic of)	114	0.8	1 557	0.5	3 058	10.4	1	1.5	–	–
Total South America	**10 202**	**5.1**	**50 991**	**1.4**	**50 397**	**12.7**	**81**	**15.1**	**52 515**	**13.2**
TOTAL WORLD	**54 278**	**1.7**	**729 602**	**1.1**	**2 403 998**	**34.5**	**772**	**6.1**	**1 279 649**	**18.3**

Source: FAO (in press).

Annex 4. Data sources used to obtain information on countries' policy measures to enhance forest-related benefits

Chapter 4, which provides an overview of policies and measures taken by countries since 2007, draws upon data derived from secondary data sources covering changes during the period 2007–2013. Sources include the FAO national forest programme/forest policy document database,[31] country reports to global bodies (UNFF 8, 9 and 10), country reports to regional bodies or C&I processes (ITTO, FOREST EUROPE, Montréal Process, COMIFAC) as well as FAOLEX (forest-related legislation data base). These sources cover 72 countries for which information was available in English, French or Spanish. The documents were first analysed using quantitative analysis based on a set of keywords for each of the topics covered and supported by text analysis software (MaxQDA, ATLAS.ti). Sections of documents where these topics were addressed were subsequently analysed qualitatively. Further sources were compiled from project databases of key international organizations such as the World Bank, FAO and bilateral development partners, country press reports as compiled by FAO's bi-monthly InfoSylva newsletters, the newslists of IISD Forest Policy and Practice FORESTS-L listserv, the Mongabay newsletter, the RRI Quarterly Newsletter, and the FLEGT and REDD+ newsletters. These were analysed qualitatively and provided additional information on the countries covered in the document analysis as well as 41 countries not covered by the document analysis. Actions taken at regional levels through regional processes or bodies are thus not considered except in cases where these have supranational authority on specific topical areas (such as the European Union for its Member States).

Findings concerning policies and measures in individual countries were organized on the basis of broader emerging trends. Sample policies and programmes were chosen for closer examination as case studies. An overview of the main sources used for this chapter is listed in Table 22. Available data covers a total of 121 countries (see below), comprising 95 percent of total forest area globally. Where percentages of countries are used in Chapter 4, these refer to the set of 72 countries for which quantitative and qualitative information was provided. Verification of the information and the results of the analysis was undertaken through an internet search of national government websites, topical reports and reviews by experts.

[31] Available at http://www.fao.org/forestry/country/61838/en/.

Country	1=data included, including anecdotal data (e.g. newsclip)
Burundi	1
Cameroon	1
Central African Republic	1
Chad	1
Congo	1
Democratic Republic of the Congo	1
Equatorial Guinea	1
Gabon	1
Rwanda	1
Saint Helena, Ascension and Tristan da Cunha	
Sao Tome and Principe	
Central Africa	**9**
Comoros	
Djibouti	
Eritrea	
Ethiopia	

Country	1=data included, including anecdotal data (e.g. newsclip)
Kenya	1
Madagascar	1
Mauritius	
Mayotte	
Réunion	
Seychelles	
Somalia	
South Sudan	
Uganda	1
United Republic of Tanzania	1
East Africa	**4**
Algeria	
Egypt	
Libya	
Mauritania	
Morocco	1
Sudan	1

Country	1=data included, including anecdotal data (e.g. newsclip)
Tunisia	1
Western Sahara	
Northern Africa	**3**
Angola	
Botswana	1
Lesotho	
Malawi	
Mozambique	1
Namibia	1
South Africa	1
Swaziland	
Zambia	1
Zimbabwe	1
Southern Africa	**6**
Benin	
Burkina Faso	1
Cabo Verde	
Côte d'Ivoire	1
Gambia	1
Ghana	1
Guinea	
Guinea-Bissau	1
Liberia	1
Mali	
Niger	1
Nigeria	1
Senegal	1
Sierra Leone	1
Togo	1
West Africa	**11**
Africa	**33**
Armenia	1
Azerbaijan	
Georgia	1
Kazakhstan	
Kyrgyzstan	
Tajikistan	1
Turkmenistan	
Uzbekistan	
Central Asia	**3**

Country	1=data included, including anecdotal data (e.g. newsclip)
China	1
Democratic People's Republic of Korea	
Japan	1
Mongolia	1
Republic of Korea	1
East Asia	**4**
Bangladesh	1
Bhutan	1
India	1
Maldives	
Nepal	1
Pakistan	1
Sri Lanka	1
South Asia	**6**
Brunei Darussalam	
Cambodia	1
Indonesia	1
Lao People's Democratic Republic	1
Malaysia	1
Myanmar	1
Philippines	1
Singapore	
Thailand	1
Timor-Leste	
Viet Nam	1
Southeast Asia	**8**
Afghanistan	1
Bahrain	
Cyprus	1
Iran (Islamic Republic of)	1
Iraq	
Israel	1
Jordan	
Kuwait	
Lebanon	1
Occupied Palestinian Territory	
Oman	
Qatar	
Saudi Arabia	1

Country	1=data included, including anecdotal data (e.g. newsclip)
Syrian Arab Republic	
Turkey	1
United Arab Emirates	
Yemen	
Western Asia	**7**
Asia	**28**
Albania	
Andorra	
Austria	1
Belarus	1
Belgium	1
Bosnia and Herzegovina	1
Bulgaria	1
Croatia	1
Czech Republic	1
Denmark	1
Estonia	1
Faroe Islands	
Finland	1
France	1
Germany	1
Gibraltar	
Greece	
Guernsey	
Holy See	
Hungary	1
Iceland	
Ireland	1
Isle of Man	
Italy	1
Jersey	
Latvia	1
Liechtenstein	
Lithuania	1
Luxembourg	
Malta	
Monaco	
Montenegro	1
Netherlands	1
Norway	1

Country	1=data included, including anecdotal data (e.g. newsclip)
Poland	1
Portugal	1
Republic of Moldova	1
Romania	1
Russian Federation	1
San Marino	
Serbia	1
Slovakia	1
Slovenia	1
Spain	1
Svalbard and Jan Mayen Islands	
Sweden	1
Switzerland	1
The former Yugoslav Republic of Macedonia	
Ukraine	
United Kingdom	1
Europe	**32**
Anguilla	
Antigua and Barbuda	
Aruba	
Bahamas	
Barbados	
Bermuda	
Bonaire, Sint Eustatius and Saba	
British Virgin Islands	
Cayman Islands	
Cuba	
Curaçao	
Dominica	
Dominican Republic	1
Grenada	
Guadeloupe	
Haiti	1
Jamaica	1
Martinique	
Montserrat	
Puerto Rico	
Saint Barthélemy	

Country	1=data included, including anecdotal data (e.g. newsclip)
Saint Kitts and Nevis	
Saint Lucia	1
Saint Martin (French part)	
Saint Vincent and the Grenadines	
Sint Maarten (Dutch part)	
Trinidad and Tobago	
Turks and Caicos Islands	
United States Virgin Islands	
Caribbean	**4**
Belize	
Costa Rica	1
El Salvador	1
Guatemala	1
Honduras	1
Nicaragua	1
Panama	1
Central America	**6**
Canada	1
Greenland	
Mexico	1
Saint Pierre and Miquelon	
United States of America	1
North America	**3**
North and Central America	**9**
American Samoa	
Australia	1
Cook Islands	
Fiji	1
French Polynesia	
Guam	
Kiribati	
Marshall Islands	
Micronesia (Federated States of)	
Nauru	

Country	1=data included, including anecdotal data (e.g. newsclip)
New Caledonia	
New Zealand	1
Niue	
Norfolk Island	
Northern Mariana Islands	
Palau	
Papua New Guinea	1
Pitcairn Islands	
Samoa	
Solomon Islands	
Tokelau	
Tonga	
Tuvalu	
Vanuatu	
Wallis and Futuna Islands	
Oceania	**4**
Argentina	1
Bolivia (Plurinational State of)	1
Brazil	1
Chile	1
Colombia	1
Ecuador	1
Falkland Islands (Malvinas) *	
French Guiana	
Guyana	1
Paraguay	1
Peru	1
Suriname	1
Uruguay	
Venezuela (Bolivarian Republic of)	1
South America	**11**
WORLD	**121**

* A dispute exists between the governments of Argentina and the United Kingdom of Great Britain and Northern Ireland concerning sovereignty over the Falkland Islands (Malvinas).

Food and Agriculture Organization
of the United Nations

OUR PRIORITIES

The FAO Strategic Objectives

HELP ELIMINATE HUNGER, FOOD INSECURITY AND MALNUTRITION

MAKE AGRICULTURE, FORESTRY AND FISHERIES MORE PRODUCTIVE AND SUSTAINABLE

REDUCE RURAL POVERTY

ENABLE INCLUSIVE AND EFFICIENT AGRICULTURAL AND FOOD SYSTEMS

INCREASE THE RESILIENCE OF LIVELIHOODS TO DISASTERS

2014

State of the World's Forests

Enhancing the socioeconomic benefits from forests

Across the world, forests, trees on farms, and agroforestry systems play a crucial role in the livelihoods of rural people by providing employment, energy, nutritious foods and a wide range of other goods and ecosystem services. They have tremendous potential to contribute to sustainable development and to a greener economy. Yet, clear evidence of this has been lacking. This evidence is critical to inform policies on forest management and use, and to ensure that the benefits from forests are recognized in the post-2015 development agenda, not only with respect to the environment, but also for their contributions to broader social issues.

This edition of *State of the World's Forests* addresses this knowledge gap by systematically gathering and analysing available data on forests' contributions to people's livelihoods, food, health, shelter and energy needs. Crucially, the report also suggests how information might be improved and policies adjusted, so that the socioeconomic benefits from forests can be enhanced in the future.

ISBN 978-92-5-108269-0 ISSN 1020-5705

9 789251 082690

I3710E/1/06.14