Forests for People

INTERNATIONAL YEAR
OF FORESTS • 2011

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Foreword

JAN L. MCALPINE, DIRECTOR, UNITED NATIONS FORUM ON FORESTS SECRETARIAT, UNITED NATIONS DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS

Forests provide sustenance and livelihoods for an estimated 1.6 billion people across the world. They directly contribute to poverty reduction and the alleviation of hunger by providing jobs and incomes for poor families. In a global environment where the challenges are many — from growing unemployment rates to rising food prices and climate-related stresses — the need to manage our natural resources sustainably has become all the more urgent.

There has been increased interest in realizing the full potential of forests for global sustainable development in recent years and the United Nations General Assembly's decision to proclaim 2011 the International Year of Forests has been instrumental in translating this interest into year-long action. Since its inception in 2000, the United Nations Forum on Forests (UNFF), a subsidiary body of the Economic and Social Council of the United Nations (ECOSOC), has had the main objective of promoting the management, conservation and sustainable development of all types of forests and strengthening long-term political commitment to this end.

People's interactions with forests provide practical experiences on how to operationalize sustainable development, translating rhetoric to reality and providing a valuable toolkit of good practices and lessons learned. Coordinated efforts and cross-sectoral approaches are required to maximize the benefits of forests for the sustainable development of people. In June 2012, the international community will converge on Rio de Janeiro for the United Nations Conference on Sustainable Development. Forests offer tested solutions to key challenges in sustainable development and contribute to all three pillars that support such development.

The publication of *Forests for People* as part of the activities to commemorate the International Year of Forests, 2011 will undoubtedly contribute to raising awareness and strengthening sustainable forest management for the benefit of current and future generations. The stories that comprise this publication draw upon diverse experiences from around the world, reflecting the many ways in which people are changing their interaction with forests to improve the sustainability of their development.

Achieving sustainable solutions ultimately requires a process of dialogue and shared learning. This publication contributes to such a process by bringing together best practices from governments and stakeholders and I am certain that *Forests for People* will contribute to greater understanding and a convergence of approaches for forests and people — and their sustainable future worldwide.

Jan L. McAlpine
Director, United Nations Forum on Forests Secretariat
United Nations Department of Economic and Social Affairs

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African Development Bank

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ASEAN Centre for Biodiversity

Asian Development Bank

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Australian Government Department of Agriculture, Fisheries and Forestry

Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management

Canadian Forest Service, Natural Resources Canada

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Chilean National Forestry Corporation (CONAF)

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European Forest Institute

Finnish Ministry of Agriculture and Forestry

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G.B. Pant Institute of Himalayan Environment and Development

German Federal Ministry for Economic Cooperation and Development

German Federal Ministry of Food, Agriculture and Consumer Protection

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Mexican National Forestry Commission (CONAFOR)

National Institute for Environmental Studies, Center for Global Environmental Research

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New Forests Asset Management

Norwegian International Climate and Forest Initiative

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Turkish Ministry of Forestry and Water Affairs

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WaKa – Forest Investment Services

World Agroforestry Centre (ICRAF)

World Bank

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Image: courtesy of the Anji Bamboo Society

Image: CONAFOR

NIKOLAUS BERLAKOVICH, FEDERAL MINISTER OF AGRICULTURE, FORESTRY, ENVIRONMENT AND WATER MANAGEMENT, AUSTRIA

It is widely recognized that the value of forests for life in general, and the potential benefits and solutions they bring to our increasingly challenged world, are enormous. However, the demands directed towards the world's forests are numerous, expanding and partially conflicting with each other.

Forests should sustain livelihoods, host biodiversity, help stabilize the climate, provide sustainable materials and renewable energy, contribute to greening the economy, protect soils and water, and prevent floods, erosion and avalanches. At the same time forests are not only under threat from deforestation and forest degradation, but also from storms, drought, fire, pests and disease — hazards aggravated by climate change.

Fragmented approaches and singular actions must fail when addressing the complexity of these expectations and challenges. We do have the solution at hand for securing the long-term economic, environmental and social functions of forests comprehensively and in a balanced manner — the concept, principles and practice of sustainable forest management.

Let us enhance our efforts, let us strengthen our commitments and establish robust political frameworks at all levels in order to put sustainable forest management into practice worldwide.

Nikolaus Berlakovich
Federal Minister of Agriculture, Forestry,
Environment and Water Management, Austria

IZABELLA TEIXEIRA, MINISTER OF ENVIRONMENT, BRAZIL

The United Nations General Assembly declared 2011 as the International Year of Forests to raise awareness on sustainable management, conservation and development of all types of forests. Sustainable forest management is a multilayered concept that aims at securing biodiversity, productivity and vitality while ensuring that goods and services derived from forests meet everyday needs. The theme of *Forests for People* highlights the value of forests and their economic and social relationship with humankind. Sustainable forest management can also contribute significantly to sustainable development, poverty eradication and the achievement of internationally agreed commitments, including the Millennium Development Goals.

With receding forests, expanding deserts, changing rainfall patterns and rising sea levels, climate change will disproportionately affect the world's poorest communities. Among them, the most vulnerable group will be women. They are usually responsible for gathering firewood, water, and food supplies for their families, and deforestation makes it harder to secure these resources. The involvement of women in forest governance would benefit forest and biodiversity conservation efforts. The local communities' livelihoods are directly linked to the conservation and sustainable use of forests' natural resources.

The Brazilian National Forest Programmes are formulated in order to ensure that forest-based people and the next generation will have the opportunity to marvel at the forest. Brazilian forests directly support the livelihoods of at least ten million people, and are home to a great portion of the global terrestrial biodiversity. Forests provide essential ecosystem services such as watershed protection, water flow regulation, nutrient recycling, rainfall generation and disease regulation.

Our future depends upon our forests and the protection of forests depends upon us. We must act now.

This UNFF publication is a golden opportunity to fast-track a wide range of positive initiatives and programmes that address multiple challenges, and encourage countries and people to use the new optimism and best practices surrounding forests in catalyzing long-lasting and transformative solutions.

Izabella Teixeira
Minister of Environment
Brazil

JOE OLIVER, MINISTER OF NATURAL RESOURCES, CANADA

Historically, forests have been a fundamental part of our environment, economy, culture and traditions. International Year of Forests, 2011 is therefore a wonderful opportunity for us to celebrate the many benefits that forests provide.

Canada takes great pride in its reputation as a leader in the sustainable uses of forests and has long been committed to sharing its forest management expertise with the world. Through initiatives such as the International Model Forest Network — first launched by Canada nearly 20 years ago at the United Nations Conference on Environment and Development in Rio de Janeiro — we are working in close cooperation with nearly 30 other countries to improve forest management practices globally. As these partnerships have shown, social, economic and environmental concerns are not mutually exclusive but, when addressed together, provide substantial and lasting value.

Forests and people are interconnected, as communities, families and individuals throughout the world depend on forests for their livelihood. Forests have a unique and special value as a resource, and Canada is proud to support their sustainable development, both now and for the enjoyment of future generations.

Joe Oliver
Minister of Natural Resources
Canada

BOŽIDAR PANKRETIĆ, DEPUTY PRIME MINISTER AND MINISTER OF REGIONAL DEVELOPMENT, FORESTRY AND WATER MANAGEMENT, REPUBLIC OF CROATIA

"Lucky are nations sharing their lives with forests, even luckier are those who appreciate the wealth they possess," said Josip Kozarac, esteemed Croatian writer and forester, in the late 19th century. He was a modern-day visionary, which can be clearly seen by the fact that more than a century later, in the year 2011, in which we celebrate the International Year of Forests under the motto 'Forests for People', these words have not lost their meaning and relevance, standing as evidence of a strong connection between forests and people as well as the great influence that forests have on all segments of our lives.

Encouraged precisely by these thoughts, the Republic of Croatia has launched the initiative to declare the International Year of Forests. It has been our wish to step up efforts to promote sustainable forest management, as well as development and conservation of forests worldwide. Therefore, we are very excited that this useful *Forests for People* publication is being issued, as it will permanently record the experience of many experts in the field of sustainable forest management and convey the message that sustainable development and sustainable management are the only true foundations for the future and prosperity of all people on the planet.

We therefore hope that the book *Forests for People*, particularly in today's world when global forest ecosystems are under tremendous pressure, will help ease the path towards the development of a number of forest policies and strategies worldwide which will be based on principles of sustainability.

Božidar Pankretić
Deputy Prime Minister and Minister of Regional Development,
Forestry and Water Management, Republic of Croatia

JARI KOSKINEN, MINISTER FOR AGRICULTURE AND FORESTRY, FINLAND

Finland's forest sector has recently faced new challenges, including the global economic crisis, structural changes in industry and changing expectations concerning the roles of forests. To meet these emerging needs, we are reshaping our forest-related policies, institutional and legal frameworks, economic instruments and information resources.

The cornerstone of Finland's forest policy, the National Forest Programme 2015, was renewed in 2010 to account for recent developments and to improve its coherence with other forest-related policies, including biodiversity initiatives and the national climate and energy strategy.

Our forest policies directly promote sustainable forest management in Finland and the achievement of global objectives, including those set by the United Nations Forum on Forests.

Finland's unique forest ownership structure provides a robust basis for sustainable forest management. Our forests are largely owned by families and small-scale forestry represents a significant source of income for many households. This type of ownership encourages sustainable forest management that considers the needs of future generations.

State-owned forests, mainly located in the north, are managed by the state agency Metsähallitus to fulfil multiple functions. The needs of the indigenous Sámi people represent an important consideration regarding forest management in Finnish Lapland.

All of Finland's forests, regardless of their ownership, are maintained according to the principles of sustainable forest management. In addition, our legal tradition gives everyone free access to all forests for recreational purposes, including picking wild berries and mushrooms.

In Finland, we are convinced that our aim to build a 'green economy' will provide unique opportunities for the forest sector locally, nationally and globally. This approach is not only about technology, but is a holistic approach encompassing many social and ecological benefits. It will particularly enhance socio-economic development in rural regions.

The policies needed to reach these goals must go far beyond those of the traditional forest sector. Cross-sectoral approaches and investments are crucial and private sector and financial institutions must also be involved.

By treating these challenges as opportunities, we believe that in Finland we can continue to creatively utilize our sustainably managed forests as a pillar of the national economy and a source of livelihood and well-being for our people.

Jari Koskinen
Minister for Agriculture and Forestry
Finland

ILSE AIGNER, FEDERAL MINISTER OF FOOD, AGRICULTURE AND CONSUMER PROTECTION, GERMANY

The forest is more than a mere wood supplier. It is a natural habitat and a water filter, a workplace and a place for leisure — and ultimately, it is our number one climate protector.

Germany is the homeland of sustainable forestry. The traditional, sustainable management of the forests, coupled with a well-positioned forestry and wood cluster, make Germany a global player in terms of both production and foreign trading of timber. In addition to this, roughly a quarter of the forested area provides special protection for rare plant and animal species.

One of the biggest challenges of the future lies in the area of tension to be found between an increasing demand for timber on the one hand and effective conservation of forests and nature on the other. Our answer is to be found in sustainable, multifunctional forestry, which combines utilization and protection in many different ways and secures jobs and income, and adds value throughout the region. In this way, the forest is also protected in its function as the most popular excursion and leisure destination in all of Germany.

To ensure that our forest maintains this versatility, Germany has made two groundbreaking decisions this year. One of these was the adoption of a new national 'Forest Strategy 2020', which strives to achieve a new balance between the variety of demands placed on Germany's forests on the one hand and their sustainable efficiency on the other. In addition to this, we agreed to establish a forest climate fund to adapt the forest to the effects of climate change and promote the CO_2 reduction potential of wood. In this way, the positive influence that forests and wood have on our climate will be intensified in the long term.

I hope that *International Year of Forests, 2011* will also have global effects, which will be felt well beyond 2011.

Ilse Aigner
Federal Minister of Food, Agriculture and Consumer Protection
Germany

JAYANTHI NATARAJAN, MINISTER OF ENVIRONMENT AND FORESTS, GOVERNMENT OF INDIA

Forests in India are integral to environment, economy, culture and traditions. They provide a range of essential ecosystem services in addition to valuable timber, fuelwood, fodder and non-timber forest products (NTFP) for sustainable livelihood of rural people and forest-dependent communities.

The National Forest Policy, 1988 provides the roadmap for sustainable management of forest with people's participation through Joint Forest Management which is based upon a 'care and share' principle. This, coupled with enactment of supportive acts, provides a sound legal framework to the forest management and ecological security of the country.

In accordance with the Millennium Development Goals, India has taken steps to make an impact on poverty by promoting NTFP development for people living in and around forests for sustenance and supplemental income. The recently launched Green India Mission, one of the missions under the National Action Plan on Climate Change, acknowledges the role of the forestry sector in environmental amelioration through climate mitigation, food and water security, biodiversity conservation and livelihood security of forest-dependent communities and strives for increase in forest cover of 5 million hectares as well as quality improvement of another 5 million hectares.

While addressing the livelihoods of forest-dependent communities — focusing on poverty alleviation and maintaining the habitat of Protected Area Networks for wildlife management — India is one of the few countries where the forest and tree cover has shown an increase of around 3 million hectares between 1997 and 2007, as well as improving quality of life by promoting urban greening in towns and metro cities, such as Delhi, Hyderabad, Chandigarh and Bangalore.

I wish all success to the UNFF for its endeavour in bringing out this landmark publication, *Forests for People* in the International Year of Forests, 2011.

Jayanthi Natarajan
Minister of Environment and Forests
Government of India

MICHIHIKO KANO, MINISTER FOR AGRICULTURE, FORESTRY AND FISHERIES, JAPAN

Japan is one of the most forested countries in the world, with nearly 70 per cent of its total land area covered by forest. It is crucial for Japan to secure and upgrade the environmental services provided by forests and so the challenge ahead of us is to ensure the stable supply of timber with the maximum use of planted forests, to revitalize local communities through expansion of job opportunities and, subsequently, to establish a wood-based low carbon society in order to help the realization of a green economy.

International Year of Forests, 2011 provides us with the opportunity to raise worldwide awareness of the multiple values and the significant contribution to global livelihood forests bring. Japan's National Committee declared 'Walk in the Woods' as the national theme of the year. I believe that each citizen should join the campaign and contribute to the positive outcome of our activities which protect and foster rich forests.

Let us tackle the global issues we face, such as deforestation and illegal logging, and share the wisdom and start to make substantial commitments to our future success.

Michihiko Kano
Minister for Agriculture, Forestry and Fisheries
Japan

HENK BLEKER, MINISTER FOR AGRICULTURE AND FOREIGN TRADE, THE NETHERLANDS

Forests have always played an important role in the Netherlands. In the seventeenth century they provided timber for the construction of the Dutch merchant fleet. Today they serve an important recreational function in this densely populated country.

The ecological value of forests and nature has in the past rightly received much attention. Now there is a growing awareness of the need to involve people, especially the young, in the conservation and development of forests and nature. This can be achieved by ensuring the functions of forests and nature are more closely aligned to the wishes of the public, and that they are easily accessible. Forests are not only there for people, but people are there for forests. This means that forests and nature are protected, managed, maintained and developed by people. The Government is responsible for protecting and enhancing nature. At the same time it believes responsibility for nature and forests should be shouldered across society as a whole. As well as having rights to a public amenity, people also have responsibilities.

That is why I support International Year of Forests, 2011, and its 'Forests for People' theme. The initiative will raise awareness of the role forests can play in sustainable development and a green economy, issues that are central to the Rio+20 UN Conference on Sustainable Development in 2012. But International Year of Forests, 2011 also emphasizes the importance of forests for people. This book shows what people can do to keep forests sustainable. In the Netherlands we also make use of forests outside our national boundaries: over 90 per cent of our annual timber consumption is imported. I therefore believe it is important that the wood we use comes from sustainably managed forests. This is why we are working towards more sustainable supply chains, both for those products which may require forest clearance to provide space for their production, as well for timber. Lastly, many forests disappear because their potential economic value is underestimated. This is why sound and sustainable financing of forest management is important, so their economic value can stimulate their conservation. I hope this book will contribute to the revaluation and therefore the conservation of our forests.

Image: Bob Friedlander

Henk Bleker
Minister for Agriculture and Foreign Trade
The Netherlands

LARS PEDER BREKK, MINISTER OF AGRICULTURE AND FOOD, NORWAY

The International Year of Forests, 2011 has given me a unique opportunity to highlight the benefits, opportunities and challenges for forests. The FOREST EUROPE ministerial conference in Oslo in June became a milestone for the work on forest cooperation in our region. As host and co-chairman of the conference I was pleased by the positive outcome. Ministers responsible for forest policies in Europe agreed on future goals, targets and actions for FOREST EUROPE and decided to open negotiations on a legally binding agreement on forests in Europe. Through FOREST EUROPE we have developed strategies for sustainable forest management and tools available for the European region in order to monitor and develop sustainable forest management and support countries in their national forest policy development and implementation.

Reducing deforestation and forest degradation in developing countries (REDD+) will have substantial benefits in addition to the reduction of greenhouse gas emissions. These include positive impacts on biodiversity and on sustainable economic development, including poverty reduction. Thus, reducing deforestation and forest degradation can produce a triple dividend — gains for the climate, for biodiversity and for sustainable development. This was the background for The Norwegian Climate and Forest Initiative launched during the climate change negotiations at Bali in December 2007. COP 16 in Cancún provided great steps forward and a new momentum in the development of REDD+. REDD+ is a priority area for Norway in our effort to mitigate climate change, and important work has been done during the International Year of Forests.

Norway has domestic experience in the field of forest and natural resources management that is guiding our policies for the future. Through the last hundred years, both the standing stock and the annual growth of forests in Norway have more than doubled, although removals have been relatively stable. Due to this long-term effort, the forest in Norway is currently sequestering a volume of CO_2 similar to half of the country's domestic greenhouse gas emissions. Forests can continue to provide a multitude of benefits for the society. Not less, but more international cooperation is needed in order to fulfil our ambitions for the forests of the world. The International Year of Forests has inspired us to strengthen this cooperation.

Lars Peder Brekk
Minister of Agriculture and Food
Norway

JUAN RAFAEL ELVIRA QUESADA, SECRETARY OF ENVIRONMENT AND NATURAL RESOURCES, MEXICO

Conservation of forests in Mexico is of international importance, because much of the biological diversity of Mexico's forests is unique to this country, and therefore an important contribution to our planet's overall biodiversity.

Besides their importance in environmental terms, Mexico's forests are closely associated with the cultural richness which depicts the country. It is no coincidence that many of the best protected forest areas are managed by indigenous groups, communities and ejidos.

Taking responsibility, the Federal Government, with the help of society, has been given the task to preserve this natural wealth, which is also a heritage of the world.

As a nation we have understood that preserving natural resources is compatible with economic development. Moreover, we have proven that sustainable forest management is a real opportunity for national development and welfare of the population.

The Federal Government is promoting public policies towards sustainable management of the country's forest ecosystem, mainly to strengthen the conservation and restoration tools in order to ensure the continuance of this natural wealth in the present and future.

Juan Rafael Elvira Quesada
Secretary of Environment and Natural Resources
Mexico

ESKIL ERLANDSSON, MINISTER FOR RURAL AFFAIRS, SWEDEN

As the Minister for Rural Affairs in Sweden I am responsible for forest and forestry issues and, as a forester myself, forests are of great importance to me.

A central theme in how we use our natural resources in Sweden is that they should be used but not overused. Forests are of great economic significance in Sweden. The major part of Sweden's land area is covered by productive forests and they need to be used wisely and with a long-term perspective.

At the same time there are other values to be considered. Swedish forestry and forest policy was early to recognize sustainable resource utilization and to adopt ambitious targets for biodiversity conservation. Forest management in Sweden today acknowledges two equal aims including both production objectives and environmental considerations. This is in line with the concept of sustainable forest management which considers economic, ecological and social aspects of forest management. Most Swedes have a close relationship with the forest and thanks to the Right of Public Access, almost all forests are open for visitors. Sweden is largely defined by its forests. Its 'Forest Kingdom' concept has become a vision as well as a policy programme initiated by the Swedish Government. The main objective is to create new jobs related to forests in Sweden and to help economic development especially in the rural areas. Sustainability is a central theme.

The global context is also a priority in Sweden's 'Forest Kingdom' vision which includes facilitating forest know-how overseas. This UNFF publication is an excellent initiative which gathers information and stories about forests from all over the world and it is with great pleasure that I look back at an international year for the forest. It has highlighted the important role forests play for the well-being of mankind.

Eskil Erlandsson
Minister for Rural Affairs
Sweden

THOMAS J. VILSACK, SECRETARY OF AGRICULTURE,
UNITED STATES DEPARTMENT OF AGRICULTURE, UNITED STATES OF AMERICA

A century ago, Gifford Pinchot, a conservation leader in the United States, realized that both peace and prosperity depended on access to natural resources, including the forests that sustain so many people around the world. He reasoned that forestry and conservation should therefore be world priorities. His reasoning still rings true today. Forests cover about 31 per cent of the world's land area, supplying drinking water to billions of people worldwide. They provide habitat for wildlife, sequester and store carbon and furnish livelihoods for communities around the world. These are just some of the many benefits that people receive from forests.

Today, forestry and conservation have indeed emerged as world priorities, as reflected in the events associated with the International Year of Forests, 2011. The theme for these events, 'Forests for People', highlights the central role of forests in the lives of people around the world — and the key role that people can play in sustaining forests for the benefit of all.

As we look to the future, we would do well to remember that key insight made a century ago: conservation of natural resources through sustainable forest management is central to human peace and prosperity.

Thomas J. Vilsack
Secretary of Agriculture, United States Department of Agriculture
United States of America

DR JACQUES DIOUF, DIRECTOR-GENERAL,
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

As a key component of the global ecosystem, forests cover one third of Earth's land surface, regulate water cycles and climate and are home to 60-80 per cent of terrestrial biodiversity and hundreds of millions of people.

Forests play a critical role in achieving food security and sustainable development. Foods from forests, such as leaves, fruits, seeds and nuts, provide a critical part of nutritionally poor diets. The collection, processing and sale of forest products, if handled in a sustainable way and promoted through small forest enterprises, can provide income-generating opportunities to people in forest-rich remote rural areas. Moreover, forests contribute to the provision of biodiversity, decrease soil erosion and protect from natural disasters, as well as providing us with clean water – important benefits that are often not quantified.

Forests also have fundamental social functions, such as empowerment, education and health. A natural resource that offers us so many benefits deserves special attention in our quest for sustainable development.

Forest restoration and sustainable forest management can provide a workable solution to using and preserving the world's forests in the long term, to help ensure forests truly remain a key resource for people. Practising sustainable forest management will help make the world's poorest more food secure and better able to live in sustainable, resilient environments. The Food and Agriculture Organization of the United Nations' work on the management and protection of all types of forests addresses these challenges to unlock forests' full contribution to sustainable development.

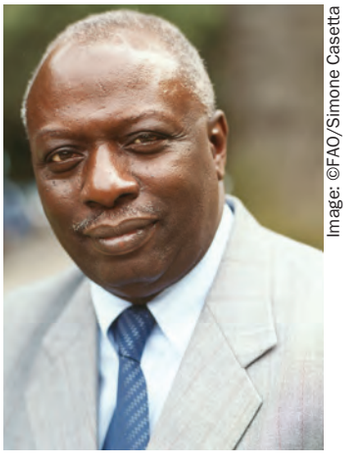


Image: ©FAO/Simone Casetta

Dr Jacques Diouf
Director-General
Food and Agriculture Organization of the United Nations

ACHIM STEINER, UNITED NATIONS UNDER-SECRETARY GENERAL AND UNITED NATIONS ENVIRONMENT PROGRAMME EXECUTIVE DIRECTOR

In 2011, we celebrated the International Year of Forests and these celebrations could not have occurred during a more appropriate time.

Climate change and biodiversity loss have brought forests to the attention of governments, global leaders and millions of people across the world. New kinds of economic analysis of forest ecosystems, from services such as water regulation and soil stabilization to nutrient recycling for agriculture and carbon capture, have also been emerging and attracting the attention of the finance sector and the development community.

By some estimates these services are worth trillions of dollars a year and in many developing country communities they are part of the natural asset base, worth up to 90 per cent of the GDP of the poor.

For the large majority of terrestrial biodiversity and for the 1.6 billion people that depend on forests for their daily livelihood or the various industries that rely on wood or other forest services and goods, it is imperative that forest destruction and degradation is stopped and reversed.

Some countries are now building on the United Nations Environment Programme-hosted partnership — The Economics of Ecosystems and Biodiversity — to assess the rich and wide-ranging value of forests as the first step towards factoring them into national accounts and perhaps a broader indicator of wealth beyond simple GDP.

During the International Year of Forests, 2011 and in the lead up to RIO+20, we have a golden opportunity to place forests in the centre of the necessary and urgent transition towards a green economy while capturing the rich and varied value of one of humanity's key life support systems.

I would encourage countries and communities to see how intelligent public policy allied to smart mechanisms can be designed and deployed to accelerate and scale up sustainable forestry within a green economy as a key strategy towards sustainable development and poverty eradication worldwide.

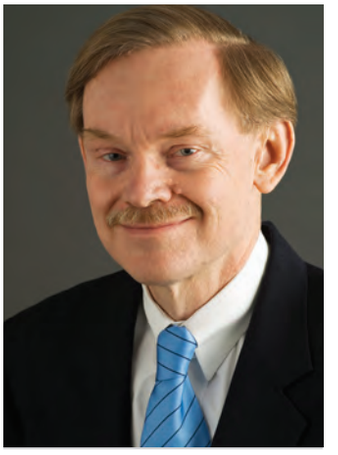
Achim Steiner
United Nations Under-Secretary General and
United Nations Environment Programme Executive Director

ROBERT B. ZOELLICK, PRESIDENT OF THE WORLD BANK GROUP

International Year of Forests, 2011 presents an important opportunity to take a fresh look at how healthy forests support a wide range of development goals, including energy access, overcoming poverty, food security, and climate change adaptation and mitigation. How can we make the best use of trees as solar-based, renewable sources of fuel and building material? What is the potential of agroforestry to fertilize and retain water for both public and private investment? How can we tap the long experience of indigenous peoples in managing natural resources and adapting to climate change to help maintain forest ecosystems?

The World Bank Group is committed to working with developing countries as partners to preserve and carefully manage these precious natural resources. One good example of this is the Wildlife Premium Market Initiative, a programme to value the wildlife in forests as a complement to ongoing efforts to reduce emissions from deforestation and forest degradation (REDD+). We need to recognize the value of forests that are teeming with life: we don't want silent forests.

In the International Year of Forests, 2011 the World Bank Group joins the rest of the world in celebrating the work of preserving forests, reversing deforestation, and promoting the significance of forests for sustainable development. Forests are the lungs of the world. For many creatures, they are also the last wildlife habitats — rich reservoirs of biodiversity, vital ecosystems. They are fundamental to our planet.



Robert B. Zoellick
President of the World Bank Group

LUC GNACADJA, EXECUTIVE SECRETARY,
UNITED NATIONS CONVENTION TO COMBAT DESERTIFICATION

We need to think outside of the box in order to preserve our land and forest resources in drylands, because desertification, which means land degradation in drylands, can easily lead to forest degradation. However, a healthy forest in these habitats can play a multiple role — from buffering against drought and land degradation, to preserving rich biodiversity. Forests cover about 18 per cent of land in drylands, and represent a natural capital for adaptation and mitigation to climate change. More importantly, they offer a safety net against poverty by providing a vital ecosystem of goods and services.

The real significance of forests in drylands, however, is not only the protection of one third of the global population who live there; but for the forests' impact on food security for those of us who live in non-dryland regions. If you consider that 44 per cent of the world's food production systems and 50 per cent of its livestock are in drylands, you will see how important the preservation and restoration of its soil is for all of us. Land degradation over the next 25 years is forecast to reduce global food production by up to 12 per cent, resulting in an increase in world food prices by as much as 30 per cent. For global food security, the availability of land for farming will be key to maintaining medium- and long-term food supplies and price stability. In this regard, agroforestry offers a promising avenue for land restoration, while feeding the poor. Agroforestry is driving the Greening of the Sahel in West Africa, where land improvement is occurring on more than five million hectares.

Land degradation and desertification imply forest degradation and vice versa. If we continue to underestimate the importance of forests in drylands, their sustainable management and conservation activities will never attract adequate technical resources and financial investments. The existing and potential contribution of the drylands will never be realized without investing in the prevention and reversal of forest and tree degradation in the drylands. May we never forget that forests keep the drylands working.

Luc Gnacadja
Executive Secretary
United Nations Convention to Combat Desertification

IRWIN LAROCQUE, SECRETARY-GENERAL, CARICOM

CARICOM Member States are highly dependent on their natural resources base — limited and threatened though it is — for socio-economic development. Central to our natural resources base is our forestry sector which is characterized by two main structures: those relating to the small islands, and those of the continental countries in the subregion.

Some of the island countries have little of their original forest cover remaining. Population density on those islands is high, and most of the forest was cleared for agriculture, housing and tourism development. The continental countries have low population density with relatively large tracts of forests which offer them greater flexibility for alternative use of their forest resources. The forest resources in the Caribbean are currently used as the major source of watersheds, providing habitat for biological diversity, ecotourism and recreational sites, timber, fuels and other household materials.

In the Caribbean, stakeholder participation has been a significant component of strategies for the management of our forests. There is smooth facilitation of this thrust since most of the forest resources are in public ownership.

The development of programmes by continental Caribbean countries related to the regulation of climate and sequestering of carbon emissions is also a critical component of the management of our forests. And, in the context of the broader development goals of the Caribbean, the forest is being evaluated for its contribution to economic diversification, income generation, and poverty alleviation in keeping with the Millennium Development Goals (MDGs).

Irwin Larocque
Secretary-General
Caricom

The International Year of Forests, 2011: inspiring action

Jan McAlpine, Director of the United Nations Forum on Forests Secretariat

The International Year of Forests, 2011 (Forests 2011) is truly a historic first. It is a testament to rising visibility of forests in global policy discussions; as Secretary-General Ban Ki-Moon stated: "By declaring 2011 as the International Year of Forests, the United Nations General Assembly has created an important platform to educate the global community about the great value of forests — and the extreme social, economic and environmental costs of losing them."

Forests cover one third of the Earth's land area, providing vital habitat, goods and services that sustain people and ecosystems. Historically, how people interact with forests has been a reflection of our complex and at times contentious relationship with our natural environment. Since the first Earth Summit in Rio in 1992 — where forests were valued largely for their environmental benefits — our understanding of forests has broadened to recognize the equally important role of forests in providing economic, social and cultural benefits.

At the United Nations Forum on Forests (UNFF), this holistic perspective is the driving force behind policy discussions that highlight the need for a cross-sectoral, cross-institutional 360-degree perspective on forests. Sustainable forest management is not 'one size fits all'; it is a dynamic and evolving concept, carried out through diverse methods and strategies implemented on the ground, many of which are described in this book. The common thread in all of these stories is the shared focus on maintaining and enhancing the full spectrum of economic, social and environmental value of all types of forests, for the benefit of present and future generations.

It is estimated that 1.6 billion people, a quarter of the world's population and many of them the poorest of the poor, depend on forests for their livelihoods and basic subsistence needs. Forests provide a large proportion of rural income, gross domestic product (GDP), food and medicine and they frame the cultural identity of communities. Forests provide opportunities for ecosystem-based adaptation to reduce greenhouse gas emissions and for carbon sequestration. They reduce soil erosion, protect watersheds, and stabilize and enhance soils. Forests are vital to maintaining land productivity and restoring degraded lands. Globally, it is estimated that over

Image: UNFFS

The well-being of everyone, both economic and spiritual, is intertwined with the health of our forest ecosystems

Image: © Flat Dog Productions, Ltd

Best of Festival "Queen of Trees"

2 billion hectares of land have potential for restoration, mostly in tropical and temperate areas.

While forests have undeniable direct impacts on the lives of forest-dependent communities, the well-being of all 7 billion of us, physical, economic and spiritual, is also deeply intertwined with the health of our forests. This growing awareness of the interconnected nature of forests is part of the changing landscape at the policy level and in public awareness.

Our planet's most critical terrestrial biodiversity and wildlife reside in forests. Managing protected forest areas also requires us to ensure that local and indigenous communities have access to forest resources. We cannot manage our forests by putting a fence around them; people are a critical part of this equation.

'Forests for People' has been the theme for the International Year and during the official launch, every speaker and feature film stressed that people directly depend on forests for their well-being and even survival. From mitigating climate change to providing wood, medicines and the livelihoods of billions of people from across the world, forests are at the centre of our existence.

The global launch of Forests 2011 was held in New York in February 2011. The ceremony, at the high-level segment of the UNFF, featured a wide range of international speakers, including United Nations Under-Secretary-General Sha Zukang, Nobel Peace laureate Wangari Maathai, renowned filmmaker Yann Arthus-Bertrand and Felix Finkerbeiner, founder of Plant-for-the-Planet, a network for school-age children.

This landmark publication, Forests for People, captures the spirit of Forests 2011 by showcasing articles and stories from around the world, reflecting how people are changing their interaction with forests to sustainably manage these vital resources. It is very fitting that it was decided to launch the book at the Forests 2011 closing event at United Nations Headquarters, New York in January 2012 which will be a transision to future action.

Films and videos

Film is a powerful medium to inspire a sense of personal responsibility and stewardship. The International Year created the first ever International Forest Film Festival,[1] hosted by the United Nations Forum on Forests Secretariat (UNFFS) in collaboration with the Jackson Hole Wildlife Film Festival. The festival received nominations of 167 films from over 30 countries and winning films were announced at the launch of Forests 2011.

Forests 2011 logo

Image: UNFFS

The Forests 2011 logo was designed by United Nations graphic designer Matias Delfino to convey the theme of 'Forests for People', celebrating the central role of people in the sustainable management, conservation and sustainable development of our world's forests. The icons in the design depict some of the multiple values of forests and the need for a 360-degree perspective. Forests provide shelter to people and habitat to biodiversity, are a source of food, medicine and clean water, and play a vital role in maintaining a stable global climate and environment. The logo has been translated into over 50 local languages, and is being used by thousands of local and international organizations.

Image: www.GoodPlanet.org

Yann Arthus-Bertrand/Altitude

Hundreds of screenings have taken place, for audiences around the world throughout 2011 as part of the continuing festival. The Film Festival was awarded the grand prize by CinemAmbiente, the leading environmental film festival in Europe. The Turin-based organization also coordinates the worldwide network of similar environmental film festivals and the Environmental Film Festival Network (EFFN).[2]

The success of the Film Festival is a credit to the Jackson Hole Wildlife Film Festival (JHWFF) and its Executive Director Lisa Samford; JHWFF has a long history of working to raise awareness and empower action through the innovative use of media. The JHWFF provides broadcasters, filmmakers, and other industry stakeholders with a forum to expand the role of media in understanding wildlife and their habitats.

Award-winning filmmaker and United Nations Environment Programme Goodwill Ambassador Yann Arthus-Bertrand created a short film, 'Of Forests and Men',[3] narrated by United Nations Goodwill Ambassador for Biodiversity Edward Norton, for Forests 2011. The film, which premiered at the Forests 2011 launch ceremony, was generously made available free of copyright.

A Forest Public Service Announcement created by Adolescent. TV for UNFFS is a contemporary take on how everything, from the tea we drink to the furniture we use in our daily lives, has a forest within it. The video clip is currently featured on the United Nations multimedia site and can be seen on the Forests 2011 website.

Video messages recorded by United Nations Secretary-General Ban Ki-Moon and 19 forest ministers and senior officials from the Collaborative Partnership on Forests, as well as by Norton, are featured on the United Nations YouTube channel.

Future Policy Awards

The World Future Council collaborated with the UNFFS, FAO and CBD Secretariat on the 2011 Future Policy award.[5] The 2011 award

Commemorative stamps

The United Nations Postal Administration (UNPA) issued a series of eight stamps[4] to commemorate Forests 2011. These vibrant new stamps illustrate the importance of trees and forests in people's lives. Designed by internationally celebrated artist, Sergio Baradat, the artwork highlights the beauty of forests and their vital link to life on Earth. For centuries, stamps have been valued for their role in chronicling human history. Just as the rings within trees hold the history of life on earth, stamps mark historic milestones. This stamp series visually evokes the spirit of Forests 2011 and transports it to the far corners of the world.

"Sergio's colourful designs remind us all that one third of the Earth's land surface is covered by trees," says UNPA Chief David Failor. "The stamps also remind us that mankind plays an important role in maintaining the balance provided by forests."

Children's letters

The 2011 Universal Postal Union (UPU) international letter writing competition[6] asked young people to imagine themselves as a tree writing a letter to someone to explain why it is important to protect forests. An estimated 2 million young people from 60 UPU member countries participated in the competition. A Great Oak in Guyana's Windsor Forest and an observant little tree 'prepared to care for humanity' helped 15-year-old Charlée Gittens from Barbados and 13-year-old Wang Sa from China to win the gold medals.

Charlée Gittens
from Barbados (on pollution)

"Look at the fog that surrounds the city and realize that you are on the same path. You may not see it now, a bit like getting taller. You don't realize it has happened unless you measure your height constantly or until there is such a difference that it is impossible not to have recognized it. Will you only stop when it is too late?"

Sa Wang from China
(story of trees in a Western Village vs. Eastern Village)

Said the chief of the Eastern Village: "Forests are the wealth of all our generations – from our ancestors to our great-great-grandchildren. For our descendants' sake, we should not fight over trees... We will not cut down trees. We will plant more trees. We will plant as many trees as they have cut down."

was dedicated to policies that enable the conservation, management and sustainable development of forests. In total, 20 forest policies from 16 countries were nominated and out of these, six were short listed: Bhutan, The Gambia, Nepal, Rwanda, Switzerland and the US. The Gold Award went to Rwanda's National Forest Policy. Despite population and land pressures, Rwanda is on course to reach its goal of increasing forest cover to 30 per cent of total land area and for border to border landscape restoration. The two Silver Awards went to the US and The Gambia. The US Lacey Act amendment of 2008 prohibits all trade in wood and plant products that are knowingly illegally sourced from a US state or any foreign country. The Gambia's Community Forest Policy has achieved incredible advances in sustainable forest management and poverty alleviation by handing control of forests to the communities that use them.

Celebrating innovation to benefit the world's forests is one of the primary objectives of Forests 2011. This year's Future Policy Awards recognize government policies that have succeeded in translating a vision for a sustainable future into tangible action.

Children's Art Contest

In celebration of Forests 2011, the UNFFS collaborated with the Gabarron Foundation[7] to organize the 2011 International Children's Art Contest. The theme, 'Celebrate the Forests', challenged children to use the power of imagery to raise awareness on the multifaceted values of forests and the role of youth in safeguarding natural resources.

The Gabarron Foundation, along with the Queen Sofia Children's Art Museum in Spain, has been developing programmes aimed at promoting diversity of arts and culture for 20 years. To date, it has collected more than 50,000 works expressing the creative spirit of children internationally. Children between the ages of 5 and 14 were invited to submit their work. Winners were announced at the Forests 2011 closing event in January 2012 at United Nations Headquarters, New York. An awards ceremony for the winners, featuring an exhibit of a selection of the artwork from the contest was arranged for February 2012 at the Gabarron Carriage House Center for the Arts in New York, NY and at a United Nations event for the winners.

Forest Heroes

Achieving a sustainable future requires passion, innovation and strategy, but more importantly it requires the effort of everyday people. These people are Forest Heroes and to honour them, the UNFFS launched the Forest Heroes Programme and Awards. Ninety nominations were received from over 40 countries and all five geographic regions, representing a diverse range of individuals, the youngest being 15 and the oldest 84.

These heroes embodied innovative and grassroots initiatives, tapping into the ecosystem values of forests, from an oyster fisherman's discovery of the positive role of forests in maintaining clean water for the oyster beds to two young girl scouts mounting a campaign to require that the source of palm oil for girl scout cookies be from sustainable sources. The finalists were invited to receive their awards at the Forests 2011 closing event in January 2012 at United Nations Headquarters, New York.

Forests 2011 legacy

The success of Forests 2011 has been the result of a combination of actions on the local, national and regional level, involving governments and stakeholders from all walks of life. As the International Year of Forests, 2011 draws to a close, the challenge is to go beyond business as usual and develop a 'greenprint' for action for a sustainable future for all. The upcoming United Nations Conference on Sustainable Development — known as Rio+20 – is a major opportunity to carry the message of forests for people forward and to implement cross-cutting actions.

A future that does not incorporate forests and their essential values and services as cornerstone elements in a green economy would not work. Forests offer a range of tested solutions for sustainable development, such as climate change, biodiversity, livelihoods, soil and water, and will contribute in many ways to a world greenprint.

It is a new era around the world, evidenced by a new understanding of all aspects of forests, their functions and contributions. The Secretary-General of the Rio+20 Conference Mr Sha Zukang, has said, "we stand at a crossroads and our actions determine the future of mankind". We must make sure that world sees that forests hold the essence of the economic, environmental and social values that provide for our future.

Dryland forests — agroforestry and people in drylands: a needed approach

Sergio A. Zelaya and Jasmin Metzler, UNCCD Secretariat

"Forests are critical to the eradication of poverty in the drylands. They are also the first step towards healing the drylands and protecting them from desertification and drought." (Luc Gnacadja, Executive Secretary of the UN Convention to Combat Desertification)[1]

According to the Millennium Ecosystem Assessment (2005), drylands occupy 41 per cent of the Earth's land area and are home to more than two billion people.[2] The UN Convention to Combat Desertification (UNCCD) defines drylands as arid, semi-arid and dry subhumid areas, meaning areas, other than polar and sub-polar regions, in which the ratio of annual precipitation to potential evapotranspiration falls within the range from 0.05 to 0.65.[3]

Dryland forests cover 18 per cent of the land in arid zones, according to the Millennium Ecosystem Assessment.[4] The largest proportion of dry forest ecosystems is found in Africa and the world's tropical islands, where they account for 70-80 per cent of the forested area. In South America they represent only 22 per cent of the forested land but in Central America almost 50 per cent.[5]

The United Nations designated 2011 as the International Year of Forests with an emphasis on forests that serve people. 2011 is also the second year of the United Nations Decade on Deserts and the Fight against Desertification, and hence gives the opportunity to focus on dryland forests. Furthermore, the World Day to Combat Desertification 2011 was dedicated to the call, 'forests keep the drylands working'.

40 per cent of Earth is open or closed forest. Of this 42 per cent is dry forest, 33 per cent is moist forest and only 25 per cent is wet forest.[6] Despite being more extensive than rainforests, public awareness of tropical dry habi-

Image: Pablo Olivieri – UNCCD photo contest 2009

Dryland forest

Image: Subir Gupta - UNCCD photo contest 2009

Human interventions cause forest degradation in drylands

tats is low and they receive little attention from conservation efforts. At the same time few financial investments are allocated for the arid zones' forests compared to other forest ecosystems.

Dry areas of the tropics often have different soil types than tropical wet forest areas, making them better for agriculture. When managed unsustainably they become degraded. This degradation is far more advanced than that of wet forest.[7] Intensive human intervention, for example, fire, grazing, agriculture and firewood collection, has already adversely transformed many dryland forests.

The dry forest systems that have not been completely compromised are generally impoverished and fragmented. The degradation process thus initiated has led to a shift away from the original vegetation types to drier, less productive and less resistant forest types, exposing large numbers of people to the threat of desertification and associated disastrous ecological, social, and economic impacts. Furthermore, loss of vegetation causes biodiversity loss and contributes to climate change through reducing carbon sequestration and lowering resilience.

Hence, it is not surprising that the Global Forests Resources Assessment of 2010 published by the FAO claims that: "The protective functions of forests are more important in the arid zones than elsewhere." By providing ecosystem goods such as fodder, fuel, wood for construction, medicines and herbs, forests meet the primary needs of some of the world's poorest populations. Trees also stabilize the soil, which prevents soil erosion and helps to conserve water. In short, dry forests are a buffer against drought and desertification and a safety net for the poor.[8]

Despite suffering from greater degradation than wet forests, dry forests have the potential to recover to a mature state more quickly than wet forests and they may, therefore, be considered more resilient. Managing dryland forests in a sustainable way is a tool of improving the poorest people's conditions of living/livelihoods and can thus contribute to meeting the United Nations Millennium Development Goals regarding poverty alleviation, eradication of hunger and protection of the environment.[9],[10]

The UNCCD 10-year strategic plan for 2008-2018 has specific provisions and expected outcomes for improving the conditions of the population and ecosystems affected by land degradation, which leads to desertification. It promotes sustainable land and ecosystem management, measures that in turn address poverty — which is a major cause of forest biodiversity loss — and increase ecosystem resilience, making the rural poor less vulnerable to the impacts of land degradation.

Apart from dry forest preservation, the policy-relevant issue is the promotion of sustainable land management (SLM) techniques like conservation agriculture, agroforestry and soil conservation in arid, semi-arid and dry sub-humid areas, where tree removal, cropping and overgrazing result in soil erosion and watershed depletion. Agroforestry in drylands can help in restoring land, while feeding the poor. It is driving the Greening of the Sahel in West Africa, where land improvement trends have been observed on over five million hectares in Niger. In the 1980s the peasant farmers in southern Niger had to plant their crops three or four times each planting season because the plants were buried by wind-blown sand. Today, they typically plant only once because the forests now protect the seedlings.

Image: Stafford Ondego - UNCCD photo contest 2009

Women are key to sustainable land and forest management

Moreover, the trees they plant produce, at least, a six-month supply of fodder for on-farm livestock, as well as firewood, fruit and medicinal products for home consumption or cash sales. The forests absorb the excess carbon in the air and are important biodiversity sanctuaries providing global benefit.

In India *Prosopis cineraria* based agroforestry helped to control wind erosion and water erosion, improvement in land productivity and conservation of soil and water resources. *Prosopis cineraria* is a hardy, leguminous tree species of desert regions, which farmers have been growing for ages because of its multi-purpose uses, soil fertility enhancing ability as well as symbiotic effect on associated crop yield. It provides food, valuable fodder for cattle and firewood for domestic use (from the lopped material). By virtue of its multi-purpose uses it gives a kind of insurance to the farmers during drought and crop failure. Facilitating effects are observed on the crop yield because of increased nutrient availability and a balanced resource sharing between the tree and associated crops. People of the Indian desert worship the species and the state government has declared it as the state tree owing to its importance in sustainable livelihood of the local people.[11]

In Peru afforestation and reforestation of degraded lands is being done by planting trees, regenerating natural ecosystems and control of pastoralists to improve the living conditions of the affected population and improve the conditions of affected ecosystems. The dryland forest area of the Ignacio Távara community has been severely degraded. 9,500 hectares of degraded area are now in the process of being reforested with domestic species, while the local communities are benefiting from the selling of the generated carbon credits.[12]

The relevance of policies on land degradation and desertification must target soil stabilization, arresting water and wind erosion and maintaining nutrient cycling in soils. Agroforestry action, agroecology practices are suggested here, as well. Another option is through the recognition and use of goods and services provided by the forest ecosystems and the development and implementation of agroforestry systems. Payment for ecosystem services is an approach that can help to harness additional funding for smallholder farmers.

Therefore, there are some guiding components for policies on dry forests that can target increased livelihoods:

1. National policies should foster local governance and institutional decentralization
2. Policies should aim at good management, fostering market development for local products and services
3. Forest communities in drylands should be supported to make the move from reactive-regulation of proactive-use of services; empowerment of local communities is a must
4. National level policymakers could keep in mind the cost of inaction, as well as the costs that deforestation and degradation represent to the livelihoods of rural populations.

Dryland forests still need increased visibility in the policymaking and policy implementation processes. Increased partnership building for the implementation of priority actions that address increased livelihoods of populations that are especially vulnerable to land and water degradation and support to international initiatives on forests and forest ecosystems, especially

Image: Sebastian Gortari - UNCCD photo contest 2009

Forests are a source of livelihood for the rural poor

Image: Arnold C. Jumpay - UNCCD photo contest 2009

Engaging smallholder farmers in reforestation

fostering synergy, takes time, but is a needed approach. The coordinated implementation of the three Rio conventions can be more effectively achieved within their common mandate on forests; providing the starting point for addressing these common issues at the local and national level. Furthermore, action on scientific issues related to dry forests and on countries with low forest cover needs to be strengthened, linking these issues with the international work on these matters, not only of the UNCCD but also of the Intergovernmental Panel on Climate Change (IPCC), Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) and other independent initiatives.

On the other hand focusing on smallholder farmers and targeting women as priority can be an effective way to realize increased livelihoods.

Actions on agroforestry and combating poverty targeting smallholder farmers through policies, incentives and exchange mechanisms need to be undertaken, based on those lessons learned related to agroforestry systems in drylands. At the same time success stories based on traditional knowledge should be promoted.

In Ghana, for example, indigenous knowledge and beliefs of environmental management forms an integral part of drylands development activities. Traditional authorities are encouraged by the Government institutions to designate more areas as sacred groves. The traditional authorities mobilize and sensitize the communities on the importance of reforestation and provide the necessary land space needed for the project. The protected area becomes a small refuge for a large variety of fauna and flora and a repository of numerous native species found nowhere else in the community in such large concentrations. It maintains a higher biodiversity than the original open-canopy forest. The grove then becomes an important source of both seeds and seed dispersers vital to traditional shifting cultivation practices, and of herbs for local medicinal, social and religious purposes.[13]

In the forest-related action local actors seek support or the strengthening of their capacities to counter the threats of anthropogenic actions, climate change and biodiversity loss. The potential negative impacts of climate change on dry forests are of particular concern since dry forest soils are particularly susceptible to wind and water erosion.

A final comment refers to the need for processing UN-REDD financing to drylands and dry forests. Currently, REDD+ activities, especially demonstration activities, are concentrated in humid forests rather than in dry forest areas. Readiness activities are more equally distributed between humid, semi-humid and dry forest areas. One explanation for the neglect of dry forest areas is that these forests are generally 'poorer' in carbon than humid forests.[14] However, this is arguable as dry forests cover greater areas than humid forests in the tropics and are typically more degraded, making them key target areas for terrestrial carbon storage, recovery, and 'avoided' deforestation projects.[15] In addition, dry forests offer a particularly promising opportunity for targeting REDD+ co-benefits; they tend to have higher population densities than humid forests and mainly poor people,[16] along with high levels of biodiversity.[17]

Global demands, local needs: a big picture approach to forests

Rachel Kyte, Vice President for Sustainable Development, World Bank

Forests are central to the World Bank's mission of poverty eradication and sustainable development. For people struggling to avert famine in times of economic or agricultural stress, forests are a crucial safety net: trees provide fruits, leaves, nuts, gum, fuelwood, timber — tangible goods that people can eat, feed their animals or trade for food when regular crops fail.

But even in good times, forests and trees on farms play a vital part in meeting the needs of millions of people around the world — from indigenous peoples, who are key custodians of the last intact natural forests, to farmers and city dwellers. Over the years, the world has come to understand the full range of valuable ecosystem services forests perform. Forests regulate watersheds, house pollinating bats and bees, host 80 per cent of the world's terrestrial biodiversity, absorb carbon dioxide through photosynthesis, maintain soil fertility and control erosion.

Image: Kyle O'Donoghue/World Bank

Forests are a crucial safety net for people in times of need

Image: Kyle O'Donoghue/World Bank

Forests host 80 per cent of the world's terrestrial biodiversity

Because of their versatility, forests are an indispensable ally in our collective search for a better future in which more people will be able to achieve prosperity without damaging their environment.

This vision of 'green growth' guides the World Bank Group's work in the forest and agriculture sectors. As climate change and food shortages throw new challenges in the path of developing countries, our programmes are supporting solutions that increase productivity without compromising livelihoods, soil, water, biodiversity and forests. To avoid solving a problem while exacerbating another, the World Bank urges its client countries to take an integrated approach to climate change, poverty and food security.

A triple win

Although agricultural expansion and shifting agriculture are the main drivers of deforestation and forest degradation in different parts of the world, and deforestation and forest degradation in turn emit a significant share of global greenhouse gas emissions, there are several reasons for hoping we are close to reversing this negative trend.

Recent years have seen the creation of 'sustainable commodity roundtables' that bring the private sector, financiers, governments, smallholders and civil society organizations together to produce commodities such as soy, palm oil, sugar and cotton, in sustainable ways that include 'zero deforestation' targets. This approach complements the laudable progress made by producer and consumer countries to clean up the timber value chain. The World Bank has been a strong believer in forest law enforcement and governance efforts to combat illegal logging and develop a more level playing field for legitimate forest sector enterprises and forest-dependent people, and supports multi-stakeholder processes to make supply chains more sustainable.

There is also momentum behind the idea that forestry and agriculture are closely linked agendas and that integrated landscape approaches hold the ticket to sound rural development. In particular, 'climate-smart' agriculture (which includes proven practical techniques, such as mulching, intercropping and agroforestry, as well as innovative practices, such as better weather forecasting, more resilient food crops and risk insurance) can deliver sustainable and profitable crop intensification and encourage the planting or regeneration of trees on farms, while reducing deforestation.

Image: Flore de Préneuf/World Bank

Landscape restoration measures are an indispensable tool in the fight against poverty and environmental degradation

Finally, there is growing awareness that landscape restoration measures are an indispensable tool in the fight against the twin ills of poverty and environmental degradation. The vicious cycle of land degradation, low yields, poverty and expansion of the agricultural frontier into marginal grasslands and forest lands can be broken through natural forest regeneration programmes, tree planting, and numerous other locally-appropriate land management techniques. According to a recent global assessment, up to two billion hectares of lost or degraded forest landscapes could be restored and rehabilitated worldwide. (Restoration does not mean returning land to its hypothetical 'original' state, but rather regenerating functional, locally adapted ecosystems, in which forests and agriculture are sustainable and able to coexist.) If even a fraction of those areas were to be restored to functional and productive ecosystems, they could help deliver a 'triple win' by improving rural livelihoods and food security, increasing climate resilience, and helping mitigate greenhouse gases — while taking pressure off pristine forests.

The World Bank has seen this promise materialize in many countries. In China for example, the Bank supported over the course of a decade one of the world's largest erosion control programmes which has returned the devastated Loess Plateau to sustainable agricultural production, improving the livelihoods of 2.5 million people and securing food supplies in an area where food was sometimes scarce in the past. The project encouraged natural regeneration of grasslands, tree and shrub cover on previously cultivated slopelands. Replanting and managed grazing regimes allowed the perennial vegetation cover to increase from 17 to 34 per cent between 1999 and 2004. Terracing not only increased average yields, but also significantly lowered their variability. Agricultural production has changed from generating a narrow range of food and low-value grain commodities to high-value products. It is estimated that as many as 20 million people have benefited from the replication of the Loess Plateau approach throughout China.

In Viet Nam, a coastal wetlands protection and development project (1999-2007) demonstrated that it is possible to reduce pressure on coastal mangrove ecosystems, while improving the livelihoods of coastal communities who have witnessed a resurgence of aquatic resources such as crabs and clams. Planted and protected by local communities

Image: Flore de Préneuf/World Bank

The planting or regeneration of trees on farms can help reduce deforestation while improving yields, climate resilience and carbon sequestration

in the Mekong delta, the mangroves return the favour by protecting people when storms rage.

In Albania, a project that integrated forest, pasture and agriculture management (2005-2011) showed that with strong involvement of local communities, forest resources and whole landscapes can improve dramatically. Improved management of Albania's forest and pasture resources and watersheds in 240 communes, through participatory planning, institutional change and small-scale investments in planting of forests and orchards in degraded lands, thinning and cleaning of degraded forests and pastures, as well as erosion and grazing control measures, contributed to a 25 per cent increase in income earned from forest activities in communal forest and pasture lands and a 50 per cent increase in income earned from forest and agriculture activities in micro-catchments — all while sequestering carbon.

Working with partners

Although the World Bank Group is the largest source of multilateral finance for forests, its lending and grants are still a drop in the bucket of funds necessary to achieve global forest goals – from conservation of dense-canopy tropical forests (where deforestation and climate change could fuel a dangerous process of dieback), to sustainable forest management and landscape restoration schemes. We need to find ways to leverage and blend different sources of financing to tip the balance in favour of sustainable practices.

For example, the World Bank Group is exploring a wide range of opportunities to help developing countries reduce greenhouse gas emissions from deforestation and forest degradation, and to conserve, sustainably manage and enhance forest carbon stocks. This large-scale 'payments for environmental services' approach known as REDD+ will likely rest on a complex mix of multilateral and bilateral assistance, civil society efforts, private sector initiatives and carbon markets.

The World Bank's approach has been to prepare and pilot different REDD+ initiatives through partnerships. The World Bank serves as the Trustee and the Secretariat of the Forest Carbon Partnership Facility, a global partnership that is helping 37 countries draft REDD+ readiness plans and will provide carbon

Image: Kyle O'Donoghue/World Bank

In order to succeed, initiatives must benefit first and foremost the indigenous peoples, forest-dependent communities and smallholder farmers who depend on natural resources for their livelihood

payments to countries that meet certain targets. It is the implementing organization, together with other multilateral development banks, of the Forest Investment Program, and is financing pilot investments through the BioCarbon Fund, a public-private initiative that mobilizes resources for pioneering projects that mitigate climate change and improve local livelihoods.

The World Bank Group recognizes that the private sector and individuals play a key role in shaping tomorrow's landscape. In order to succeed, our initiatives must benefit first and foremost the indigenous peoples, forest-dependent communities and smallholder farmers who depend on natural resources for their survival and livelihood. We also encourage responsible corporate investments across the forest products supply chain through its private sector arm, the International Finance Corporation (IFC), and aim to create a more level playing field for legitimate forest-sector enterprises by providing technical assistance in the area of forest law enforcement and governance. We are working with a range of partners to identify business opportunities and supportive policy reforms that could boost private investment in trees and landscape restoration and bring grass-roots re-greening initiatives to the next level of impact and scale.

At a glance

The World Bank Group is the largest source of multilateral financing for forests. IBRD and IDA assistance to the forest sector has averaged US$327 million a year during the last three years. The IFC invested US$195 million in eight projects related to forest use in its 2011 fiscal year. With other multilateral development banks, the World Bank also serves as an implementing agency for the Global Environment Facility (US$19.5 million for forests in 2011) and the Forest Investment Program (about US$630 million pledged) under the Climate Investment Funds.

From crisis to consensus: the future of forestry in Asia and the Pacific

Jack Hurd, Asia-Pacific Forest Program Director, The Nature Conservancy
Allison Bleaney, Communications and Partnership Manager, Responsible Asia Forestry and Trade Program

Over the past decade, the crisis brought on by rampant deforestation and forest degradation has prompted a fundamental shift in Asia's forest policy dialogue, including the desire for a more holistic approach to management that integrates social, economic, ecological and climate goals. However, forests continue to be degraded and converted to other uses. These activities will persist unless the financial and political incentives that drive land-management decisions are rapidly changed to reinforce this new approach.

Thankfully, this change is happening. Growing demand for legal and sustainable wood products and increased awareness of the link between forests and climate change are prompting governments and industry to move away from 'business as usual' and seriously pursue improved forest management. This is positioning the forest sector as a potential model for the global shift to a green/ low-carbon economy.

Image: ©Bridget Besaw

Measuring forest carbon, East Kalimantan, Indonesia

Challenges

Rapid economic growth in Asia and changes in manufacturing processes, logistics and information technology have fuelled unsustainable and illegal logging in many forested countries over the last 20 years. This threatens the livelihoods and security of indigenous communities and vulnerable populations, while causing widespread environmental degradation and releasing substantial and unnecessary carbon dioxide emissions into the global atmosphere.

While forest cover has increased in some countries in the region, this is largely due to the rapid expansion of plantations designed to stabilize soils and feed into an increasingly dynamic pulp and paper sector. Natural forest quantity and quality, however, continues to decline in many countries. There are a number of reasons for this, but the underlying causes are complex and connected:

- Existing financial and political incentives undermine robust, holistic forest management
- Institutional structures and policy mechanisms are outdated and ill-suited to current comprehensive forest management objectives
- Land-use planning does not adequately consider the interests of all stakeholders
- Limitations in human and institutional capacity prevent optimal management of forest land and the interplay between land-use practices.

These factors perpetuate singular interests and lead to conflict over management objectives that produce sub-optimal outcomes in both land-use planning and land-management decision-making. Of the above-mentioned factors, it is the misalignment of incentives that drives everything else.

Opportunities

Fortunately, growing interest in green and low-carbon development is creating incentives and opportunities for improved forest management.

Demand for legal and sustainable timber products — The East Asia Forest Law Enforcement and Governance conference held in Bali, Indonesia in 2001 ushered in a new era in which government agencies, private corporations, non-governmental organizations (NGOs) and other institutions committed to combat illegal logging

Image: ©Celina Yong/RECOFTC

FSC certified logs, Deramakot Forest Reserve, Sabah, Malaysia

across the global supply chain while promoting the expansion of trade in legal timber products.

This led initially to a series of public timber procurement policies and more recently to legislation in the United States and the European Union to prohibit imports of wood and wood products from illegal sources. These new laws — the 2008 Amendments to the US Lacey Act and the EU Timber Regulation — have sparked a shift from short-sighted, destructive timber extraction practices to a more sustainable business model.

Private companies, which clearly want to continue to process, manufacture, export and sell timber products, are responding to these policy signals and, in doing so, putting more pressure on forest concessions to ensure that the products flowing into timber supply chains are from legal and sustainably harvested sources.

As companies respond to consumer demand in their major markets, they are also looking to their governments for domestic policy guidance that will ensure a level playing field and help their industry stay competitive in this changing landscape. Indonesia's new Timber Legality Assurance System and China's developing system to verify the legality of both domestic and imported wood are significant steps that producer and processor countries are taking to bring national policy in line with the demands of international markets.

Reduction of emissions from deforestation and forest degradation — In 2007, delegates to the United Nations Framework Convention on Climate Change (UNFCCC) reached a breakthrough agreement on the 'Bali Roadmap' which included an action plan for designing a system that would allow financial rewards to flow to developing countries that reduced carbon emissions, first from deforestation and ultimately from forest degradation as well (known as REDD).

Three years later in Cancún, Mexico, UNFCCC negotiations produced a framework for combating deforestation as a substantial source of carbon pollution, and a mechanism for financial incentives with appropriate safeguards to reduce forest loss (now called REDD+).[1] While deep-seated divisions and opposing viewpoints dominate the global discussions around the post-2012 climate architecture, one area on which most countries agree in principle is the importance of REDD+ as part of the global solution.

More than US$3.7 billion has been pledged by developed countries to support developing countries in their preparations to participate in a global REDD+ system.[2] In Asia alone there are hundreds of small and large REDD+ projects underway, testing the many elements that will eventually be incorporated into national frameworks that are consistent with the emerging requirements of the UNFCCC process.

Image: ©Aji Wihardandi/TNC

Segah River, East Kalimantan, Indonesia

It is expected that funds will flow to those countries — from Indonesia to Lao PDR — that can demonstrate and deliver reductions in emissions from deforestation and forest degradation. This is creating a powerful political and financial incentive to introduce the fundamental reforms in government policies, land-use planning and land management that are absolutely essential for the long-term health and well-being of forested landscapes throughout the tropics.

Solutions

Taking advantage of the emerging opportunities requires the adoption of enabling public policies and a commitment to progressive corporate and private practice. It is the intersection of policy and practice that will ultimately deliver a new approach to forest management.

Expanding responsible forestry and trade

Policies and market demand have shifted in favour of responsible forestry and trade and there is an urgent need to continue to build capacity to respond across the forest sector.

The Responsible Asia Forestry and Trade (RAFT) Program is a partnership led by The Nature Conservancy and involving six other NGOs, government agencies, intergovernmental bodies and companies working across eight countries in Asia and the Pacific.[3]

The partnership approach has enabled the RAFT Program to channel the practical experience and analytical capacity of leading organizations in this field into policymaking processes. As the regulatory framework to promote improved forest management emerges, RAFT partners have taken this work full circle with training initiatives and demonstrations to support implementation at the field level.

One example of this is found in Indonesia, where RAFT partners have been active participants in the development of the new Timber Legality Assurance System, bringing on-the-ground experience in forests and factories to the table. To help ensure that the system gets off to a fast start, RAFT partners have developed and launched a training programme to help forest staff across the country meet this new requirement. This programme has been endorsed by Indonesia's national Forestry Training and Education Center, and is meeting demand from timber concessionaires that did not exist five years ago.

Together RAFT partners have helped bring nearly 1.3 million hectares of tropical forest under Forest Stewardship Council (FSC) certification,[4] with another 2 million on the way. With these results, RAFT partners have helped build momentum across the region in favour of legal and sustainable forest management. To sustain this momentum and translate intention into results, two things need to happen:

Image: ©Mark Godfrey/TNC

Adelberts Mountain Range, Madang, Papua New Guinea

Responsible sourcing — While public procurement policies, bilateral agreements and legislation prohibiting imports of illegal timber are working,[5] there is a need to strengthen and expand these efforts, sending clear signals across the global supply chain that products made from illegally and unsustainably harvested forests are no longer welcome in the marketplace. Regional and international bodies, such as the Association of Southeast Asian Nations and the Asia Pacific Economic Cooperation forum present clear opportunities to reach multiple countries with sound technical support and advice on responsible forest sector development.

Training and technical assistance — From 2006-2010, the number of timber concessions engaged with RAFT Program partners grew from 5 to 59. At a time when demand for tools, training and technical assistance in progressive approaches to forest management continues to grow, it will be important to adapt training materials for dissemination and use by associations and institutions with national and regional reach. This will require moving from a model of working one-on-one with timber concessionaires and factories to working primarily through industry associations, government extension services and training and educational centres.

Rolling out REDD+

As governments develop new regulations and institutions to meet climate change commitments, it will be important to shape the mechanisms that create incentives for improved management of all types of forest. These processes must be informed by practical land management experience while remaining keenly attuned to political sensitivities.

Since 2009 The Nature Conservancy — with support from the governments of Australia, Germany, Norway and the United States — has been working with the District of Berau, East Kalimantan, Indonesia and its partners in developing the Berau Forest Carbon Program (BFCP). Operating across an entire political jurisdiction, the BFCP will demonstrate how REDD+ can be applied in an area large and complex enough to provide important lessons for scaling-up to provincial and national implementation but small enough to establish and attribute responsibility for delivering measurable reductions in carbon dioxide emissions.

The BFCP has a suite of specific emission reduction strategies around different land-use types (such as protected areas and production forests) and a suite of enabling strategies (including land-use planning and stakeholder engagement) designed to lock in gains and make them durable over the long run. It will also demonstrate how incentives for mitigating emissions from deforestation and forest degradation can be used not only

Image: ©Allison Bleaney/RAFT

Tractor, PT. Belayan River Timber concession, East Kalimantan, Indonesia

to combat climate change, but also to improve the overall regulatory framework for natural resource management. To make the most of this opportunity, there are two important areas for further work:

Policy and institutional design — Delivering credible reductions in emissions will require institutions with a role to play in land management to move out of silos and institute new approaches. Decision-making processes must also engage government departments at multiple levels, from the local to the provincial and national, while integrating the expressed needs and aspirations of local communities and business interests. Such integrated and shared decision-making will require new institutions and/or coordination mechanisms. Countries should begin experimenting with these sorts of processes to get some practical experiences that can be adapted and ultimately taken to scale.

Improving existing mechanisms — It is rarely necessary to develop entirely new REDD+ solutions. For instance, in Indonesia there are many natural resource management mechanisms that can be implemented more rigorously or altered slightly to meet the needs of REDD+. One example is the annual development planning process, which could be strengthened with better trained staff, better integration of local results and increased transparency. This could be expanded to include REDD+ issues, such as planning village-level mitigation actions or obtaining the free, prior and informed consent of local stakeholders on REDD+ activities. Similarly, Indonesia's Timber Legality Assurance System could become the vehicle communicating and auditing specific low-carbon management practices.

Conclusion

Demand for responsible wood products and efforts to pilot REDD+ programming in the field are creating incentives for sustainable forest management as part of a green/low-carbon economy. This will improve forest ecosystem quality, help forests to mitigate and adapt to climate change and ensure that forests continue to help meet the changing socio-economic development needs of the region.

A new opportunity for old technology in Borneo

Image: ©Nurni/Jakarta Post

Bulldozers tear through the forests of tropical Asia, wreaking havoc on soil, trees, the long-term profitability of timber companies and, ultimately, the global climate. But in the forests of Borneo, former illegal loggers operate a 'monocable' winch that pulls logs through the forest with minimal damage. This same winch, as it turns out, is also pulling forest concessions down the road towards sustainable forest certification.

The monocable is a motor-driven winch that pulls one log at a time from the harvested tree stump to a stacking area on the log hauling road. "When combined with pre-harvest mapping of both the trees to be cut and the 'skidding' paths that will be used to pull the logs out, use of a monocable can reduce damage to the soil and surrounding trees by up to 70 per cent," says Bambang Wahyudi of The Nature Conservancy (TNC). This is largely because the monocable reduces the width of a skidding trail from 5 metres with a bulldozer to the width of a log. This small, portable and less detectable machine has long been used by illegal loggers.

In 2009, TNC staff in Indonesia introduced the monocable for sustainable forestry in Indonesia, when it was not yet recognized by the Ministry of Forestry due to its association with illegal logging. TNC worked with Government partners to get approval to test the technology in two concessions. After visiting one concession in 2010, the Ministry of Forestry was eager to see the monocable expanded to others. Along with its smaller footprint on the forest, the monocable promises more legal jobs for local loggers. "Now we are working full-time without feeling guilty," says Ami Daud of his new job managing monocable crews at Belayan River Timber concession in East Kalimantan.

Early research suggests that the monocable is one example of an improved management practice that, when combined with others, could reduce carbon emissions from logging by up to 35 per cent, without reducing timber production.

While responsible practices create long-term benefits and savings, natural production forests continue to come under pressure in the face of lucrative alternative land uses such as oil palm and timber plantations. This will continue until the many values forests provide are accounted for in the incentive structures that guide land use in Asia and the Pacific.

In the International Year of Forests, 2011, the enabling policy environment for moving from 'business as usual' to responsible forest management is stronger than ever, making this the best moment in decades to focus our efforts and support squarely on actions that continue to turn opportunities into positive changes for tropical forests.

Africa's award-winning forest policies

Alexandra Wandel, Director of the World Future Council

African governance was praised when the winners of the 2011 Future Policy Awards were announced at the United Nations headquarters in September. Rwanda's National Forest Policy was proclaimed the winner and The Gambia's Community Forest Policy took home a Silver Award. The prize is awarded annually by the World Future Council, a foundation that brings the interests of future generations to the centre of policymaking. In the International Year Of Forests, 2011, the foundation honoured policies that best contribute to the conservation and sustainable development of forests for the benefit of current and future generations. The jury that decided on the winning policies was composed of experts on sustainability and forests from all five continents. Runners-up were forest policies from Bhutan, Nepal and Switzerland. The US Lacey Act conservation law's 2008 amendment, which bans the import of illegally harvested wood, received the second Silver Award.

"Exemplary policy solutions do exist — the Future Policy Award celebrates the best of them. The aim of the award is to raise global awareness about these policies and speed up policy action," explains Jakob von Uexküll, Founder of the World Future Council. The Future Policy Award is designed to alert policymakers and the public to the importance of best practices in lawmaking and highlight regulatory vision. The awards were celebrated at New York's Central Park Zoo at an event convened by the World Future Council, the Secretariats of the United Nations Forum on Forests and the United Nations Convention on Biological Diversity, the Food and Agriculture Organization of the United Nations and the Forest Stewardship Council, and hosted by the Wildlife Conservation Society.

A connected approach

The winning African policies are so successful because they acknowledge that environment, economy and

Image: World Future Council

Future Policy Award ceremony, 2011: H.E. James Kimonyo, Ambassador of Rwanda to the US, Carl Lewis, Olympic gold medalist and Goodwill Ambassador of the Food and Agriculture Organization of the United Nations, and Hon. Jato S. Sillah, Minister of Forestry and the Environment, The Gambia

empowerment are strongly interconnected. Transferring land and resource ownership to local communities is a way to prevent over-exploitation of resources and the positive spill-over effects can empower local African populations to take charge of their lives.

The late Wangari Maathai, founder of the Green Belt Movement, Nobel Peace Prize laureate and Honorary World Future Councillor, commended Rwanda for its approach to managing the country's forests, remarking: "Rwanda has sought not only to make its forests a national priority, but has also used them as a platform to revolutionize its stance on women's rights and create a healthy environment."

Despite continuing population and land pressures, Rwanda is one of only three countries in Central and Western Africa to achieve a major reversal in the trend of declining forest cover. Its National Forest Policy, which has the ambition of making forestry one of the bedrocks of the economy and of the national ecological balance, was implemented in 2004 and updated in 2010. The Government is currently implementing an Economic Development and Poverty Reduction Strategy, which considers the reversal of deforestation to be a crucial factor in alleviating poverty. It has set the goal of increasing forest cover to 30 per cent of the country by 2020. There has already been an increase of 37 per cent since 1990.

Principles in practice

The guiding principles of Rwanda's National Forest Policy cover a wide range and reach, from the development of agroforestry and sustainable forest management to the protection of endangered plant species and fragile ecological zones. The forest fund budget increased by approximately US$1 million between 2004 and 2010, largely spent on afforestation and reforestation programmes. Positive impacts include the greening of the previously degraded Bugesera Region and the afforestation of Umutara in Eastern province. The Gishwati Area Conservation Programme, initiated in 2007, has increased its forest reserve by 67 per cent, benefiting the chimpanzee population, which is on the brink of extinction. About 10 per cent of Rwanda's territory consists of protected areas. The conservation of national parks also has direct economic benefits, as tourism makes the largest contribution to GDP of all sectors in the economy. In implementing the policy, the Government is working to maximize the participation of a wide range of stakeholders, including public institutions, civil society, private operators, youth associations and women. The Rwandan people benefit from the restored forests through improved food security and poverty alleviation. This is due to the role that forests play in the prevention of land degradation and protection of watersheds — important preconditions for improving agricultural productivity and sustainability.

The Gambia won its Future Policy Award after establishing itself as one of the first African countries to introduce a community forest management approach. Its Forest Department managed to achieve a net forest cover increase of 8.5 per cent over the last two decades and its Community Forest Policy is recognized as one of the most inspiring and innovative in the world.

Prior to the forest policy reform of 1995, the Gambian law emphasized Government ownership and manage-

Image: Kanimang Camara, NACO

Community forest management in The Gambia

Image: UNEP REMA

Tree planting in Rwanda

Image: UNEP REMA

Rwanda's National Forest Policy encourages the development of agroforestry and sustainable forest management

ment of the nation's forests. Local communities had limited rights to access and utilize forest resources, resulting in disengagement from forest protection, widespread forest fires, illegal logging and forest clearances for agriculture and settlement.

Realizing that this approach would defeat efforts to achieve wider forest protection, the 1995 policy aimed to achieve forest management that is both sustainable and socially equitable by recognizing the rights of local communities to access forest lands and benefit from managing their own resources. In this way, the rural population played a key role in local development and poverty reduction while decreasing forest degradation through public involvement in fire prevention and forest protection. Further specific policy goals include maintaining forest cover of at least 30 per cent of total land area and ensuring that 75 per cent of this forest is managed and protected by communities. The policy used a phased introduction, allowing forest users and the Government time to adapt and build a sense of ownership of forest resources amongst local communities. If communities can demonstrate their ability to effectively manage the forest and protect it from fires and illegal exploitation for a period of up to three years, final and permanent ownership is legally transferred to them. More than 350 villages countrywide now participate in community forestry, owning over 29,000 hectares of land and managing 12 per cent of the country's forests.

Despite being one of the world's poorest countries with a rapidly growing population, The Gambia has managed to achieve a net forest cover increase of 8.5 per cent over the last two decades. Both illegal logging and forest fires have been reduced in community-managed areas and new markets for forest products have developed. This generates income — especially for women — and develops organizational capacity as well as market skills and understanding.

The importance of community involvement

"It is essential for communities to be engaged in the design and implementation of rules governing their own resources and the ecosystems upon which they depend for survival. By placing the rural population at the centre of sustainably developing and caring for the forest, The Gambia's innovative laws and policies address poverty and forest renewal in an integrated way," says Marie Claire Cordonier Segger, Director, Center for Sustainable Development Law and World Future Councillor.

Community forest management can prove advantageous for social justice and equality. Public engagement in planning and implementation leads to local and decentralized decision-making and promotes self-governance. The rights of local communities are strengthened and the attendant gains of poverty reduction, women's empowerment and public decision-making can spill over into other spheres of society and contribute to development.

Creating a nationwide movement for forests

Koki Okawa, Noriko Ishitobi, Hidetaka Ichikawa and Rikiya Konishi,
International Forestry Cooperation Office, Forestry Agency, MAFF, Japan

International Year of Forests, 2011 (Forests 2011) provides us with the opportunity to raise global awareness regarding the multiple values of forests and their significant contribution to livelihoods.

The story of Japanese forests is somewhat different from that in the rest of the world, although it relates strongly to the global situation. Japan has a long history of forest management, wood use and respect for nature, and it maintains rich forest cover of 69 per cent of national land, with forest stock growing in maturity. However, its forestry sector is stagnant due to low timber prices and ageing forestry workers. On the other hand, along with growing public interest in environmental issues, there are high expectations for the role of forests as carbon sinks as well as for biodiversity conservation and disaster prevention.

To protect and foster rich forests, it is important for each citizen to join the Forests 2011 campaign and take concrete actions along with it. This process is not always easy as there is still a commonly held misconception that harvesting wood is not in any way desirable for our environment. The level of understanding of forests varies widely among different groups of people. An effective campaign requires a strategy that can properly inform all groups, and the National Committee for Forests 2011 was established to reflect the wide range of views among the general public.

The Forestry Agency organized its first National Committee on 16 December 2010, preceding the bridging ceremony linking the International Year of Biodiversity with Forests 2011 on 18 December in Ishikawa Prefecture, Japan. The committee includes foresters, eminent academics, industrial leaders, media organizations and public figures such as environmentalist C.W. Nicol and television presenter Mitsuyo Kusano.

At its first meeting, the committee decided on 'Walk in the Woods' as the national main theme of for Japan's contribution to Forests 2011. The theme is aimed at

Image: MAFF

The National Committee includes foresters, eminent academics, industrial leaders, media organizations and public figures

Image: MAFF

Government officials who took part in the Tokyo Marathon on 27 February 2011 wore Forests 2011 sashes

ease of participation for all, as a starting point to reflect the issues surrounding our forests. In addition to the national theme, priority areas for communication have been discussed and identified for domestic and international requirements.

Actions for sustainable forest management worldwide:
- Promote reducing emissions from deforestation and forest degradation in developing countries (REDD+)
- Support tree-planting activities in developing countries, for example by non-profit organizations (NPOs)
- Facilitate international communication at various levels, including from governments to NPOs and the private sector.

Actions for future generations in Japan:
- Boost efforts to implement the Forest and Forestry Revitalization Plan
- Support private entities in their efforts to keep forests in good condition and raise awareness of these efforts
- Promote forest conservation in view of the enrichment of water resources and the linkage between oceans and forests
- Assist people in actions to conserve forests and biodiversity and support farmers and foresters who conserve 'satoyama' landscapes (traditional areas between mountain foothills and arable land that promote biodiversity) and agricultural fields
- Disseminate knowledge on forests and forest products.

In order for communication or public relations activities to be effective, it is necessary for the message to match the medium and target groups for the communication. In the light of the limited resources in the national Government to promote Forests 2011, some of its activities are being conducted in cooperation with the private sector.

The secretariat of the committee has proposed project ideas to explore a variety of activities, including publicity campaigns in newspapers, TV broadcasts on forests, special topics in academic societies, forest photo and art competitions, a symposium on the protection of water, and collaboration with environmental forums.

Fostering beautiful forests

The National Movement on Fostering Beautiful Forests was initiated in Japan in 2007 to promote forests' multifunctional roles. The movement has a unique scheme involving Forest Supporters, who actively engage in forest-related activities, and there is a secretariat and a special website (www.mori-zukuri.jp) to support the scheme. Currently there are about 35,000 Forest Supporters, including 900 companies and organizations. In order to promote the use of the Forests 2011 logo mark in Japan, the secretariat of the movement has revamped its Forest Supporters website with explanations in Japanese regarding logo use.

Thanks to the scheme, by the end of June 2011, 292 Forest Supporters had obtained the logo using the website. Forest Supporters can use the site to make announcements about their own Forests 2011 activities, which gives the committee secretariat a valuable insight into the attitudes of the private sector.

Badges and t-shirts with the Forests 2011 logo have been seen as far afield as New York, Jakarta and Phnom

Image: MAFF

The nomination of Child Ambassadors helps spread the message of Forests 2011 to all age groups

Penh. Such promotional materials are a small but effective way to hold something in common with people, and to promote various events and organizations. There has also been active use of promotional materials that are visible, attractive and reusable, such as posters, flyers, stickers, flags, badges and sashes. For example, about 20 government officials who took part in the Tokyo Marathon on 27 February 2011 wore Forests 2011 sashes. In addition, in honour of Forests 2011, the design section of Nika Association is dedicating its annual poster competition to the theme of forests. The winning posters are to be used for distribution.

The secretariat has been trying to involve the private sector in Forests 2011 activities through meetings to exchange information and ideas. At the first such meeting on 17 December 2010, the Director-General of the Forestry Agency delivered the keynote address. Many other forestry officials are taking part in the promotion of Forests 2011 and seeking collaboration with the private sector.

On 8 March, the Minister of Agriculture, Forestry and Fisheries Minister Michihiko Kano appointed 21 child actors who perform a musical, 'Freddie the Leaf' as Child Ambassadors for Forests 2011. The musical, which tells of the short life of a leaf and his friends on the tree, is a touching story about the cycles of life and nature. The musical has also become involved in activities to support people affected by the Great East Japan Earthquake. In addition, it was one of the few films from Japan to be included in the International Forest Film Festival. The nomination of Child Ambassadors for this kind of activity aims to help the message of Forests 2011 to reach all age groups with the help of enjoyable performances.

In May, a set of commemorative stamps was issued by JP Post to commemorate Forests 2011 and the National Greening Campaign. Along with a stamp with the Forests 2011 logo, the stamps feature local trees of Wakayama Prefecture, which hosted the year's National Greening Festival.

Because of the historical connection of forests to our livelihood, Forests 2011 can easily be associated with the arts. From 2 July to 2 October 2011, the Museum of Contemporary Art Tokyo hosted the exhibition 'L'Homme qui Plantait des Arbres', featuring the work of Canadian animator Frederick Back. On 12 July, a memorial charity concert for Forests 2011 was held at Hamarikyu Asahi Hall, Tokyo, featuring the Yomiuri Nippon Symphony Orchestra. Part of the entry fee was donated to the Greenery Fund of the National Land Afforestation Promotion Organization of Japan. Another notable example of collaboration between environmental awareness and cultural event is the Fuji Rock Festival held in Yuzawa Town, Niigata Prefecture from 29 to 31 July.

Campaigns led by the national Government run the risk of concentrating activities in the capital. The same is true of mass communication media such as newspaper advertisements and television programmes. In order to boost a nationwide Forests 2011 movement, there has been active cooperation with local authorities for potential activities, and a number of gatherings have taken shape, sharing a common theme: 'tradition of skills and knowledge'.

National Committee members, such as Oscar-winning musician Ryuichi Sakamoto, have participated in the local gatherings and made significant contributions to the celebration of Forests 2011. In addition, the gatherings have made use of the film 'Mountains, Students

and Sages' (2010, Japan), which was part of the International Forest Film Festival.

Activities are not limited to cooperation with the private sector. The Forestry Agency of Japan manages National Forests amounting to 20 per cent of the country's land area. Answering to the expectation of people's participation in and commemoration of Forests 2011, the National Forest management has introduced a special rate of benefit-sharing afforestation for the coming three years. According to this package, the entity that establishes forests in National Forest lands will receive 80 per cent of the proceeds, 10 per cent more than normal.

2011 is also memorable for the registration of the Ogasawara Islands as a World Natural Heritage Site. On these islands, National Forests account for a significant portion of the total forest area and they provide important habitat for various rare flora and fauna. With 80 per cent of the National Forests in Ogasawara designated a Forest Ecosystem Reserve in 2004, work is continuing to conserve the natural environment for future generations.

On 21 July in Nagoya City, where Japan hosted the Convention on Biological Diversity Conference of Parties, a leading regional newspaper held a Forests 2011 Commemorative Meeting titled 'Biodiversity, Tourism and Forests'. The event was timely, following the World Heritage Conference in Paris the previous month, and drew an audience of about 700 people. Public figures such as Junko Tabei (the first woman to reach the summit of Mount Everest) and Yoshitsugu Minagawa, the Director General of the Forestry Agency, took the platform and told the audience about the important relationship between our lives, leisure and biodiversity.

Forests and disaster recovery

The Great East Japan Earthquake on 11 March 2011 compelled the second Forests 2011 National Committee meeting on 14 April to discuss the contribution of forests and forestry to recovery from the disaster. The following points were raised at the meeting:

- Forestry and wood industries are important to the affected area, and support for them contributes not only physically but also economically to recovery
- Donations from the private sector may develop a green corridor along the Tsunami-affected seashore
- Evacuation shelters should make use of wood as much as possible, as it is better for the purpose and for public morale than other industrial materials.

The meeting was well timed to discuss the relationship between forests and the recovery, and gave us a chance to review subsequent Forests 2011 activities in the light of disaster management.

In addition to nationwide support packages for the affected area, the secretariat of the National Committee has also contributed to events such as a lecture by an affected fisherman who has a long history of tree planting to enrich marine resources; symposiums to discuss how to revive the coastal forests; and the promotion of wooden fans. Volunteers of the Forestry Agency have purchased fans made of wood from thinning operations. The bulk purchase supports the affected Tohoku region by using materials from the region or by donating the part of the sales if produced outside the region. Using the fans also contributed to power savings in summer, combating the power supply issues in Kanto region. In order to increase exposure of Forests 2011, the official logo appeared on the fans.

Image: MAFF

A set of commemorative stamps was issued by JP Post to commemorate Forests 2011 and the National Greening Campaign

Jan McAlpine, the head of the United Nations Forum on Forests, dedicated a video message to one of the symposiums held by the Organization for Industrial, Spiritual and Cultural Advancement on 11 July.

At the time of writing this chapter, a number of important events were in the pipeline. It is sad that Japan was affected by a historic disaster in 2011, preventing a more positive and cheerful celebration of Forests 2011. However, the Great East Japan Earthquake and Forests 2011 together offer the opportunity to plan a future that is sustainable, cooperative and optimistic.

Strengthening national forest programmes

Ewald Rametsteiner, Food and Agriculture Organization
and Jerker Thunberg, National Forest Programme Facility

More than a decade ago, countries recognized the importance of comprehensive forest policy frameworks. They agreed on a common approach known as national forest programmes (NFPs) to achieve sustainable forest management. Acknowledging the validity of diverse approaches to implementing sustainable forest management (SFM), countries also adopted a set of principles designed to guide NFP development and implementation. Today, NFP processes are under way in more than 130 countries, according to the Food and Agriculture Organization (FAO) Global Forest Resource Assessment 2010.

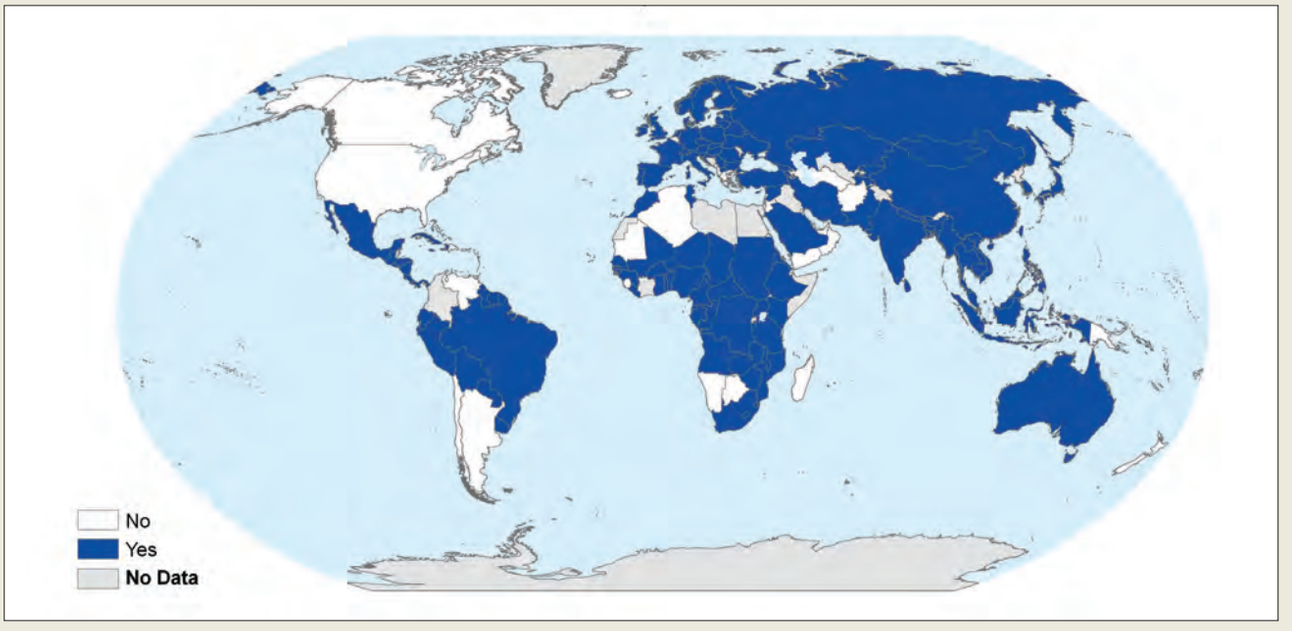
The NFP Facility, hosted by FAO, was created in 2002 as a mechanism to assist countries in developing and implementing NFPs that address local needs and national priorities effectively and reflect internationally agreed principles. Aiming to play a catalytic role, the NFP Facility stimulates broad stakeholder participation in the NFP process by providing grants directly to civil society to implement planned NFP activities. The NFP Facility also facilitates capacity-building and information services. By 2011, it supported 70 countries and four regional initiatives, involving more than 800 local organizations in forest policy formulation and implementation activities. Many other international organizations, donors and development partners have provided assistance for NFP processes in various countries.

Since the mid-1990s, many countries have made substantial progress in implementing NFPs and its principles. The following are some of the major experiences gained by the NFP Facility and FAO in supporting NFPs. These provide valuable lessons on how to improve future implementation of NFPs.

A comprehensive governance framework for forest-related activities

Emerging issues such as climate change, forest law enforcement and the green economy have had a direct effect on forests and the way they are managed and used. In many countries, there has been a proliferation of forest-related initiatives, including on reducing deforestation and forest degradation (REDD) or forest law enforcement and governance (FLEG). This has increased the need for greater consistency and coordination among initiatives. The wide adoption of NFPs

Countries reporting the existence of a National Forest Programme



Source: FAO Global Forest Resource Assessment 2010

Image: FAO

National forest programmes put emphasis on increased involvement of both men and women in decision-making

globally represents an opportunity to build a commonly agreed approach. This can strengthen national forest governance frameworks and accelerate the transition towards SFM. However, few NFP processes have been able to coordinate all major forest-related initiatives in the country through their NFPs. Partly as a consequence, countries often have parallel structures and processes for different initiatives and lack effective coordination.

What are NFPs?

NFPs are a framework for developing and implementing comprehensive forest policies in pursuit of sustainable forest management at the country level. The framework is built on specific principles that can be clustered in three groups: national sovereignty and country leadership, consistency within and integration beyond the forest sector, and participation and partnership.

While many NFP processes have led to effective policies, more emphasis is needed on implementation and monitoring

NFPs have been conceived as long-term iterative processes. This includes the development of policies, strategies and action plans, their implementation, monitoring and evaluation, and subsequent adjustment to new and emerging needs and realities. In many countries, NFP processes have been instrumental in providing platforms for related communication, consultation, coordination and collaboration. A key obstacle to successful implementation of many NFPs is a lack of national budgets for policy implementation, which results in limited impact and tangible benefits in the field. NFP processes also need to be forward-looking, incorporating feedback and adapting over time.

To be country-owned and country-led, NFPs need sufficient capacity and authority

Countries have identified national sovereignty and country leadership as key principles of NFPs. Overall, this principle is being put into practice: most countries assert that they own and lead their NFPs. This principle has also been strongly emphasized in the support through the NFP Facility. Its allocation of grants is based on a competitive and transparent process, led by the national multi-stakeholder steering committees. However, while donors and development partners can play important roles in supporting an NFP process, there is a risk that they will undermine its original intent. For example, institutional arrangements put in place to implement donor support to NFPs sometimes take a project approach, with the consequence that the NFP is considered a project rather than a long-term process.

Although countries have shown initiative in establishing NFPs, the agencies that head them can struggle with issues of leadership. NFPs are often led by forest administrations that lack the power and capacity to coordinate, communicate, negotiate, mediate and manage change across sectors. Other important initiatives, such as on climate change, governance and tenure reform, may be housed elsewhere, including in other ministries. For an NFP to give strategic direction, its steering body must have the authority, capacity and determination to lead on forest-related issues at the national level. Leadership continuity depends on the

Image: FAO

Many farmers are experienced cross-sectoral land-use planning practitioners

commitment of financial resources for the NFP structure, which, in turn, may be regarded as an indicator of a country's political will to embrace an NFP process. An NFP structure that is lean, efficient and affordable is most likely to be durable.

Involving stakeholders is critical for the legitimacy and effectiveness of an NFP

When the NFP approach was adopted in the mid-1990s, countries stressed the need for appropriate participatory mechanisms to involve all interested parties in NFP processes. Overall, countries have made considerable progress in strengthening participation. Today, there is a broadly shared recognition of the importance of involving public and private stakeholders at all levels and an increased effort to do so.

In most countries, the participation of local groups and the private sector in forest-related decision-making is increasing, also due to the strong promotion and support of the NFP Facility, FAO and other development partners. Nevertheless, insufficient access to information and a lack of organization and capacity still hinder the involvement of certain stakeholder groups — especially indigenous peoples, women and local community groups — in NFP processes. There is also a need to further increase stakeholder participation in the implementation of NFP-driven policies and strategies, particularly in the monitoring of implementation. Such involvement can be encouraged by supporting capacity-building in stakeholder groups.

To be effective, NFPs require a broad intersectoral approach

The need for a broad intersectoral approach at all stages is one of the agreed NFP principles. NFPs should be integrated into wider programmes for sustainable land use and activities of other sectors, such as agriculture, energy and industrial development, should be taken into account. This is rarely the case in practice, however, and the mandate and role of an NFP in coordinating forest-related activities across sectors is often neither clear nor widely accepted.

In many countries, other sectors show only a limited willingness to participate actively in an NFP process, especially when the benefits of doing so are unclear. Moreover, other sectors rarely consider fully the outcomes of NFP processes in their respective policies or planning processes. One reason for this is that, in most countries, the contributions of forest products and services to local livelihoods and wider economic development are still insufficiently recognized. Often, forest agencies also need to strengthen their efforts to understand fully the views of other sectors and how they work, and invest sufficient time and resources in engaging in dialogue with other sectors on major topics. There is also a need to strengthen alignment with long-term national priorities and commitments.

There is widespread consensus that NFPs can play an important and sometimes essential role in improving forest governance and fostering sustainable forest management. Forests are part of the livelihoods and daily realities of vast numbers of people. An NFP, therefore, can have far-reaching effects. Among its other purposes, a widely supported and vibrant NFP process can ensure that the forest sector also plays a leading role in promoting national goals such as good governance, democratization, decentralization and sustainable rural development.

Forests for People

Dilip Kumar Periyapattanam Jayapal, Director General of Forests and Special Secretary;
Shri Radha Krishan Goel, Inspector General of Forests and Subhash Chandra, Deputy Inspector General of Forests, India

Forests are a prominent feature of the Indian landscape, covering about 79 million hectares (ha) which represents almost a quarter of the geographical area of the country. These forests are integral to the environment, economy, culture and history of the country. While providing multiple tangible benefits such as timber, fuelwood, pulpwood, fodder, fibre, medicines, grasses and other valuable non-wood forest products, forests also regulate the hydrological cycle, protect aquifers, conserve biodiversity, enhance carbon sequestration as a spin-off effect of forest conservation, and promote ecotourism.

In terms of land use, forestry is the second largest after agriculture in India. The social forestry resources created towards the end of the 20th century are constitutionally devolved to local self-government for management. Agroforestry, along with trees outside forests (TOF), has emerged as the potential area for meeting the requirement of people and industries for forestry products and is recognized as part of the strategy for development of forests and forest-based industry in India. This alone contributes to 1.6 billion m^3 growing stock as against 4.5 billion m^3 from natural forests.

Image: Ministry of Environment and Forests, India

Collection of tendu leaves

While addressing the basic needs of the increasing population for various forestry products, agroforestry diverts pressure from natural forests, leaving them to rejuvenate so that they can perform their environmental functions and provide ecological security to the country.

Policy and legal framework

The foundation of scientific management in forestry was laid in India in 1864 by Dr D. Brandis, the first Inspector General of Forests, through the mechanism of a working plan which, in turn, was based upon the sound principle of sustained yield. The policy and legal framework provides for forests to meet the basic needs of the local communities, and the demands for forest produce, while emphasizing the protective role of forests. From time to time, India has taken to strengthen the mechanism of its vibrant National Forest Policy, through the enactment of: Wildlife Protection Act, 1972; Forest Conservation Act, 1980 (FCA, 1980); Environment Protection Act, 1986; Biological Diversity Act, 2002 and the Scheduled Tribes and other Traditional forest Dwellers (Recognition of Forest Rights) Act 2006 (FRA, 2006) which provides for assigning habitation and occupation rights to the forest dwellers in forests along with responsibility for conservation of biological resources and maintenance of ecological balance.

The implementation of FCA, 1980, which provides for approval of the Central Government for diversion of forest land for non-forestry activities, had the salutary effect of reducing the diversion of the forest land from 4.135 million ha (1950 – 1980) to 1.14 million ha (1981 – 2010), and reducing annual deforestation from 0.13 million ha in the 1970s to 0.02 million ha.

Forest management with local people

Forests have been recognized traditionally as multipurpose resources for providing livelihood to a substantial part of the population. Strategy for forest management in the last few decades has focused on empowerment of local communities, resulting in a paradigm shift in the approach from regulatory to participatory mechanisms with the declaration of National Forest Policy, 1988. This policy embodies many elements of sustainable forest management, and treats India's forest as an environmental and social resource. Ecological security became the prime objective in National Forest Policy, 1988, and the focus also shifted towards addressing livelihood needs of the forest-dependent communities, realizing that poverty is the biggest threat in

Image: Ministry of Environment and Forests, India

A view of Satpura National Park

conservation of forest resources. From 1990, the Government of India adopted the principles of 'care and share' highlighting the need for the partnership of village communities in protecting and developing degraded forests through the institution of Joint Forest Management Committees (JFMC). The village communities benefit from the increased grass fuelwood and timber produced as well as wage labour and watershed development. JFMC has now been recognized as a body of Gram Sabha — a village level institution. This participatory model in forest management now covers more than 20 million ha in over 100,000 communities and has succeeded in stabilizing the forest cover in India despite the pressure of increasing population and demand for forest products and services, contributing in large measure to the observed increase in forest and tree cover by 3.13 million ha from 1997 to 2007 (India State of Forest, 2009). This unique model of partnership is a relationship developed between the local communities and forest departments in India for integrated development of villages in proximity to the forest areas. The scientific and sustainable management of forests is provided by the forest department, while the local communities help in the micro planning process for regeneration, protection and management of forests, and receive the predetermined share from the forest resources managed by them.

Non-timber forest products management and livelihoods

Non-timber forest products (NTFPs) in India are known to play an important role historically in the social life of forest-dependent communities. NTFPs contribute over 68 per cent of total forest export revenue in India. Nearly 300 million people, living in and around forests in India, depend on NTFPs for sustenance and supplemental income. India has shown remarkable progress during the last decade in enhancing the contribution of forest poverty alleviation through empowering people with the ownership of NTFPs as well as value addition in accordance with the Millennium Development Goals declaration in 2000 to halve the number of people living in poverty by 2015. Likewise other forest-based, low-key economic activities such as ecotourism are promoted as a poverty alleviation activity. Such activities are increasingly incorporated in forestry programmes, be it ecodevelopment in national parks or externally aided programmes.

Integrated development by JFMC in Tiria village, Chhattisgarh, India

Image: Ministry of Environment and Forests, India

As part of the 'care and share' policy of the Government, this Joint Forest Management Committee (JFMC) of 368 members (74 families) was established in 1998. It managed a forest area of 340 ha and received its share of Rs.159 lakhs from harvesting of timber in a recent five-year period. These funds were used by JFMC to improve socio-economic status of the village by way of providing solar electric connections, tube wells with overhead tanks for water supply, biogas plants to supply piped gas to every household as well as install biodiesel engines for lift irrigation to augment irrigation facilities. These interventions by JFMC had the following benefits:

- Reducing dependency on fuelwood resulting in improvement of density of adjoining forest areas
- Harvesting of two agriculture crops every year due to improved irrigation
- Enhancement of the income of each family by Rs.15,000 to Rs.20,000
- Improvement of education level of villagers due to solar-powered electricity
- Reduction in incidences of water borne diseases due to piped water supply to every household.

The 'greening' of India

The intangible benefits derived from forests by way of providing ecological security of the country are very important. India has recognized the link between forests and the hydrological cycle, and forests' ability to generate water is the highest priority when making working plans.

Likewise, forests play a key role in removal of accumulated CO_2 in the atmosphere, and sequester it in vegetation, soil and wood products. From 1995 to 2005, the carbon stocks in our forests and tree cover have increased from 6,245 million tons to 6,622 million tons, corresponding to the increase in forest cover, thereby registering an annual increment of 38 million tons of carbon which is equivalent to 138 million tons of CO_2.

Image: Ministry of Environment and Forests, India

Women collecting Mahua flowers

This CO_2 removal is enough to neutralize 11.25 per cent of India's total greenhouse gas emission at 1994 level. Hence, there is a need to scientifically develop sound methodology for estimation of ecological services in order to arrive at realistic monetary contribution of tangible and intangible benefits of forests to the country's GDP, as there are wide variations in existing estimates for quantification of ecological services provided by forests

The National Mission for a Green India (GIM) is one of the eight missions under the National Action Plan on Climate Change (NAPCC). This mission recognizes that climate change phenomena will seriously affect and alter the distribution, type and quality of natural resources of the country and the associated livelihoods of the people. Its main objectives are to increase forest and tree cover on 5 million ha of land and improve quality of forest cover on another 5 million ha to enhance annual CO_2 sequestration by 50-60 million tons up to 2020.

Urban areas in India witness a high level of air pollution affecting ambient air quality, which has an adverse effect on health. The realization that forest cover acts as the green lungs of the city, besides acting as a filter for suspended particulate matter (SPM), has resulted in a shift towards urban greening in metro cities and towns. As a result cities like Delhi, Bangalore, Chandigarh and Hyderabad have been able to increase forest cover manifold through innovative management interventions and campaigning strategies. The forest and tree cover of Delhi has increased from 25 km^2 in 1995 to 300 km^2 in 2007 (India State of Forest, 2009). Such success stories have been replicated in Hyderabad, Chandigarh, Bangalore and Gandhinagar.

Wildlife management

While India has only 2.5 per cent of the world's land area it supports around half of the global population of tiger, Asiatic elephant, one-horned rhino, Indian gaur and snow leopard and it is the last bastion of Asiatic lion. There is a network of 661 Protected Areas (PAs) encompassing about 4.8 per cent of the geographical area of the country forming the nucleus of the biodiversity conservation strategy of the country. Two major flagship programmes, namely Project Tiger (1973) and Project Elephant (1991) were implemented to conserve these species along with their habitats and corridors besides addressing man-animal conflict. The latest tiger census report, released in March 2011, has estimated the tiger population at 1,706 as compared to 1,411 in 2008 while wild elephant population is estimated at around 27,694.

Despite the fact that forests in India are managed for ecological security and addressing livelihood needs of forest-dependent communities, it is a matter of great satisfaction and pride that India is one of the few countries in the world where forest and tree cover has not only stabilized but rather shown an increase of 3.13 million ha between 1997 and 2007 apart from maintaining the habitat in PAs for management of wildlife in the country.

NTFP development in Orissa, India

Image: Ministry of Environment and Forests, India

Sanjog, a small NGO at Kantabanji in Balangir district, Orissa state, has promoted many enterprise-based rural development activities. It has established formidable non-timber forest produce (NTFP) based enterprises with initiatives for sustainable regeneration of resources. The enterprises are registered as cooperatives in district industries centres (DIC), which receive Government subsidies.

Lac insect rearing can yield more from just three trees than an acre of paddy farm. This is because each Kusum (*Shleichera oleosa*) tree earns the owner about Rs.1,650 net in just six months. The lac is sold at Ranchi, Jharkhand state or Gondia in Maharashtra or Jaipur, Rajasthan where it used in bangle and jewelry making. Training is provided by the Indian Lac Research Institute, Ranchi.

Stitching leaf plates from Siali/Mahul *(Bauhinia vahlii)* climber leaves earns 200 tribal women about Rs.3,600 yearly (over 8 months) in the Mohangiri mountains of the Kalahandi-Balangir border. They now earn 20 per cent more as a result of collective sales through 'Banashree' federation which has DIC registration. This is also partly due to access to remote and profitable markets of Tirupati temple by Sanjog through Andhra traders, rather than depending only on the local traders. Climber planting is necessary to maintain stock and avoid loss due to bark stripping for rope making.

Austria's forests — from regulations to cooperation and partnerships

Ingwald Gschwandtl, Federal Ministry of Agriculture, Forestry, Environment and Water Management, National and International Forest Policy and Forest Information, Austria

Some 150 years ago, Austria and the surrounding region was struck by massive deforestation and forest degradation. As a consequence, people suffered from floods, soil erosion and diminishing wood supply. This led to the first Austrian forest legislation in 1852, which established tenure rights on forests and introduced the obligation to manage forests sustainably.

Today, Austria is a highly developed country with forest cover of close to 50 per cent, a very productive and internationally competitive forest industry, and an environment and landscape attractive to tourists from all over the world.

People have always been of central concern to forest policy in Austria. The current Austrian Forest Act defines sustainable forest management in accordance with the provisions of the Ministerial Conference on the Protection of Forests in Europe. This requires an approach that secures the long-term economic, environmental and social dimensions of forests comprehensively and in a balanced manner.

Despite the fact that 80 per cent of Austria's forests are privately owned, mostly by small holders connected to farms, with the economic utilization of wood as a raw material providing income and livelihoods for forest farmers, all forests are freely accessible to the public for recreation purposes. Forest owners are obliged to manage their forests in a way that also supports a wide range of public values, such as protective and environmental functions.

There are high expectations of forests in Austria. They are expected to sustain livelihoods, host biodiversity, help stabilize the climate, provide sustainable materials and renewable energy, contribute to greening the economy, protect soils and water, and prevent floods, erosion and avalanches.

A solid legal and institutional framework is the basis for ensuring the multifunctionality of our forests. Forest law enforcement, research and education as well as

Image: Beda Sylvester Widmer

Forests provide landscapes that attract tourists from all over the world

Image: Georg Rappold

Austria has forest cover of close to 50 per cent and an internationally competitive forestry industry

Image: Georg Rappold

Shared principles and goals are crucial to forest policy development

monitoring are important tools to this end. There are specific and quite detailed management regulations laid down in the Austrian Forest Act, such as limits on the size of clear cuts and the obligation to engage in reforestation. Forest owners are also requested to employ certified forest professionals for holdings that are larger than 1,000 hectares.

In 2003 an additional and complementary policy instrument, the Austrian Forest Dialogue, was launched in response to the dynamic policy environment our forests are subject to. It is a participatory process, engaging a broad range of stakeholders in a long-term, transparent, cross-sectoral dialogue, which supports forest-related policy formulation and implementation. The dialogue is set up with a clear structure and conducted on the basis of rules of procedure, agreed upon by the stakeholder groups represented.

A milestone achievement of this dialogue process is the first Austrian Forest Programme, jointly developed by 80 organizations and institutions representing a broad range of public and private interests in relation to forests and their management. In a forward-looking manner, it addresses all relevant topics and identifies shared principles and goals regarding Austrian forests. The programme is trend-setting for the measures and activities carried out by the organizations and institutions participating in the Austrian Forest Dialogue.

The Austrian Forest Programme is structured along seven thematic areas: the contribution of Austrian forests to climate protection; forest health and vitality; productivity; biodiversity; the protective functions of forests; social and economic aspects; and Austria's international responsibility for sustainable forest management.

For each thematic area, the Austrian Forest Dialogue assessed the status quo and analysed trends and challenges. On this basis, the participants agreed on 28 principles, 52 goals and 66 sets of measures which aim at guiding forest-related policies and actions. In order to allow for the assessment of progress in implementation of each goal, a total of 70 indicators have been developed.

The shared principles and goals constitute the basis for concrete individual measures identified by the Austrian Forest Dialogue and reflected in its Work Programme, which is designed for immediate implementation. The Work Programme is a living document which is continuously updated. At present, it contains some 125 measures, of which 29 have already been implemented, 51 are works in progress and 45 are under preparation for implementation. An external evaluation of the Austrian Forest Dialogue was carried out from 2010 to 2011 and brought interesting results, which are now used for developing further the process.

While thematic area 6 of the Austrian Forest Programme encompasses a wide range of goals and measures aimed at strengthening the relationship between forests and people, thematic area 7 identifies various actions to better utilize the rich experience of the Austrian forest and land use sector in international cooperation.

In 2009 the Austrian Natural Resource Management and International Cooperation Agency (ANRICA) was established in order to better concentrate knowledge and capacities for international cooperation. Registered as a foundation, it is supported by the Austrian Government and governed by Austrian organizations

Image: Johannes Prem

An Austrian chocolate company gives a percentage of its revenue to support a forest project in Laos

Image: Christoph Gröll

Biodiversity is a key thematic principle for forest management

representing public administration, management and business consulting, engineering, finance, banking and investment, research, development, education and training, sales and marketing of natural resource goods.

ANRICA is both an implementing and an advisory organization specialized in rural area management and development, grouped around three principal working domains:

- Natural resource management (agriculture, forestry, mining)
- Economic development of rural areas
- Preservation of environmental services.

Politically, Austria strongly supports a holistic approach to forests, so that all economic, environmental and societal aspects are dealt with in a balanced manner. Austria believes in a commonly agreed global framework for sustainable forest management, as a reference point for forest-related actions in all contexts and at all levels. Austria has a long history of proactive engagement in a number of multilateral and international institutions and processes, in particular the United Nations Forum on Forests. In Europe, Austria has initiated a process towards a Legally Binding Agreement on Forests for the pan-European region and globally, as part of its long-term advocacy for an adequate forest regime.

However, ultimately all concepts and regulations regarding forests will only work if carried out together with people. International Year of Forests, 2011 was a unique opportunity to emphasize the interdependency of people and forests at all levels. Austria established a rich, comprehensive agenda for promoting these aspects of forests in the public debate.

Efforts were taken to ensure broad systematic media coverage on forests, for instance the Austrian State TV station covered a specific forest-related topic every week throughout 2011. Social media tools Facebook and Twitter were used in order to reach out particularly to young people. Specific information packages were issued and a Forest Education Package was provided to all Austrian primary schools. Various public private partnerships helped to broaden the support basis and the outreach of forest-related communication activities.

A remarkable project in this context is a brand of organic chocolate named 'A Piece of Forest', produced by an Austrian fair trade company and sold commercially. A certain percentage of the revenue supports a forest project in Laos under the leadership of WWF and the Austrian Federal Forests Company. The money is dedicated to improving the forest situation in the protected area of Xe Pian, a natural habitat of the tiger, which is threatened with extinction.

In relation to the magnitude of the world's forest problems, this project is certainly just a small contribution. However, it is a striking idea to combine the purchase of something people enjoy — a piece of delicious chocolate — with raising both funds for an important forest project and consumers' awareness about the challenges forests face globally. The core message thus conveyed will stay relevant far beyond this project and International Year of Forests, 2011. Each forest, whatever its location, is closely interrelated with the global environment and economy, and deserves our full attention and support more than ever.

Sustaining societies through forests and trees: agroforestry and the United Nations conventions

Kate Langford, World Agroforestry Centre, Kenya

Climate change, biodiversity loss, and land and water degradation are inextricably linked. It is widely acknowledged that to lessen the impact of these global problems on ecosystem services and human well-being, innovative approaches are urgently needed which balance environment and development needs.

Agroforestry — the integration of trees into agricultural systems and/or the management of forests by farmers — is one such approach, with the ability to reduce poverty, improve productivity and achieve environmental sustainability.

For historical reasons, we tend to make clear divisions between what we consider to be agriculture and what is forest. Statistics, institutions and scientific traditions follow this divide, however in the actual landscapes we care about there is no such division. Trees exist outside of forests in agricultural landscapes, and in many cases farms encroach upon forests. In reality, there is a gradient of tree densities for which no single forest definition, and certainly not those currently used, makes sense. Agroforestry sits at the interface between forests and agriculture.

Far from a new practice, agroforestry is a traditional land use that has been developed by subsistence farmers throughout most of the world. A study in 2009 found that 48 per cent of the world's farmland has greater than 10 per cent tree cover which represents over 1 billion hectares of land and 558 million people.[1] Six million square kilometres — or 27 per cent of agricultural land globally — has more than 20 per cent tree cover. Beyond this, large areas which are classified as forest provide a living to farmers

Image: Charlie Pye-Smith/World Agroforestry Centre

A farmer extracting rubber in Indonesia

Image: Charlie Pye-Smith/World Agroforestry Centre

Alain Tsobeng, a researcher with World Agroforestry Centre in Cameroon holding a superior variety of njansang

through agroforests of varying types. Agroforestry systems range from home gardens to subsistence livestock and pastoral systems, staple crops, on-farm timber production, tree crops of all types integrated with other crops, and biomass plantations.

With growing recognition that agriculture needs to drastically shift to incorporate more sustainable farming systems, agroforestry is gaining more and more prominence. It is increasingly promoted by land-use managers and international development organizations for its ability to result in both livelihood and environmental benefits, especially in some of the poorest and most degraded areas of the world.

Agroforestry lies at the very heart of the intention of the three United Nations conventions dealing with environmental stability: the United Nations Convention on Biological Diversity; the United Nations Convention to Combat Desertification; and the United Nations Framework Convention on Climate Change. The challenge which lies ahead is to realize the full potential of agroforestry globally.

Agroforestry and biodiversity conservation

According to the International Institute for Environment and Development, agroforestry is among just five key biodiversity conservation interventions that can actually lift people out of poverty.[2]

As rural population densities continue to rise, natural forests and the services they provide are increasingly threatened. Agroforestry can make it possible for many of these goods and services to be produced on-farm thereby stabilizing agricultural landscapes and alleviating pressure on natural ecosystems.

Thousands of smallholder farmers in Africa, Latin America and Asia are benefiting from growing superior varieties of indigenous fruit trees through participatory tree domestication programmes coordinated by the World Agroforestry Centre. The farmers are able to diversify what they grow and in many cases earn extra income. In addition they are increasing on-farm biodiversity.

In Guinea, establishing an effective system of community/Government forest co-management and providing livelihood alternatives to people living on the forest fringes has had a profound influence on the management of four large forest areas. The Landscape Management for Improved Livelihoods (LAMIL) project has also done much to improve the welfare of local people who are now growing trees for food, live fences, fodder, fuel and wood. And there has been a significant increase in the abundance of wildlife in the forest.

In many areas that harbour the world's biologically richest and most threatened eco-regions, including most of the global biodiversity hotspots, agroforestry is an important land use. Agroforestry practices which are designed to improve land quality and productivity often also create habitats for wild species in agricultural landscapes. Above ground, agroforestry helps to provide diversified and connected habitats used by wildlife while below ground, the soil biota is increased.

Indonesia has the world's largest area planted in rubber; some 3.3 million hectares. Much of this is in smallholdings of jungle rubber, that is, rubber grown in agroforests which contain 60-80 per cent of the biodiversity (such as

Image: Charlie Pye-Smith/World Agroforestry Centre

The LAMIL project enables farmers to have a steady source of income. A buyer purchases mangoes from farmers in Guinea

tree seedlings and birds) of comparable natural forest.[3] These rubber agroforests are threatened in many places by more profitable land uses, such as intensified rubber monocultures. The World Agroforestry Centre has been testing and promoting technologies to improve the productivity of jungle rubber while maintaining biodiversity.

Agroforestry and climate change

According to the Intergovernmental Panel on Climate Change, "transformation of degraded agricultural lands to agroforestry has far greater potential to sequester carbon than any other managed land use change."[4]

Trees store carbon both above and below ground. Estimates of the carbon sequestration potential of agroforestry systems vary from under 100 metric tons of carbon dioxide equivalent (Mt CO_2e) per year by 2030[5] to over 2,000 Mt CO_2e per year over a 30-year period.[6]

Agroforestry is also well recognized as a strategy for climate change adaptation. Expected higher average temperatures, more severe weather extremes, greater variation in rainfall and shorter growing seasons will place enormous pressure on agricultural systems, food production and food prices. Agroforestry helps to buffer against the impacts of climate change by reducing erosion and runoff, improving water retention and providing shade.

Research has found that the tree components of agroforestry systems stabilize the soil against landslides and increase infiltration rates.[7] This reduces surface flow during the rainy season and increases groundwater release during the dry season. Agroforestry has also been shown to redistribute water in the soil profile, providing annual crops with greater water availability.[8] In Zambia, maize yields of improved fallow agroforestry systems were, on average, nearly two times as high as for a pure maize control.[9]

Farmers use trees to diversify risks as they provide alternative streams of income and increase food security. This will become all the more important with climate change. By integrating trees, farmers can decrease their dependency on a single staple crop or sufficient grass for their livestock. The diversity of plants used in agroforestry systems can provide multiple harvests at different times of the year.

Agroforestry and combating desertification

Agroforestry is cited in the United Nations Convention to Combat Desertification as a potential win-win land use system in providing key rehabilitation and other ecosystem services while also generating production and income for land users.

Drylands occupy 41.3 per cent of the Earth's surface. When land degradation occurs in the drylands it is referred to as desertification. The livelihoods of more than one billion people in some 100 countries are threatened by desertification.

There are examples from around the world where agroforestry is being successfully practised as a form of dryland management and soil conservation to prevent the desertification of landscapes. Agroforestry systems increase soil organic matter and available nutrients,

Image: Julius Atia/World Agroforestry Centre

Baobab fruits in Niger

improving the fertility of soils and increasing productivity of the land. Trees also provide erosion control, improve water infiltration, provide land cover and shade and act as windbreaks.

In Senegal, planting strips of *Casuarina spp.* in the Niayes coastal stretch north of Dakar has stopped the movement of sand dunes and provided shelter from the sea winds that made any type of agriculture impossible. Market gardening is now thriving and provides a livelihood to an increasing number of settlers.

Fertilizer trees which capture nitrogen from the atmosphere and transfer it to the soil provide a low cost way for farmers to improve soil fertility and boosts crop yields. In Malawi, Zambia, Kenya, Tanzania, Niger, Burkina Faso and other countries in sub-Saharan Africa, fertilizer trees are doubling and tripling average maize yields.

In pastoral areas of sub-Saharan Africa, three-quarters of the 10,000 tree and woody species are used as fodder, supplying up to 50 per cent of livestock feed, particularly during the dry season when grass and crop leftovers are scarce.

In Shinyanga, Tanzania, a comprehensive soil conservation and agroforestry project has seen the planting of 500,000 hectares of woodlots which supply feed for animals in the dry season. As a result, smallholder farmers have seen their profits rise by as much as US$500 per year.

Realizing agroforestry's full potential

Agroforestry is complementary to the three UN environmental conventions with enormous potential to increase biodiversity conservation, address climate change and combat desertification. It also contributes to development objectives, offering multiple livelihood benefits to smallholder farmers, including: diversified income, resilience to risk, nutritious foods, medicines, green fertilizers, timber, fuel wood and fodder. But what will it take to increase the adoption of agroforestry on a global scale?

Current interest in payment for environmental services (PES) schemes seeks to reward those who provide environmental services on behalf of those who benefit. In many cases, financial transfers are not the primary issue. To improve the livelihoods of people in upland areas often requires resolution of conflicts over land use rights, recognition and respect, and access to the educational and health services that beneficiaries of environmental services take for granted. Experience from World Agroforestry Centre programmes, RUPES in Asia and PRESA in Africa, has shown that reward and co-investment schemes that start from the needs of rural poor and consider options for land use change can make a difference beyond the financial value of cash transfers. In the case of agroforestry, such environmental services include conserving biodiversity, storing carbon, preventing degradation and protecting watersheds.

Under the United Nations Framework Convention on Climate Change, nations can agree to participate in schemes that will reduce emissions from deforestation and forest degradation. At the local level, this may well result in reward and recognition schemes that remove bottlenecks for farmers to benefit from growing trees on their farms.

Research has shown that successful PES initiatives must be long-term commitments and accountability for environmental outcomes is more effective than payments for labour and effort. Because trees are usually a long-term investment, up-front payments may be needed to encourage the adoption of agroforestry.

The need to overcome policy constraints is still holding farmers back from taking full advantage of growing trees on their farms. In 2010 the World Agroforestry Centre launched the Agroforestry Policy Initiative which is designed to kick-start a global review of outdated policies and forest regulations.

Improved policies would see better coordination among different ministries that would promote clear tenure rights to land, forests, and trees, thus improving farmer access to agroforestry information and germplasm, and creating integrated competitive and fair markets. For example, following reforms to the Code Forestier in Niger, farmers have again been cultivating trees and the country has seen a tremendous increase in tree cover on over 5 million hectares in the past 20 years.[10] The Food and Agriculture Organization of the United Nations is developing agroforestry guidelines for national policies and decision-making with the involvement of key development and research institutions.

Greater investment is needed to support smallholder farmers in adopting agroforestry practices — such as provision of tree planting material, information and training, access to credit — so that they can improve incomes and ensure food security while at the same time providing environmental benefits.

Cork oak: a unique agroforestry system

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The geo-climatic peculiarities of Portugal, located in the western extreme of Europe, where the Atlantic and the Mediterranean meet, have allowed for forestry to take on a particular and pivotal role in the country. Here, you will find vast areas where the mild temperatures and rainfall regime, favoured by the Atlantic influence, encouraged the development of intensive forestry and short-rotation plantations were successfully introduced to supply a very strong pulp and paper industry, for firewood production and also for soil protection. But you will also find large areas, in the southern part of the Portuguese mainland, where the native Mediterranean oak species and its cultural traditions remain. Shaped by human activity over generations, forests coexist with agriculture and traditional practices leading to characteristic agro-forestry-pastoral systems, named 'montados', characterized by low density of trees and agriculture or pasture under canopy. The most emblematic case is that of the unique cork oak tree.

There are only around 2.5 million hectares of cork oak forests in the world, located almost entirely in the Mediterranean countries. There have been trials to introduce it to other regions, namely the Americas, Western Asia and Australia, but with limited success. Portugal has about one third of the total area of the species distribution. The industry associated with this non-wood product has developed so well that the country is the world leader in cork production and cork products trade. The Portuguese industry supplies over 50 per cent of all cork used in the world. Bottle stoppers are its main product, as 70 per cent of exports value come from these items, sustaining the entire chain and being one of the main sources of income for rural areas of the Alentejo and Algarve regions, some of the poorest regions in the country.

Image: Fernando Lopes

Afforestation of agricultural lands with *Quercus suber* (cork oak) is helping to increase forest coverage in Portugal

Image: Fernando Lopes

Debarking is done manually by highly skilled rural workers

Image: Fernando Lopes

Cork is piled in fields to dry after harvesting

Image: Fernando Lopes

Cork trees are among few species that can thrive despite the removal of bark

What exactly is cork?

Cork is the bark of the cork oak (*Quercus suber*). It is unlike the bark of other oaks, as it has unique and specific physical and chemical characteristics, particularly with regard to its cellular structure and chemical composition, which also confer special properties on it. Cork floats, is waterproof, has elasticity and flexibility, and is a good acoustic and thermal insulation material. Furthermore, the cork oak is one of the few trees that can survive after being debarked and regenerate a new bark, so the harvest of cork is a sustainable use of the trees.

Cork is an extraordinary protector of the tree against forest fire, and its properties make it the best material for its most distinguished product, the cork stopper. Now used worldwide in the most famous wine bottles, it is interesting to note that the use of cork stoppers started in the mid-18th century, when the famous Don Pierre Pérignon, from the Hautvillers Abbey in France, discovered this material and started to use it to seal Champagne bottles.

The exploitation system on which the economy of the cork oak forest relies is based on harvesting part of the bark every nine years. Through an initial incision that does not reach the inner bark, the cork is released. This operation is done in late spring and early summer, but always guided by actual meteorological conditions, so that the phellogen is active and the cork can be detached without damaging the tree. A new bark grows and nine years later is ready to be deployed.

The nine year cycle is due to both economic and ecological reasons: nine years is the minimum (average) period for cork to be thick enough to produce a good cork stopper, but is also the period recommended by the tree physiology to recover from the stress of debarking, therefore minimizing any problems to the tree's condition.

Cork oak woodlands, provider of multiple goods and services

Traditionally, agriculture and grazing have taken place under the canopy of the cork oak forests, whose fruits and leaves are used as fodder by cattle. Its wood is hard and rather difficult to work by carpentry, but it is excellent as firewood. Nowadays the system is becoming even more complex, and the range of goods and services has been broadening: game, aromatic herbs, beekeeping, mushroom picking, bird watching, horse riding and all kinds of nature tourism and leisure activities associated with rural areas are done in parallel to the traditional grain crop, pasture or forage farming.

One might expect that an ecosystem that is so much linked with human intervention would have a poor record regarding biodiversity. On the contrary, these multipurpose systems host many species and have considerable biodiversity benefits. This is mainly due to the particular landscape pattern: we often find open spaces alternating with more closed areas, different density of trees, patches of different crops, fallow land and bushes. Within a few hundred metres one can find various species of fauna, due to the micro-habitats or new niches provided by the patches' distribution. Certain prey birds are particu-

Image: Fernando Lopes

Cork is left to dry for several months before being transported for stopper manufacturing

Image: Fernando Lopes

Portugal's montados sustain a wide range of fauna as well as trees

larly favoured by the open spaces, which provide opportunities for hunting, while the edges and fringes provide the shelter for prey and old trees provide nesting conditions. Cork oak stands are predominantly irregular, old trees remaining on the field with plenty of hollows that provide habitat for many species, not only of birds but also of reptiles as well.

Through the different *facies* of the montado, over 60 species of breeding birds occur (of which 40 are Passeriformes), over 20 mammals and more or less the same number of reptiles and amphibians. If the variety and abundance of top predators is to be taken as a good indicator of the structure of an ecosystem, the number of birds of prey is especially impressive, as they are more visible. Studies in Portugal indicate that some of the montados host more than 10 different species of breeding birds of prey, with a density of 60 to 80 couples per 100 km^2.

Although stands are typically of low density and volume increment is very low, the carbon stock in these systems can be significant, mainly in the soil pool due to the long period of retention.

Sustainable management of cork oak stands

The protection and expansion of forests and, in particular, of cork oak forests, has been a concern over centuries. The first records of legal measures to protect forests in the country date back to the middle of the 7th century. This, however, did not prevent the consistent shrinking of the forest area, as the population increased and more land was needed for agriculture. Later, the Age of Discovery increased overseas navigation and trade, requiring more wood for the shipping industry. The forest area reached a minimum in the 19th century, when stronger legislation was put into force on what could be seen as the first package of forest policy measures. Nevertheless, the situation started to reverse only around 1900, when the afforestation programmes started to show results.

Cork oak has been protected by law since 1927. Only in certain cases where it is judged to be in the public interest is it possible to cut a stand of cork oak, and rules concerning the debarking operation, for instance, have not changed much since then. In fact, the most recent legislation (2001) has its roots in that first legal document. The coexistence of forests and agriculture led to the need to adapt practices to overcome some problems. Research and experimentation, combined with traditional knowledge, made it possible to define a set of best practices designed to safeguard the sustainability of these ecosystems. And as interregional cooperation is fundamental, a broad set of actors, including forest owners' associations, the National Forest Authority, the National Forest Research Station and universities, worked together to develop a Good Practice Guide for cork oak stands.

Among these good practices, we emphasize the non-use of deep ploughing, the use of methods to control weeds that do not damage the roots and the management of livestock so as to ensure that the regeneration of forest stands and soil conservation is assured. The Good Practice Guide is intended mainly

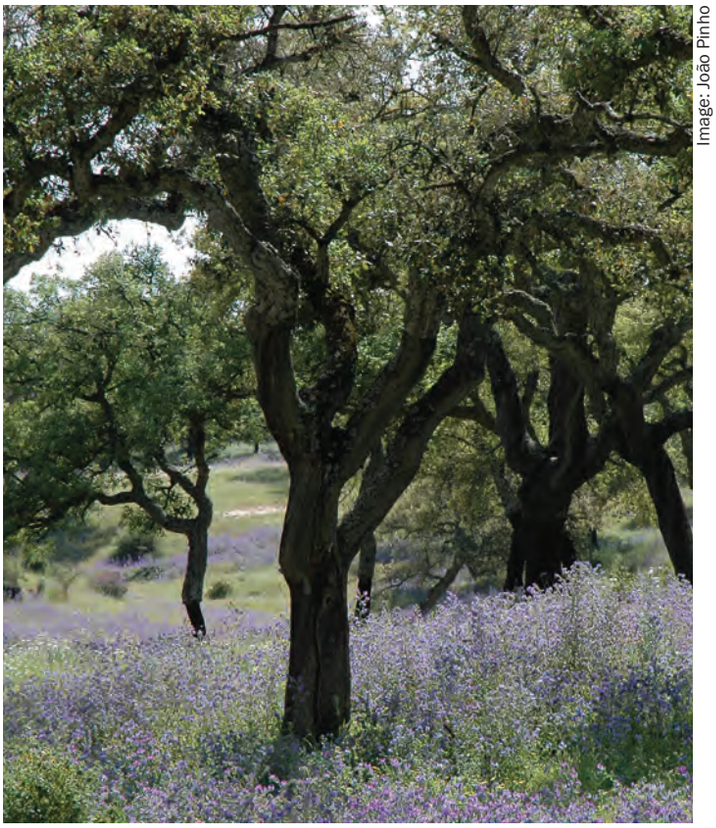


Image: João Pinho

Sawn pastures, rich in legumes, are promoted in order to enrich soil and increase carbon sequestration

Image: João Pinho

Acorns are the basis of the diet for black pigs, which are common in southern Iberia

for forest producers, while the industry, pushed by the market and in order to cope with more demanding environmental requirements, has also set an International Code of Practice for Cork according to the SYSTECODE quality assurance system, under the Confederation of Cork Industries (CELIÈGE).

We should also note the Business and Biodiversity Initiative, a European initiative of which Portugal is a member. In this context, an innovative service of free technical advice has been put into practice, entirely financed by the largest industrial company in the cork sector. This service results from a partnership agreement concluded between the National Forest Authority, the Institute for Nature Conservation and Biodiversity, WWF, Quercus Association (a national environmental NGO) and a cork industry company, Corticeira Amorim.

Under this service, forest owners can invite experts from WWF and a research institution to visit their cork oak forests, analyse their status and produce technical reports that identify the best practices of the forests and associated biodiversity management requirements. These reports are the basis for supporting the process of certification of sustainable forest management, if forest owners wish to do so. The area of certified cork oak forest has been increasing since this service was introduced.

Sustainability of cork oak forest is one of the main objectives of national forest policy in Portugal. Cork's social, economic and environmental importance, from national to local levels, makes it imperative to protect and to manage it, in order to preserve it for future generations in good condition while producing income for rural regions.

Image: João Pinho

Cross-section of a trunk of cork oak, showing its characteristic thick bark

Developing Estonia's forest policy

Marku Lamp, Head of Forest Department, Ministry of the Environment, Estonia

Estonia is situated in Northern Europe in the Baltic region, and is one of the three Baltic States (along with Latvia and Lithuania). It is bordered by Finland in the north (across the Gulf of Finland), by Sweden in the west, by Latvia in the south and by the Russian Federation in the east.

Located in a border area where the coniferous Euro-Siberian taiga opens onto a European zone of deciduous forests, Estonia has 87 native and more than 500 introduced tree and bush species. Pine, birch, spruce and aspen are the most common Estonian trees. The largest forests can be found in north-east and central Estonia, stretching from the north coast to the Latvian border. About 10 per cent of Estonia is a nature reserve.

About 75 per cent of all plant species in Estonia are found on the west coast, where the climate is more moderate. In many locations in Estonia, for example on Hiiumaa Island and in the north east, large tracts of the primeval forests that once covered Europe have been preserved.

Estonian forests are home to many animals — hares, foxes and deer are common and it is not uncommon for visitors to meet a wolf, lynx, bear or elk. They also provide habitat for several animal species close to extinction, such as European mink, dormouse and flying squirrel. The European beaver, once hunted to extinction in Estonia, was successfully reintroduced in the 1950s.

The forest has always been an important place for Estonian people — it was believed to be a sacred place in Estonia's primeval religion and people worshipped the wood-spirits, because the forest was their essential source for food and building materials.

Estonia regained its independence in 1991, after being incorporated into the Soviet Union as a Soviet Republic for about 50 years. The country's forestry and forest management have received influences from both Russian and German silviculture, which in the early 20th century also shaped the structure of forest land and land ownership. In times of Russian influence, state-owned forestry was predominant and private forestry was generally under German rule.

Forest policy and the national forest programme

The legal basis for sustainable development in Estonia is provided by the Constitution of the Republic of Estonia, which came into force in 1992. The Sustainable Development Act was approved in 1995. According to the

Image: Min. Env. Estonia

Forests have an important place in Estonia's spiritual tradition

Image: Min. Env. Estonia

Estonians have the right of access to forests across the country

1997 amendment of the Act, long-term plans for sustainable development are to be made within the energy, transport, agriculture, forestry, tourism, chemical, building materials and food industry sectors.

Estonia's active partnership in sustainable development processes at the global level began at the United Nations Conference on Environment and Development held in Rio in 1992. Implementation of the Agenda 21 and Millennium Development Goals was renewed at the United Nations Summit on Sustainable Development in Johannesburg in 2002.

In the early 1990s, the Estonian forest sector was largely organized on the basis of structures left over from the Soviet era. The adjustment to a market economy and new environmental standards proved to be slow and difficult and it became apparent that a thorough overhaul of the sector was needed. The key issues were related to the organization of public forest administration, establishing an appropriate balance between forest production and conservation and providing support to private forest owners. In order to accelerate development in the forest sector and to improve the basis for legislative reform, the Ministry of the Environment decided, in early 1995, to launch the Estonian Forestry Development Programme, including the task of formulating a National Forest Policy.

The Estonian Forest Policy, which was adopted by the Riigikogu (the Estonian parliament) in the summer of 1997, expresses the importance of forests in four aspects:

- Economic aspect — a source of revenue
- Social aspect — a guarantor of employment and provider of recreation
- Ecological aspect — a preserver of the diversity of species
- Cultural aspect — a part of Estonian culture.

According to the forest policy, Estonian forests are a great natural and ecological resource. Two general objectives have been set for forest management:

- Sustainable management and use of forests and wooded lands in a way, and at a rate, that maintains their biological diversity, productivity, regeneration capacity, vitality and potential to fulfil, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, without damaging other ecosystems
- Effective management of forests.

Implementation of the Forest Policy was deficient due to the lack of an integral plan of implementation measures. To coordinate the implementation of activities defined in the Forest Policy and the allocation of the required resources, the Ministry of the Environment compiled two long-term Forestry Development Programmes, the first for the period 2002-2010 and the second for 2011-2020.

The main objective of the current development plan is to ensure the productivity and vitality of forests and diverse and efficient use thereof. For that purpose, in the long term perspective, timber is used as a renewable natural resource in the timber industry and in energy to the extent of increment. To maintain the productivity of forests, reforestation work is performed on at least half of the regeneration cutting areas. Finally, to maintain the good status of populations of endangered species and species typical to Estonia, at least 10 per cent of the forest land area has been placed under protection and the representation of forests under strict protection has been improved.

Forests for people

A century and more ago, the protection of nature depended on common sense and the initiative of

Image: Min. Env. Estonia

Estonian forests represent an important natural resource

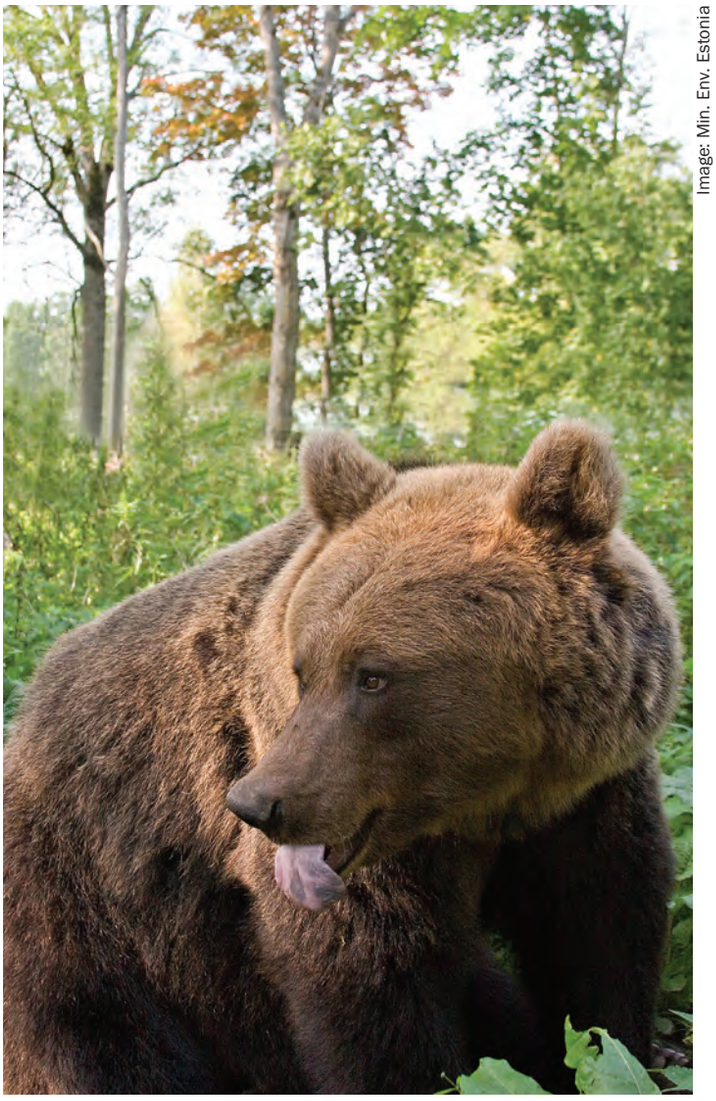


Image: Min. Env. Estonia

Estonian forests provide habitat for bears and other wild animals

people who loved nature. Today, Estonia is a party to several conventions and has applied the requirements of different directives to protect its natural resources. However, this land, which is hardly recognizable on the map of the world, is home to 1.3 million people. In order to cope in our climate, people need warm houses; in order to heat the houses, it is necessary to use natural resources. Each of us has an impact on the environment — the question is how big this impact will be. Nature conservation is the balancing force between our desires and the possibilities the environment can offer; it has the function of ensuring that our common resources are used economically and will be preserved for generations to come.

Estonians have been dependent on wood for centuries. Pine and spruce have been always the most used tree species, valued for their strength and durability in our climate.

Forest-based industry has a lengthy history in Estonia. Along with the other Baltic provinces, Estonia was in the vanguard of industrialization when the process began in the Russian Empire in the 19th century. Estonia's forest industry was privatized in the early 1990s, but private sawmills could not pay competitive prices for logs and the majority were exported. The total output of the country's sawmills in 1993 was just 157,000 m^3. This situation changed within a few years as modern sawmills were built which could take logs from exporters. Forestry companies themselves also invested their earnings in the construction of new mills.

The structure of Estonia's forest-based industry consists of all of the main branches of the forest industry, but the pulp and paper industry is relatively small. Estonia has one old sulphate pulp and unbleached paper mill and one new, modern chemical/thermal/mechanical aspen pulp mill, Estonian Cell. The strongest sector of the Estonian industry is sawmilling, whose practitioners currently own or work in close cooperation with a variety of planer mills, finger-jointed component plants, glued/laminated beam factories, joinery factories, wood impregnation plants and more.

Hand-carved round log houses have been in favour for centuries, mainly as farm houses. You can still find log buildings over 300 years old that are well preserved and in use. Developments in further processing (joinery, glued/laminated beams and other engineered wood products) will make wood more competitive in the building sector on the domestic and export markets. The production and export of prefabricated houses in Estonia has also been consistently increasing.

The number of consumable products from forests has increased with the development of skills and way of life. The most important sources of forest by-products in the 20th century were herding, haymaking, mushroom gathering, berry picking and resin extraction. Until the occupation of Estonia by the Soviet Union, the right to hunt was vested in the landowners. In the Soviet period, game was public property and hunting was organized by state, which was the owner of all land property. After Estonia regained independence, the right to hunt was returned to landowners (with severe restrictions) and game were declared ownerless.

Local residents have been engaged in hunting for thousands of years. In the Early Stone Age, the main prey in what is now Estonia were elk and beaver. During the Middle Stone Age wild boar and deer were added and in later years, bear, ox, badger, marten and otter. Estonia's game population nowadays is viable and has yielded internationally recognized shooting trophies (particularly lynx skins and skulls). This has boosted the popularity of hunting tourism over the last 20 years.

In Estonia, the public has rights to all forests. People are allowed to explore our natural and cultural landscapes by foot, boat and bicycle, on skis or on horseback. On privately owned land, the same rights apply from sunrise until sunset. Landowners may not prohibit people's movement and open lands, roads and waterways, as well as ice and shore paths, to the public. This places people at the heart of Estonia's quest to maintain its forestry tradition for a sustainable future.

Multiple benefits from REDD+

Wahida Patwa Shah, United Nations Environment Programme, Nairobi, Kenya and Lera Miles, United Nations Environment Programme World Conservation Monitoring Centre, Cambridge, UK

Reducing Emissions from Deforestation and Forest Degradation (REDD) is an effort under the United Nations Framework Convention on Climate Change (UNFCCC) to create a financial value for the carbon stored in forests, offering incentives for developing countries to reduce emissions from forested lands and invest in low-carbon paths to sustainable development. REDD+ goes beyond deforestation and forest degradation and includes the roles played by conservation, sustainable management of forests and enhancement of forest carbon stocks.

Under the UNFCCC, countries have agreed that deep cuts in greenhouse gas emissions are urgently required, to hold the increase in global average temperature below 2° C as compared to pre-industrial levels. The overall objective of the UNFCCC is to stabilize greenhouse gas concentrations in order to prevent dangerous interference with the climate system, within a time frame that would enable ecosystems to adapt naturally to climate change and avoid threats to both food production and economic development. Deforestation and forest degradation (resulting for example from agricultural expansion, infrastructure development, destructive logging and fires) account for around 15 per cent of global greenhouse gas emissions.[1] Reducing emissions from forest loss and degradation is therefore a key part of the solution. Supporting conservation and sustainable management of forests will also contribute to climate change mitigation, by further enhancing carbon stocks and reducing the scope for leakage[2] of deforestation pressure to other forests.

Increasing the range of benefits

The advantage of REDD+, in comparison with many other mitigation measures, is that it is capable of

Image: Ravi Prabhu

Non-timber forest products from central Africa: the development of value chains for these products can help to ensure increased revenue for local producers/groups based on sustainable production, value addition and commercialization and skills enhancement

Image: Aliya Shah

Tracking mountain gorillas in Volcanoes National Park, Rwanda: one of the benefits of avoiding deforestation may be the development of ecotourism opportunities that allow local people to own and manage lodging facilities, for example, or to be hired in the tourism industry

Image: Olivier Hamerlynck/KENWEB

From the Ochna species, this coastal forest tree produces a fruit that has great commercial potential and brings income opportunities for local entrepreneurs

delivering multiple benefits beyond carbon, such as social and ecosystem-based benefits. Social benefits result when measures accompany successful REDD+ projects and strategies. These may include employment and livelihoods, equitable land tenure clarification for indigenous peoples and local communities, carbon credit payments or enhanced participation in decision-making under stronger governance. The ecosystem-based benefits arise from the result rather than the measures: i.e. from the retention, restoration or better management of forest ecosystems. These benefits are the conservation of forest biodiversity, and ecosystem services,[3] which, as well as climate mitigation, include flood prevention, water regulation, soil conservation and the provision of timber and non-timber forest products (such as charcoal, medicines, fibre, gums and food). The degradation of these services is felt on the ground by people dependent on natural resources, but may go unnoticed at the national and global levels.[4]

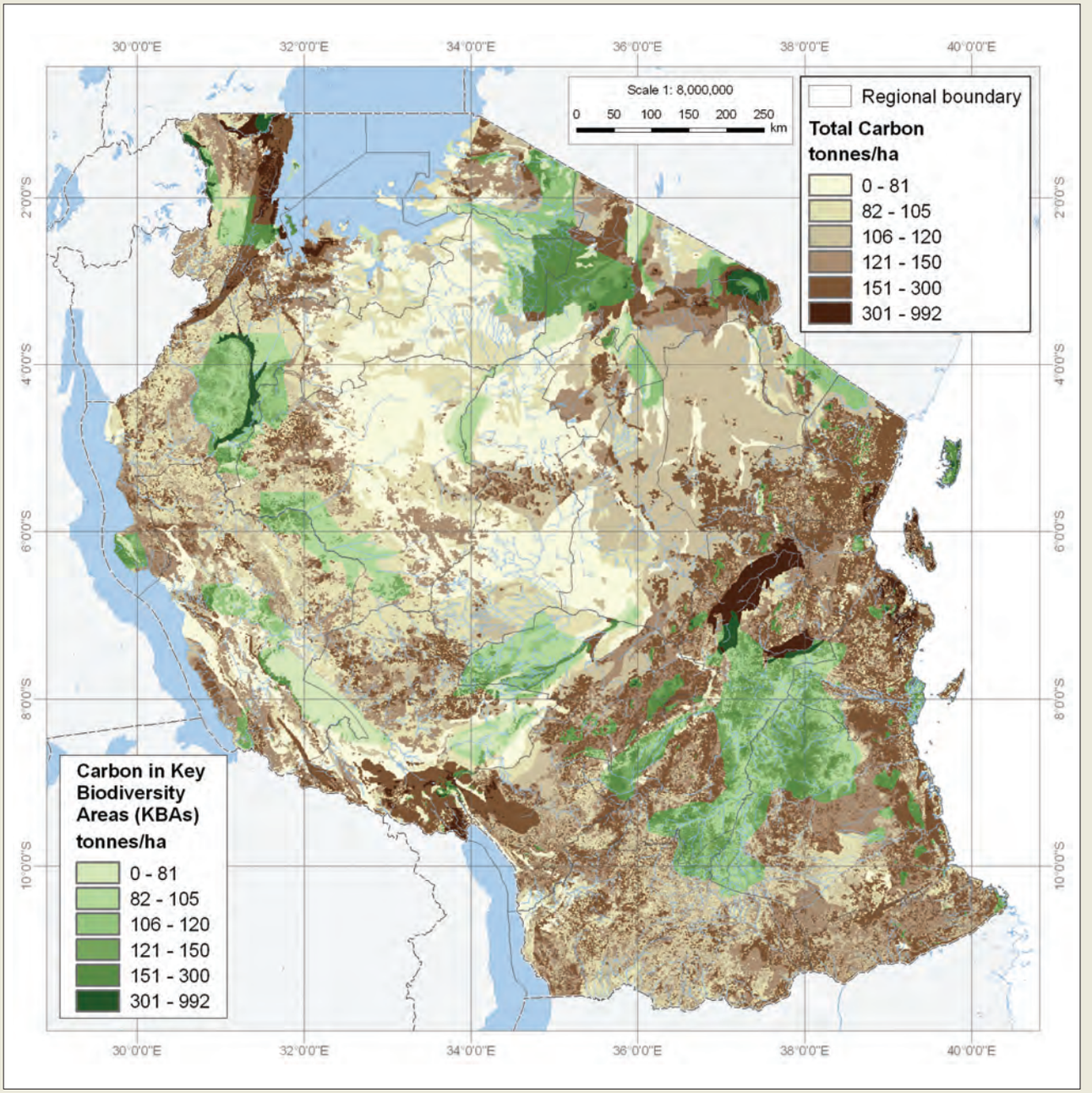
Ecosystem-based multiple benefits are important to countries implementing REDD+ for several reasons. First, for the benefits themselves, which accrue from local (e.g. forest foods) to global (e.g. biodiversity) scales and can support commitments made by countries under related multilateral agreements such as the Convention on Biological Diversity. Second, for their contribution to the long-term viability of REDD+, both through their role in increasing the value and thus acceptance of REDD+ amongst local people and at an international level, and through their role in the resilience of forest carbon stocks.[5] Third, in some cases multiple benefits are central to the investment in REDD+, with national decision makers starting to prioritize forest areas that will deliver

The REDD+ Kasigau Project in Kenya

Image: Wildlife Works Inc.

The purpose of the REDD+ Kasigau Project is to permanently protect the dryland *Acacia-Commiphora* forest that forms a wildlife dispersal and migration corridor between Tsavo East and Tsavo West National Parks in Kenya. The project will also conserve the biodiversity found in those forests, provide alternative sustainable development opportunities for the local communities and prevent the emissions that would otherwise occur were those dry forests to be converted to subsistence agriculture. Carbon financing has enabled community projects such as building of schools, higher education bursaries for children, and support for local women's and land conservancy groups.[6] Afforestation of deforested water catchments may have potential benefits for water availability and water quality for pastoral and agricultural communities although these benefits have not been measured or quantified.

Carbon in biomass and soil overlaid with key biodiversity areas in Tanzania



Source: Prepared by UNEP-WCMC and Forest and Beekeeping Division Tanzania. (See Miles et al. 2009)

an array of values. Some international investors have also indicated a strong interest in seeing REDD+ activities that deliver biodiversity conservation benefits.

The United Nations Environment Programme (UNEP) is taking the lead for the work on multiple benefits within the UN-REDD Programme. The aim is to provide assistance with the realization of these benefits from forests in REDD+ strategies and actions. As countries design their REDD+ strategies, UNEP supports them to reach optimal outcomes with respect to the mix of the different types of benefits they can realize from REDD+. This includes working with partners and REDD+ countries to develop tools and guidance to enhance the multiple benefits of REDD+ and reduce risks from inadequate planning and implementation. These tools include a set of Social and Environmental Principles and Criteria, which countries can use in the development of their REDD+ programmes.

Planning for success

The multiple benefits provided by a national REDD+ programme, and its success in avoiding social and environmental risks, will depend upon the REDD+

activities chosen, the particular forests targeted and the measures employed. Multiple benefits can be delivered at different scales; some are primarily local, while others may be national or global. The approaches taken to safeguard and enhance ecosystem services and biodiversity in a REDD+ context will therefore vary amongst countries and at different scales. If countries can integrate the need to realize multiple benefits into planning at different spatial scales, then REDD+ can both help to retain and enhance ecosystem services and biodiversity, and increase human well-being and wealth creation. For example, in Ecuador, the REDD+ planners view multiple benefits as a cross-cutting element within the National REDD+ Programme that will, amongst other things, contribute to the long-term sustainability of REDD+ policies, by implementing a 'high quality' REDD+ mechanism that not only focuses on carbon but also recognizes social and environmental additional benefits. In Kenya, a voluntary REDD+ project (described elsewhere in this article) has resulted in benefits for local communities living adjacent to the forested areas. Work has begun on initiatives around safeguards compliance based on the principle of free, prior and informed consent (see right) and identification of these multiple benefits from REDD+ implementation.

The principle of free, prior and informed consent

Safeguards are needed to ensure benefits can be realized. These should be articulated to enable the realization, planning and management of benefits as well as risk mitigation of the processes and outcomes that engaging in developing REDD+ can result in. United Nations Agencies adhere to the provisions of the United Nations Declaration on the Rights of Indigenous Peoples. Translating these principles into action, the UN-REDD Programme is engaging with local communities and indigenous peoples in a process of consultation called Free, Prior, and Informed Consent (FPIC) in order to ensure that social principles are adhered to.

For example, In the Viet Nam UN-REDD Programme, activities have begun to pilot FPIC in Lam Dong and Di Linh districts. Workshops have been held at the local level and communication materials explaining how this principle works have been disseminated. Communities now understand that they can make their own decisions about whether to allow a project or activity to start. Information sharing and dialogue is a key part of the process.

Realizing the multiple benefits of REDD+

What then needs to be done? To start with, REDD+ activities appropriate to the national context need to be selected and located with a view to optimizing a range of benefits. The next steps involve choosing REDD+ measures to ensure that multiple benefits are realized. This requires:

- Setting goals for multiple benefits, ranging from employment, income and access and use rights to natural resources for people, to ecosystem service provision and biodiversity conservation
- A clear understanding of the direct and underlying causes of deforestation and forest degradation, from local to national scales
- Estimation of the potential for reduced emissions, conservation or enhancement of forest carbon stocks, and the possible financial incentives for doing so
- Costed options for measures to address these causes without doing harm to people or to the environment, including through displacement of deforestation
- Costed options for measures for conservation, sustainable forest management and enhancement of forest carbon stocks
- Land-use planning to balance the delivery of different multiple benefits from REDD+, address trade-offs and identify areas in which each costed option might usefully contribute
- National implementation of the UNFCCC guidance and safeguards intended to promote benefits and reduce risks from REDD+ and a system for providing information on how these are being addressed and respected
- A system for monitoring forest carbon stock changes and multiple benefits.

Different forests have different values, both in terms of the services that they provide and the implementation and opportunity costs of including them within a REDD+ initiative. Working with individual countries, the UN-REDD Programme is helping to map these values against potential carbon gains, both to increase awareness of the potential for multiple benefits from REDD+ and to directly support land-use planning. Future work includes scenario development to identify and map the possible impacts of different REDD+ policies at a national scale. This includes both the impact of REDD+ and other land-use plans on multiple benefits as well as the impacts of prioritizing these benefits in REDD+ on other land-use plans. This is part of the Programme's support to countries as they seek to take into account the real costs of alternative uses of forests, and to adequately address who bears the costs of present or future changes in uses, protecting the poor from negative impacts and fostering national development.

The most relevant REDD+ activities depend on the national situation. Where there are high levels of deforestation, tackling this will be the top priority. Approaches will range from investment in the agricultural sector to increase productivity per hectare, to clarification of land tenure rights and payments for carbon stock management. In other countries, deforestation may be minimal but the carbon stocks of forests are being degraded through fire spreading from adjacent agricultural areas, or by unsustainable timber harvesting. Approaches may range from designation of REDD+ areas through zoning based on spatial, social and economic analyses, the promotion of efficient stoves to reduce demand for charcoal or the application of reduced-impact logging to reduce damage to residual stands and soils. Yet other countries have small but stable forest areas and are looking to afforest. The benefits resulting may vary dramatically depending on the strategy adopted and the tree species used.[7] The measures employed in each circumstance need to be selected according to the context, paying particular attention to the likely social and environmental results.

REDD+ has the potential to deliver healthy forests that provide multiple benefits for local people, national economies and the global community. Thoughtful planning for these benefits is crucial if REDD+ is to live up to its promise.

Forest protection and climate change

Gillian Allard, Susan Braatz and Beverly Moore, Food and Agriculture Organization

Changes in the patterns of disturbance in forests are expected under a changing climate as a result of warmer temperatures, changes in precipitation and increased drought frequency. This will play a major role in shaping the world's forests and the forest sector.

Disturbances are a natural and integral part of forest ecosystems and have major impacts, positive and negative. They influence forest structure, composition and functioning and can be important for maintaining biological diversity and facilitating regeneration. When disturbances exceed their normal range of variation, however, the impacts on forests can be extreme, affecting entire landscapes, causing large-scale tree mortality, destroying undergrowth and degrading soils. Global climate change and variability are exacerbating many of these impacts by making forests more prone to damage by altering the frequency, intensity and timing of insect and disease outbreaks and extreme weather events such as cyclones, storms, heat waves and drought and increasing the risk of landslides and large-scale fires.

Large wildfires, or mega-fires, have been noted in all regions of the world. The frequency of their occurrence is likely to increase as droughts intensify, fuels accumulate and landscapes become more homogeneous. They are not always single wildfires but often occur as groups of multiple fires across a large geographic area. Mega-fires are often extraordinary for their size, but they are more accurately defined by their complex, deep and long-lasting social, economic and environmental impacts such as adversely altering energy, water, nutrient and carbon cycles, causing a decline in biodiversity and increasing carbon emissions and weed invasion.[1] In places where climate change increases the risk of wildfire, measures should be taken to reduce this risk by putting in place effective fire management measures, including prevention, detection, control and rehabilitation.

Image: Ronald F. Billings

Outbreaks of the mountain pine beetle (*Dendroctonus ponderosae*) in western Canada and the United States have been exacerbated by changes in climate

Changes in precipitation can increase the risk of erosion, landslides and floods. Reducing the risks might entail maintaining or increasing vegetative cover and minimizing disruption on erodible slopes, increasing protection of riparian strips to protect river water quality, and taking protective measures in drylands that are at risk of drought and increased wind erosion.

A changing climate will alter the disturbance dynamics of native forest insect pests and pathogens, as well as facilitate the establishment and spread of non-indigenous species. Such changes in disturbance dynamics, in addition to the direct impacts of climate change on trees and forest ecosystems, can have devastating impacts because of the complex relationships among climate, disturbance agents and forests.

Climate, and in particular temperature and precipitation, has a very strong influence on the development, reproduction and survival of insect pests and pathogens. It is highly likely that these organisms will be affected by any changes in climate. Because they are cold-blooded organisms, forest insects and pathogens can respond rapidly to their climatic environment. With their short generation times, high mobility and high reproductive rates, it is likely that they will respond more quickly to climate change than long-lived organisms, such as higher-order plants and mammals, and thereby may be the first predictors of climate change.

Increases in summer temperature will generally accelerate the rate of development in insects and increase their reproductive capacity, while warmer winter temperatures may increase overwinter survival.[2] Warmer winter temperatures, however, can decrease snow depth. Decreased snow depth may lower the winter survival rates of many forest insects that overwinter in the forest litter where they are protected by snow cover from potentially lethal low temperatures.[3] The magnitude of the impacts of temperature on forest pests will differ among species depending on

Image: FAO

Forest fires are set to create pasture

Image: François-Xavier Saintonge

Many forest pests have altered their distribution and moved into new areas in response to climate change

their ability to adapt; flexible species are less likely to be adversely affected by climate change than specialist species.[4]

The impact of a change in temperature on pests will vary depending on the climatic zone. In temperate regions, an increase in temperature is likely to cause an increase in rates of insect survival and could increase the risk of pest outbreaks. Warming in the tropics, although proportionally smaller in magnitude, could negatively affect the survival rate of insects and reduce the risk of pest outbreaks. Compared to higher-latitude species, tropical insects have very narrow ranges of climatic suitability and live very close to their optimal temperature.[5]

Climate plays a major role in defining the distribution limits of insect species. With changes in climate, these limits are shifting as species expand into higher latitudes and altitudes and disappear from areas that have become climatically unsuitable.[6] Such shifts are occurring in species whose distributions are limited by temperature, such as many temperate and northern species. It is now clear that, during the 20th century, poleward and upward shifts of species ranges occurred across many taxonomic groups and in a large diversity of geographical locations.[7]

The ability of a species to respond to global warming and expand its range will depend on a number of life-history characteristics, making the possible responses quite variable among species. Fast-growing species will likely respond to warming by expanding their distribution, whereas slow-growing species that need low temperatures to induce diapause or dormancy, such as boreal and mountain species in the Northern Hemisphere, will suffer range contractions.[8] Range-restricted species, particularly polar and montane species, show more severe range contractions than other groups and are considered most at risk of extinction due to recent climate change.[9] Range shifts may be limited by factors such as day length or the presence of competitors, predators or parasitoids.[10] For example, the range expansion of insects that are host-specific may be limited by the slower rate of spread of their host plant species.[11]

Phenology, the timing of seasonal activities of plants and animals (such as breeding of birds and shooting and flowering of plants), can be expected to be influenced by climate change, as it is in many cases temperature-dependent. Evidence of phenological changes in numerous plant and animal species as a consequence of climate change is abundant and growing.[12] In general, spring activities have occurred progressively earlier since the 1960s and have been documented on all but one continent and in all major oceans for all well-studied marine, freshwater and terrestrial groups. Where insect life cycle events are temperature-dependent, they may be expected to occur earlier under increased temperatures; insects will pass through their larval stages faster and become adults earlier.

All of these impacts on forest health will inevitably have widespread impacts on the forest sector. Changes in disturbance regimes and in the structure and functioning of naturally regenerated and planted forests will have negative impacts on the productive functions of forest ecosystems, which, in turn, will affect local economies. Production patterns and trade in forestry commodities will be altered as species are grown more competitively in higher latitudes and altitudes. Conversely, markets may be saturated due to increased mortality of trees following disturbances, as has been experienced with the mountain pine beetle outbreak in Canada. Decreased forest ecosystem services, especially water cycle regulation, soil protection and biodiversity conservation, may imply increased social and environmental vulnerability.

By strengthening forest management practices, FAO supports countries to achieve sustainable forest management, including forest health protection. Effective forest management helps ensure that forests remain healthy, reducing the risk of forest degradation and increasing resilience to climate change.

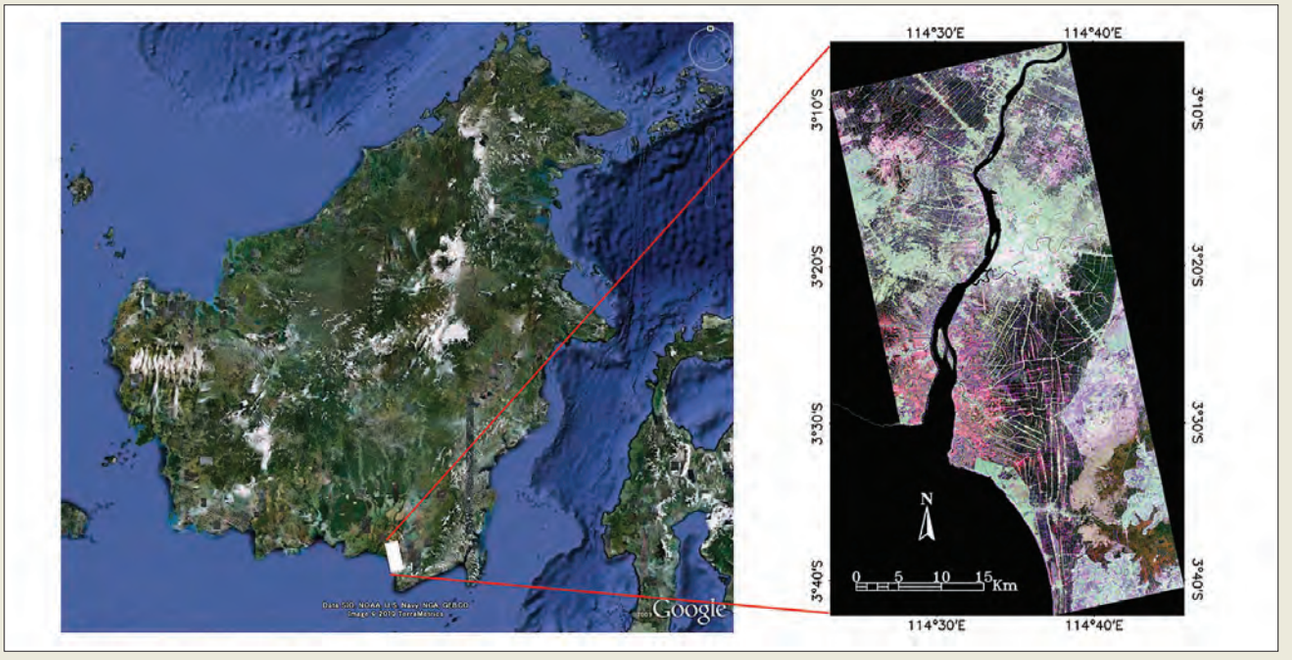
Development study of the forest carbon monitoring system using remote sensing

Yoshiki Yamagata, Hasi Bagan, Akihiko Ito and Minaco Adachi,
National Institute for Environmental Studies, Center for Global Environmental Research, Japan

Reducing emissions from deforestation and forest degradation (REDD) is considered to be one of the most important carbon emission reduction efforts. The post-Kyoto regime under the United Nations Framework Convention on Climate Change requires forest carbon monitoring systems of signatory nations. Deforestation and land-use changes are human activities with a major impact on regional carbon budgets. For instance, carbon emission from land-use change accounts for between 12 per cent[1] and 20 per cent[2] of the total anthropogenic emissions worldwide. Forest carbon biomass in Southeast Asia is the largest in the region; however, the area of primary forest has continuously decreased due to land-use conversion. The Food and Agriculture Organization (FAO) reported in 2010 that the forest area in South and Southeast Asia decreased by 0.68 million ha (23 per cent of the forest area) between 2000 and 2010.

In an effort to develop a larger-scale system for monitoring forest carbon, we used time-series satellite (optical and radar) remote-sensing data to track the history of forest disturbance, and estimated the resulting forest carbon budget using a terrestrial ecosystem model. We found that the active radar sensor Phased-Array L-Band Synthetic Aperture Radar (PALSAR) is especially advantageous for monitoring tropical forest cover under clouds, and that the time series of forest changes could be detected using Moderate Resolution Imaging Spectroradiometer (MODIS) data. We used a process-based model, Vegetation Integrative Simulator for Trace Gases (VISIT), to estimate the resulting forest carbon budget during the last 25 years. Borneo Island is one of the main sites of forest carbon tracking by the Global Earth Observation System of Systems (GEOSS), because forest disturbances

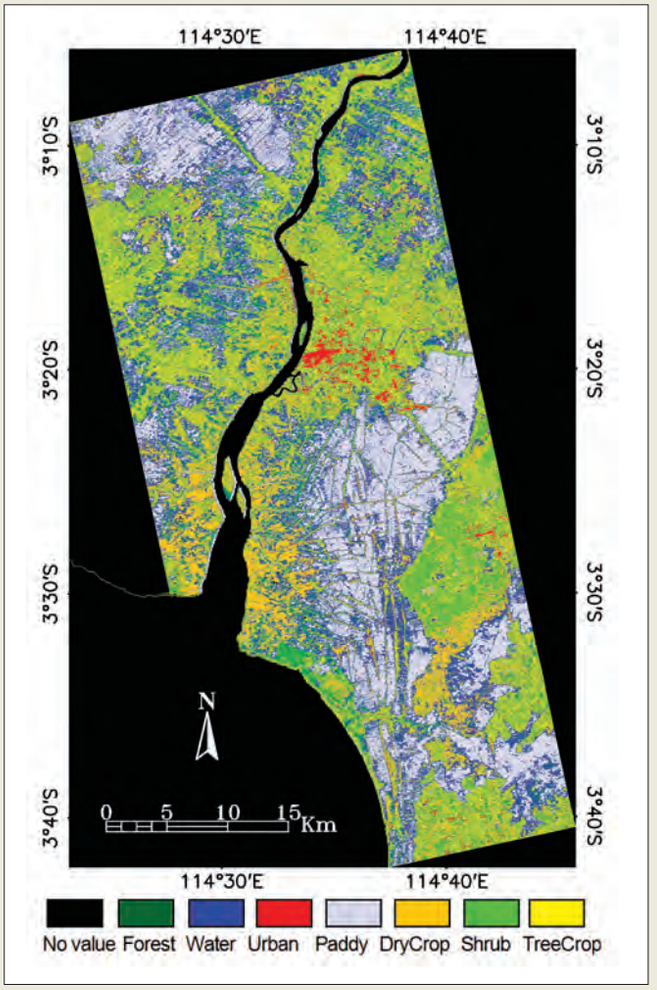
Location of the study area



The left-hand image shows the location of the study area on Borneo Island. The right-hand image is the full-scene PALSAR image acquired on 25 March 2010 (RGB = HH, HV, and VV)

Source: Extracted from ©Google Earth

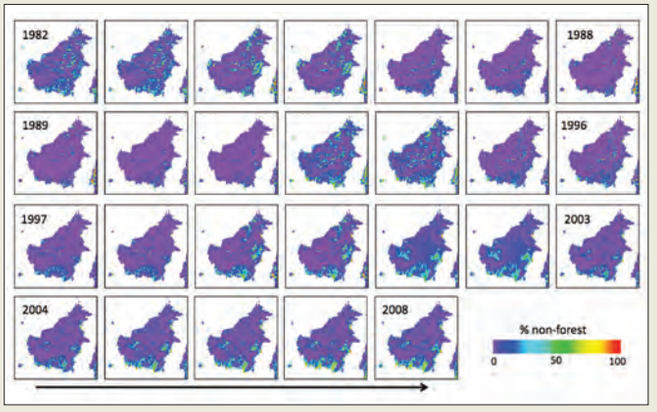
Land cover classification map



Map derived from 13 bands of HH, HV, VH, and VV and the coherency T3 matrix classified by the subspace method. The overall classification accuracy is 72.4 per cent with k = 0.6762

Source: Yamagata, Y., Takeuchi, W., Bagan, H., Ito, A. & Adachi, M. (2010)

Time-series of forest/non-forest cover of Borneo Island captured by optical remote sensing data



Source: Yamagata, Y., Takeuchi, W., Bagan, H., Ito, A. & Adachi, M. (2010)

in Borneo Island have involved both natural[3] and human[4] factors. By further validating the VISIT model with more field survey and forest inventory data, this forest carbon mapping approach will contribute to the establishment of a forest carbon monitoring system for eastern Asia.

Methodological development

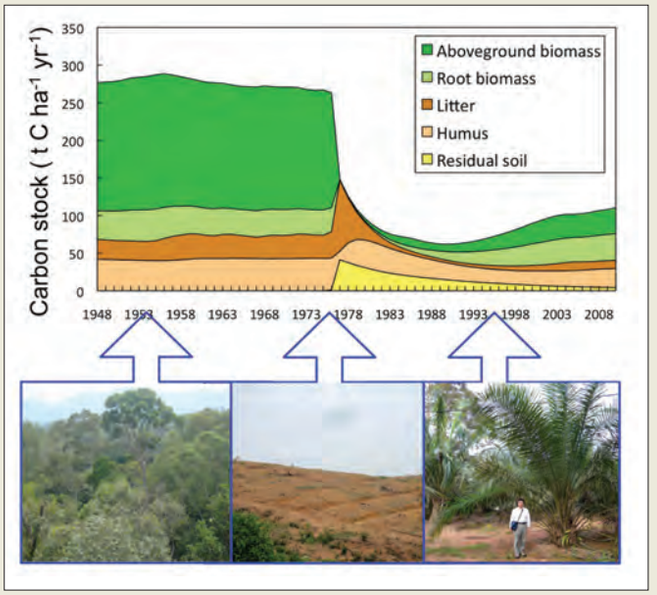
The study documented in this chapter used composite Normalized-Difference Vegetation Index (NDVI) images from optical satellite sensors such as MODIS, the National Oceanic and Atmospheric Administration Advanced Very High Resolution Radiometer (NOAA-AVHRR) and SPOT-VEGETATION data to map the time series of forest cover change on Borneo from 1983 to 2008.[5] In the study, Advanced Land Observation Satellite (ALOS)/PALSAR images were used as training data for the forest cover map because PALSAR images are more stable in difficult weather such as cloudy conditions and the spatial resolution is higher than that of MODIS images (1000-m spatial resolution). The forest/non-forest map from PALSAR and an existing land cover map produced by Boston University were used to fix the threshold of forest versus non-forest areas. First we mapped the forest/non-forest area in Borneo using a 2007 PALSAR mosaic image (50-m spatial resolution). Then we fixed the threshold value between forest and non-forest areas in a 2007 MODIS composite NDVI image. The areas classified as forest on both the forest/non-forest map and the existing land cover map were defined as forest in the MODIS composite image, and the threshold was fixed. Finally, we mapped the forest/non-forest area from 1983 to 2008 by applying the 2007 threshold value to MODIS, NOAA-AVHRR, and SPOT-VEGETATION images from other years.

The space-borne Synthetic Aperture Radar (SAR) sensor provides accurate measurements during daylight hours and at night that are nearly independent of weather conditions. Therefore, SAR technology provides an effective solution to map land cover in rainforest regions, which are often under cloud cover. The PALSAR sensor on ALOS includes several imaging modes, one of which is fully polarimetric mode. The PALSAR polarimetric antennas are able to transmit and receive both orthogonal components (horizontal [H] and vertical [V] polarization) of an electromagnetic wave, and these fully polarimetric data allow more accurate mapping of the land cover types.

In this case study, we investigated the ability of ALOS /PALSAR L-band data at quad polarization (HH, HV, VH, and VV) and 15-m resolution to produce accurate maps of land cover types.

At the study area in south Kalimantan (Borneo), Indonesia, we adopted the recently developed subspace method for land cover classification.[6] Experimental results indicated that when combining the polarimetric coherency T3 matrix (derived from the fully polarimetric Single Look Complex PALSAR data set) with intensity images, the classification accuracy is higher than when using only four-band (HH, HV, VH, VV) amplitude data.

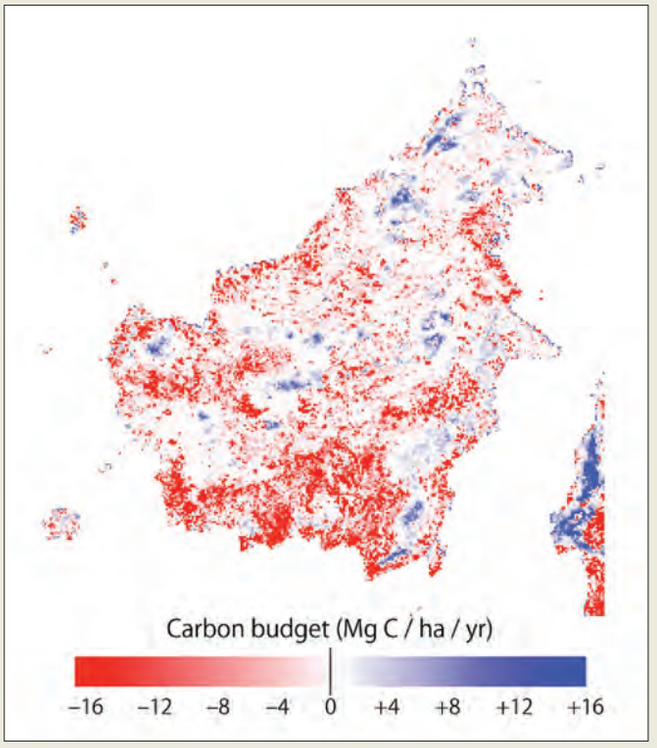
Temporal variation in carbon stock



The study case of the estimated temporal variation in carbon stock using the VISIT model during the period 1948-2010, including land-use conversion from a primary forest to an oil palm plantation in 1976

Source: Yamagata, Y., Takeuchi, W., Bagan, H., Ito, A. & Adachi, M. (2010)

Net carbon budget of Borneo Island in 2008



Results of cumulative forest cover change during the period 1982-2008 estimated by the terrestrial ecosystem model. Red areas show net carbon sources to the atmosphere, and blue areas show net carbon sinks

Source: Yamagata, Y., Takeuchi, W., Bagan, H., Ito, A. & Adachi, M. (2010)

Detecting deforestation on Borneo Island

Deforestation on Borneo Island, Southeast Asia, was successfully detected using the sequential variation in optical satellite images to show the time series of forest cover change owing to deforestation from 1982 to 2008. In each area where a forest cover decrease was detected, the model estimated carbon emission after logging and subsequent carbon accumulation in regrowing vegetation. Based on these data, we produced a map of the net carbon budget induced by deforestation on Borneo Island. Our results suggested that the southern part of the island was a large carbon source due to deforestation, especially in southern areas, although the VISIT model needs be revised to account for tropical peatlands. Moreover, we need to verify the results of the model simulation using field observations to understand the impacts of deforestation on the net carbon budget of ecosystems in Southeast Asia. For instance, above-ground biomass in primary forest in Borneo Island was reported to be 497 Mg ha-1 in 2002, the highest rate among the tropical forests of Southeast Asia.[9] The impact of deforestation would be larger than that in other regions, therefore acquiring more detailed estimations of carbon emissions induced by deforestation is one of the most important environmental research tasks. We are currently improving the prototype system by using multi-time ALOS/PALSAR data, because cloud-induced noise remains in the current forest map. Also, the terrestrial ecosystem model should be revised to account for local factors such as peatlands and historical factors such as the disturbance chronology before 1983. This monitoring system is expected to contribute to the Forest Carbon Tracking task by the GEOSS and relevant activities toward mitigation of climate change and biodiversity loss, especially as a part of the Monitoring, Reporting and Verification (MRV) system for the REDD.

The classification results confirm Gastellu-Etchegorry's 1988 finding that fewer Landsat and SPOT scenes have cloud cover percentages of less than 10 per cent from 1972 to 1987 in Indonesia than in other years.[7]

Figure 3 also shows the cloud cover situation of ALOS/Advanced Visible and Near Infrared Radiometer type 2 (AVNIR-2) optical sensor images acquired from 11 December 2009 to 29 July 2010 in the study area. It is difficult to extract land cover information by using the single scene cloud cover optical images due to cloud cover.

A model-based carbon accounting method was developed, including disturbance impacts by forest reduction and degradation on the ecosystem carbon budget. The study adopted a VISIT process-based model, which simulates atmosphere–ecosystem gas exchange and carbon–nitrogen–water cycles in ecosystems at a daily time step. The model allowed us to estimate changes in carbon sinks and sources induced by climate change and by natural and human disturbances, including land-use conversion from primary forest to cropland.

The biogeochemical carbon flows in the VISIT model are calculated based on models of the ecophysiological responses of the vegetation to environmental parameters. VISIT has been calibrated and validated using field data from Southeast Asian tropical ecosystems.[8] By combining the satellite-based forest/non-forest map and the terrestrial model, we were able to develop a prototype of a broad-scale, spatially explicit forest carbon monitoring system.

Planting native forests to fight climate change

Merryn Coutts, Greenfleet, Australia

Established in 1997, Greenfleet is an environmental charity harnessing carbon market funds to revegetate native forests and enhance biodiversity in Australia by planting around 7.5 million native trees, in more than 400 locations around the country, revegetating a total area of 7,500 hectares.

The greenhouse gases these forests will recapture are equivalent to the emissions of more than half a million cars being driven on the roads of Australia for one year.

Greenfleet is helping to revegetate areas within many of Australia's national parks, including the iconic Kosciuszko National Park, as well as returning unproductive farming land to native forests.

Greenfleet understands that climate change is not just a matter of carbon accounting – climate change involves natural ecosystems and natural processes, and employing natural solutions like planting native forests can help to reduce the extent of climate change and help our ecosystems adapt to the changes that may ensue.

Climate change modelling predicts that approximately 20-30 per cent of plant and animal species assessed so far are likely to be at increased risk of extinction if increases in global average temperature exceed 1.5 – 2.5°C.[1] Among the direct human impacts predicted are: increased mortality from extreme weather events; the occurrence of infectious diseases in new areas; reduction in fresh water supplies; and more refugees as areas become uninhabitable.

Image: Greenfleet Australia

Looking into the canopy of the 2001 planting (January 2010)

In addition to recapturing greenhouse gases from the atmosphere to reduce the severity of climate change, native forests bring many more benefits such as providing habitat for wildlife to migrate and adapt to new climate conditions, and improving soil and water quality to benefit agriculture and drinking water supplies.

Governance and administration

All Greenfleet forests are funded through the purchase of carbon offsets by the voluntary carbon market. There is a growing marketplace of individuals and organizations wanting to reduce their carbon footprint by recapturing carbon dioxide from the atmosphere, while also delivering other environmental benefits to the landscape.

For individuals, households and single organizations, the climate change challenge can seem overwhelming, so Greenfleet offers an easy programme for all these concerned parties and delivers a collective, practical response on their behalf.

As a mandatory carbon market develops in Australia, Greenfleet expects to also service this sector and increase the size of its biodiverse carbon forests.

Greenfleet does not own land, but enters into agreements with landholders (whether public or private) to protect the forests and for rights to carbon. These agreements outline the mutual obligations of the landholder and Greenfleet (as project developer) and address issues such as access, maintenance obligations and tenure of the agreement. Agreements are attached to property title to ensure that the obligations remain with the property regardless of ownership.

Under these agreements, landholders gain the following benefits, without the upfront costs of purchasing and planting the trees:

- Reduced soil erosion
- Enhanced micro-climates in the surrounding areas
- Improved water quality
- Reduced ground and water salinity
- Wind protection of arable crops
- Shelter belts for livestock
- Wildlife corridors and biodiversity protection
- Amenity – a more attractive and inviting landscape.

The Battery Creek project, Victoria, Australia

Aerial photo of the Battery Creek site identifying the revegetation zones by year (2007)

2004 planting site, looking up the hill (January 2010)

Image: Greenfleet Australia

Greenfleet forester measuring the diameter of a five-year-old tree

Over 11 years Greenfleet progressively planted 45 hectares of native forest at Battery Creek, a water catchment area for South Gippsland Water[2], in the south-east of Victoria, Australia. The catchment supplies drinking water to the South Gippsland town of Fish Creek and surrounding areas.

Prior to its acquisition by the water authority in the mid-1980s, the Battery Creek site, like much of the local area, had been used for grazing following clear-felling of the area in the early 20th century.

In addition to its carbon sequestration function, this project helps to improve land stability, water quality and biodiversity in the water catchment area.

The Superb Lyrebird (Menura novaehollandiae) is known to live in surrounding areas, so the Battery Creek revegetation project is also playing a part in reconnecting the fragmented habitat of this iconic Australian fauna species.

While the Battery Creek planting site is one large site, the variety of plant species changes from one area to another, as the terrain varies from wet gullies through gentle slopes to steep hillsides.

Each year species were selected based on local remnant vegetation and the best available information of species present prior to land clearing.

Progress

The Battery Creek project demonstrates the progress of Greenfleet's forests over time, with each year's growth showing an increase in height and trunk diameter. Trees planted in 2008-2009 are still saplings, however those planted in 2000 are now well over 10 metres tall, many 15-20 metres, and have established dense canopy coverage.

In some of the more mature planting areas it is hard to tell that the Battery Creek site is not a naturally occurring forest.

The Greenfleet team conducted a biodiversity study at the Battery Creek site in 2010 to gain an understanding of species regeneration and habitation on the site. The project included two days of general surveying and one night of specific fauna spotlight surveying. Five survey areas were selected ranging from juvenile forest with an open canopy (planted in 2008), through to mature forest with full canopy closure (planted in 1999).

Overall 42 flora and 48 fauna species were observed during the biodiversity surveys. There were direct sightings and evidence of kangaroos, wallabies and wombats throughout the site. Many birds also inhabit the area and it is hoped that in future the elusive Lyrebird will be seen.

A rich, biodiverse native forest has grown which is helping to improve water quality in the Battery Creek Catchment area. Species include a variety of *eucalypts*, wattles and tea trees native to the area. In addition, the hills have been stabilized and the forest is providing shelter for wildlife and capturing greenhouse gas emissions.

Carbon measurements

Greenfleet measured carbon yields across some of the earlier plantings at the Battery Creek site in 2010.

Seven individual areas were assessed, with a total area of 26 hectares – meaning more than half the site was sampled. The results showed impressive stores of carbon, with yields at least 300 per cent of the modelled carbon for native forests of the same age in the same location[3], while the oldest site showed carbon yields ten times the modelled values.

One of the impressive stories the Greenfleet foresters brought back to the office, was that their two-metre tape was too short to reach around the trunk of some of the trees planted in 1999.

An independent measurement of a five-year-old site at Battery Creek in 2009 also showed carbon yields greater than 300 per cent of the NCAT models.

What this means is that the Greenfleet forest at Battery Creek is growing at least three times faster than the models predict and while doing its job to recapture carbon, the forest is also rapidly restoring habitat for native wildlife, filtering runoff into the water supply reservoir and stabilizing the steep hills to reduce erosion.

Image: Greenfleet Australia

Strzelecki Gum (foreground) and Silver Wattle in flower – now a well established forest, you'd never guess it was planted by human intervention less than a decade ago

Preparing to plant

Greenfleet works closely with natural resource management professionals to select species indigenous to the local area for each planting site. As far as possible, the species selected reflect the pre-clearing vegetation classes at each site and the relevant species are selected for each zone within a planting site (i.e. ridgeline species for ridgelines, and gully species for gullies). Where possible, seed is collected in the local region.

Some of Greenfleet's sites are planted with seedlings, while others are direct seeded. Where seedlings are grown, Greenfleet engages local nurseries to grow the stock wherever possible — to support the local community and economy, to benefit from the local expertise, and to reduce transportation requirements for each project.

Proper site preparation is vital to the success of the native forest revegetation projects undertaken by Greenfleet. Many of the planting sites have been heavily grazed in the past and the ground is highly compacted – not ideal for the fine roots of young saplings. Weeds and pest animals are also common on grazing land that has been left untended for some time.

Greenfleet works with the landholder to prepare the site to ensure the best chance of survival for the new forests. While each site is different, this can include deep ripping of the ground to break up the soil, spraying for weeds and fencing to exclude pest animals.

Greenfleet selects a 'planting window' for each site, which is a time frame for the planting event based on historical climatic conditions. Where possible Greenfleet plants the seeds or seedlings to coincide with rainfall events to ensure there is adequate moisture in the soil to support the establishment of the young trees.

Maintenance and monitoring

Planting the trees is only the beginning of the Greenfleet journey. Six months after planting, a first survival check is conducted to see how the seedlings are doing and what challenges they are facing. Greenfleet foresters then perform an annual survival check-up for the next five years, followed by an inspection every five years thereafter. Forests are also measured for carbon once the trees reach a sufficient size. As the forest estate grows, so too does the monitoring task.

The landholder is responsible for ongoing maintenance of the forest – this includes weed and pest animal control, maintaining fire breaks, etc. Should any event occur that affects the forest, the landholder notifies Greenfleet and a forester visits the site to assess and determine any remedial action required.

Battery Creek (profiled on previous page) is just one of Greenfleet's native forest revegetation projects and helps to illustrate that action on climate change can also bring about significant benefits for the Australian landscape and the people who rely on the environmental services that native forests deliver.

The case for climate and forest action

Ambassador Hans Brattskar, Director General for International Climate Policy in the Department for Climate Change and Pollution Control, Ministry of Environment, Norway

Since the thirteenth round of climate change talks were held in Bali in 2007, the proposal 'reducing greenhouse gas emissions from deforestation and forest degradation in developing countries' (termed REDD+ in the UN negotiations) has gone from laggard to leader. REDD+ is the most important and cost-effective short- and medium-term climate change mitigation opportunity at our disposal. While there is uncertainty about the precise numbers, it is clear that keeping below the two degree climate threshold will be impossible without a significant reduction in tropical deforestation. By some estimates, as much as one third of the cost-effective mitigation needed in 2020 could come from REDD+.

Immediate, large-scale and coordinated action on REDD+ will give us the time we need to develop clean technologies and jobs of the future. However, REDD+ must be a complement to, rather than a substitute for, deep cuts in rich countries' emissions. The global benefits of REDD+ are enormous in terms of mitigating climate change and conserving biodiversity on a large scale. However, local benefits are equally impressive. REDD+ can contribute to sustainable economic development and poverty reduction. Standing forests preserve rainfall patterns and help communities and countries to adapt to the climate change that will inevitably occur regardless of our success in reducing global emissions. They also play a vital role for indigenous peoples.

In sum, these are the reasons why the Government of Norway made the pledge in Bali 2007 to provide up to US$500 million a year for REDD+.

As many have pointed out, there are important risks involved with REDD+ which need to be addressed head on. In order to deliver lasting results on deforestation, developing countries will have to improve their forest governance, and radically increased levels of transparency will be required. Financial mechanisms must be established that balance control over development spending priorities with the application of high international safeguards standards. This will be challenging, but it can be done.

The economic drivers of deforestation are strong. Global demand for timber, palm oil, sugar, soy and beef, and the need to feed three billion more people by 2050 will all continue to put pressure on forests. A successful reduction of global deforestation rates will depend on our ability to offer an alternative income stream that reaches the actors that make decisions on land use.

Significant, lasting, global REDD+ results can best be achieved through the adoption of a United Nations agreement that puts a value on forest carbon. We must continue to work towards a global agreement. At the same time, we can and must act immediately. Early action will deliver significant short-term emission reductions. Even more importantly, it will allow us to see what works and what doesn't. Luckily, such action is already being taken on an unprecedented scale.

Since Bali, there has been an intense effort to put in place an integrated and effective multilateral, institutional architecture to support global REDD+ efforts. More than 40 countries have been preparing to implement national REDD+ strategies and some countries are already scaling up their efforts, through United Nations- and World Bank-administered initiatives. The Congo Basin Forest Fund, administered by the African Development Bank, is meanwhile focusing on the particular needs of the Congo Basin countries. The multilateral and bilateral initiatives as well as a plethora of academic institutions and civil society organizations are together creating a global community to support REDD+ action. We are learning and sharing valuable lessons every day.

Developing countries taking the lead

Leadership in reducing tropical deforestation belongs at the highest levels of government. Only through a holistic national strategy, anchored and implemented at all levels of government and society, can the powerful forces of deforestation be addressed and kept in check over time. Heads of State and government can therefore play a particularly crucial role. The benefits of such top-level leadership are particularly evident for three of the countries that have come furthest in their efforts, and whose efforts Norway is proud to be supporting.

In Brazil, deforestation in the Amazon has decreased by more than 60 per cent from the 1996–2005 average, since former President Lula initiated his government's anti-deforestation efforts. The historical correlation between prices of raw materials and deforestation appears to some extent to have been broken. In 2008 the Amazon Fund was established as the first prototype of a large-scale, sectoral payment-for-reduced-emissions scheme with a view to deepening and sustaining results in the long term.

Several years ago, President Bharrat Jagdeo of Guyana proposed a concept for combining 'pay-for-performance REDD+' with a comprehensive strategy for putting Guyana on the path to sustainable, low-carbon growth. With Norwegian support, the Guyana REDD+ Investment Fund's first low-carbon investment projects will be launched later this year. President Jagdeo's tireless advocacy has been invaluable in creating consensus on the role of REDD+ in addressing climate change.

Image: Elisabeth Brinch Sand, Ministry of Environment, Norway

Standing forests are important as they preserve rainfall patterns and help communities and countries to adapt to climate change

President Yudhoyono of Indonesia has made his country a leader on climate change through bold unilateral commitments. He has also invited developed countries to join a partnership to protect Indonesia's remaining forests and peatlands, and Norway is proud to be a founding member. Indonesia has established a suspension on new concessions for the exploitation of peatland and forests. By 2014 the partnership should have evolved into to a pure 'contributions for verified emissions reductions' model.

Other leaders are emerging: Ministers from the Congo Basin countries have joined forces in the Congo Basin Forest Partnership. The Democratic Republic of Congo has made substantial progress in preparing for REDD+ and is now a best-practice example of how multilateral initiatives can work jointly in support of a government's strategy.

Key elements for success

Based on the experience of Brazil, Guyana, Indonesia and other countries, the following key principles appear to be crucial to making REDD+ strategies effective and sustainable.

Strong and broad-based national ownership is needed, and REDD+ needs to be integrated into the country's overall strategy for poverty alleviation and low-carbon development. To sustain public support, sectoral REDD+ strategies must be seen as integral priority elements of the national development strategy. The REDD+ strategies must also focus on optimising the additional benefits with regard to biodiversity, livelihoods and climate change adaptation. Relevant stakeholders, including indigenous peoples and local communities, must be actively involved in the formulation and implementation of the national strategy.

Payments for verified emission reductions, based on robust and independent monitoring, reporting and verification (MRV), must be at the heart of the approach taken. This will target policies and investments in such a way that they deliver results and only results-based approaches are likely to generate the financing needed. All three countries outlined here consider payments for verified emissions reductions — supported by contributing countries willing to commit to long-term partnerships — as crucial to ensuring sufficient, predictable, and sustainable funding, and as a means of assuring contributing countries that they are getting value for money.

Transparency and adherence to internationally recognized safeguards are essential for international partnerships to work. National control over development decisions must be carefully balanced against adherence to international financial, social and environmental safeguards and related transparency criteria. Reducing tropical deforestation is intrinsically a development issue. But REDD+ is different from traditional development aid, being a payment for a global service. Clearly, rich countries' taxpayers need to be assured that their money is being spent wisely, and is helping to put forest countries on sustainable, low carbon development paths. Existing Official Development Assistance (ODA) financial intermediation mechanisms need to be reviewed to suit results-based climate financing. To be credible and effective, REDD+ requires — and reinforces — sound political and financial institutions.

Climate and forest action continues

Tremendous progress has been made since Bali in preparing the world for a global mechanism to reduce tropical deforestation. Unprecedented pledges for action and financing have been made. An integrated multilateral architecture is being created to support all committed forest countries in their readiness efforts. National strategies are being prepared, monitoring systems set up, and institutional capacities developed. Key countries are pushing rapidly ahead. What is now required is predictable and sustainable medium- and long-term funding. This is needed in order to reward large-scale, verified reductions in tropical deforestation.

Forest governance at global, regional and local levels

Jeremy Rayner and Alexander Buck, International Union of Forest Research Organizations

In the most general sense of the term, 'governance' refers to any effort at directing human activity towards the solution of problems requiring social coordination. The concept of governance is always associated with the governance of problems;[1] thus, how problems come to be defined as passing beyond the competence of individuals, households and small communities is central to understanding the emergence of governance challenges and the 'governance modes' that are ultimately chosen to meet them. Specifically, the recent focus on governance, broadly understood, is directly related to a widespread feeling that the mode of coordination associated with modern states — hierarchical governance based on law and top-down administration — is struggling in the face of two major challenges: globalization and devolution.[2]

In response to these challenges, less emphasis is now placed on hierarchical coordination and more on steering through a mix of hierarchy, markets and informal networks. These mixed modes of governance have tended to blur traditional boundaries between the once well-defined roles of state and non-state actors in problem solving, creating some now familiar 'new' governance practices such as public private partnerships, decentralized administration and a variety of multi-jurisdictional networks that link international, regional, national and local participants in a common endeavour.[3] However, even as they advance solutions to the problems that they were originally intended to address, it has become very clear that such mixed or hybrid governance modes tend to create formidable coordination problems of their own, requiring metagovernance activities that attempt to coordinate the coordinators.[4]

Image: IUFRO

Globalization has a profound impact on forest management practices and trade in forest products

The governance of forests exhibits all of these characteristics. The nature of the problem that forest governance is addressing is elusive, exhibiting strong spatial patterns. Indigenous and community rights, local livelihoods, regional economic development, control over national resources and the preservation of a key component of the global environmental commons are all invoked when 'forest problems' are debated. Globalization has had a very dramatic impact on the trade in forest products and on local ecologies, both natural and social. Increasing demand for wood products in developed countries has been met by imports from newly industrializing countries, notably China, which, in turn, import timber from a variety of developing countries, many of which have limited administrative capacity to regulate forestry activity.[5] Efforts to build such capacity have often bypassed central governments, embracing (sometimes simultaneously) a variety of practices such as forest certification, partnerships with international non-governmental organizations (NGOs), decentralized forest administration, community forests, privatization and more. While the devolution theme has been especially prominent,[6] many of these initiatives, such as those directed at using forest certification to improve forest management practices and protect indigenous rights or trade agreements to combat illegal logging, are clearly multijurisdictional, seeking to work with the dynamics of globalized markets rather than trying to insulate local communities from them.[7]

The result is a complex patchwork of traditional multilateral international agreements between states, both legally and non-legally binding; global governance arrangements, such as forest certification and the various capacity-building and 'good governance' initiatives promoted by international organizations like the World Bank and OECD; some very strong regional agreements between states; and a host of national, subnational and local projects, each with its own distinct problem framing and criteria of success and failure.

Image: Matti Nummelin

The challenge is to ensure that forest sustainability goals are met amid competing objectives

Image: IUFRO

Forests play a vital role in the provision of goods and services

Key components of forest governance

The origin of the current portfolio of international forest agreements is usually considered to spring from the International Tropical Timber Agreement. As with similar 'trading and conservation' regimes negotiated at around the same time, the ITTO proved better at promoting trade than sustaining the resource and the 1980s saw growing international concern about the continuing destruction of tropical forests due to shifting agriculture, cattle ranching and over-exploitation for timber production. At the same time, environmentalists drew attention to the degradation and loss of temperate and boreal forests due to industrial forestry practices and, in some cases, pollution from intensive agriculture, along with urban and industrial development. Along with the rising salience of environmental issues came a recognition of the vital importance of forests as renewable sources of a wide range of goods and services at local, national and global levels, including food, medicine, fuel, shelter, clean water, soil stabilization, flood control and livelihood support.[8]

This contribution of forests to human well-being and to the newly coined goal of sustainable development received global recognition in 1992 at the United Nations Conference on Sustainable Development (UNCED) in Rio de Janeiro, when leaders adopted Chapter 11 of Agenda 21 on combating deforestation and the Non-legally Binding Authoritative Statement of Principles for a Global Consensus on the Management, Conservation and Sustainable Development of All Types of Forests (the Forest Principles). These documents represented the first attempt to reach a global consensus on the multiple benefits provided by forests, the key elements of national policies needed to maintain those benefits for present and future generations and the new forms of international cooperation needed to support these national efforts.

At this point, many expected the international community to move relatively quickly to negotiate a legally binding multilateral agreement on forests on the basis of the Forest Principles. For various reasons, such an agreement proved elusive.[9] As a compromise between the parties who wished to negotiate a legally binding instrument and those who opposed it, the United Nations Forum on Forests (UNFF) was created in 2000 with a renewable five-year mandate to facilitate national efforts to implement sustainable forest management (SFM) and enhance coordination among international instruments, organizations and institutions with significant forest-related responsibilities. The Collaborative Partnership on Forests was established to assist the work of the UNFF. The first review of the UNFF in 2005-2006 found its members no closer to agreement on a forest law and, in 2007, the UNFF and the United Nations General Assembly adopted the Non-legally Binding Instrument on All Types of Forests (NLBI). The NLBI creates a framework for national action and international cooperation to enhance implementation of SFM and the achievement of the four global objectives on forests endorsed by the UNFF in 2006.[10]

The NLBI thus stands as the main output of state-centred efforts to create unified, forests-focused governance. While the issue of a legally binding convention may be raised again in the next UNFF review, scheduled for 2015, other forest-related developments have been proceeding on largely parallel tracks and now challenge the very existence of state-centric governance.

In the run-up to UNCED, for example, two new conventions were developed: the Convention on Biological Diversity and the UN Framework Convention on Climate Change. Subsequently ratified by sufficient numbers of signatories, they have created binding international law. The conferences of the parties to these conventions have increasingly taken up forest-related issues in the context of their own respective mandates and in some cases, for example the Reduced Emissions from Deforestation and Land Use Degradation (REDD) and REDD+ processes for climate change mitigation, succeeding in driving the global forest policy agenda. A similar process has brought the signatories to other UN conventions, on wetlands or desertification, for

Image: IUFRO

There have been several initiatives based on grass-roots and community approaches to forest issues

example, to contribute to the forest debate from their own, forest-related perspectives.[11]

Two other kinds of governance arrangements deserve attention. First, several efforts to enhance forests and forestry practices have emerged at the regional level in response to the 'treaty congestion' in the UN system. An assessment report found 11 legally binding regional agreements and at least 13 non-legally binding processes and arrangements.[12] In terms of effectiveness, the key factor was not the kind of instrument used, since many have a mix of legal and other instruments. The more successful regional initiatives differ decisively from the ineffective ones because of their links to regional polity-building projects. Forest governance in these frameworks serves wider political interests, making voluntary coordination more effective by embedding it within regional governance structures. Both ASEAN and the EU show that such intergovernmental and supranational governance structures provide powerful support for forest governance initiatives.

Second, section III of Agenda 21 states that 'one of the fundamental prerequisites for the achievement of sustainable development is broad public participation in decision-making' and that 'the commitment and genuine involvement of all social groups' is 'critical to the effective implementation of the objectives, policies and mechanisms agreed to by governments in all programme areas of Agenda 21.' Since Rio, it has become very clear that the problems and issues related to sustainable development, including forest issues, cannot be addressed solely by governments through intergovernmental agreements. Non-governmental actors, both for-profit and not-for-profit, have a vital role to play other than as sources of advice and legitimation for state-led processes. The growing significance of policy coordination at a global level by actors without formal authority to do so is also captured by the term 'governance'. Non-state governance is conducted by international organizations acting as agents for states, but also by 'global social movements, NGOs, transnational scientific networks, business organizations, multinational corporations and other forms of private authority'.[13] Significantly, such new forms of coordination are very often found in response to the challenges arising from the complexities of environmental protection and sustainable development[14] and have been observed in forestry-related contexts at national and subnational levels.

In forest governance, most of the attention has been directed towards the various competing schemes for certifying forest products as deriving from sustainably managed sources. However, efforts at broader inclusion in intergovernmental processes, public private partnerships and corporate-NGO partnerships have become common in the forests arena. Inclusion has generated funding and capacity for policy implementation on the ground and supported moves towards decentralized implementation of SFM. For example, the Congo Basin Forest Partnership (CBFP) and the Asia Forest Partnership were both launched at the World Summit on Sustainable Development in Johannesburg in 2002, which gave special attention to the roles of public-private partnerships in promoting sustainable development. The CBFP, currently facilitated by Germany, has generated significant additional funding to support forest conservation and sustainable forest-based livelihoods in the region.

In keeping with the connection between governance and devolution, a number of regional and international initiatives have also emerged that are focused on grass-roots and community approaches to engaging local people in addressing forest issues. These include, among many others, Forest Connect, Growing Forest Partnerships, Rights and Resources Initiative, Responsible Asia Forestry and Trade and The Forests Dialogue (in partnership with UNFF). Existing grass-roots initiatives are also strengthening their international engagement, especially in the REDD+ context, including the Asia-Pacific Center for People and Forests, Coordinating Association of Indigenous and Community Agroforestry in Central America, Global Alliance of Community Forestry and International Family Forestry Alliance, to name only a few.

As a result of these developments, an increasingly distinct and comprehensive set of international goals and priorities has emerged to steer forest use and conservation, accompanied by institutions, policies and mechanisms. The result is a complex and fragmented web of forest governance at all levels, the constantly evolving outcome of many different initiatives rather than the product of an overall design.

This outcome is not necessarily sub-optimal. A single, overarching governance instrument would require a level of agreement on the nature and relative priority of forest problems that has been absent from international forest negotiations and still shows few signs of emerging. A recent assessment of international forest governance demonstrated that, looked at in terms of the full spectrum of policy problems raised by forests, the coverage of the various agreements and initiatives considered together as a 'global forest governance architecture' is rather comprehensive.[15] The problem, the assessment concluded, is ultimately one of metagovernance: how to coordinate coordination itself so that the key goals of improving forest conditions and livelihoods are not lost amidst a welter of competing objectives coming from the various forest-related governance initiatives that now dominate forest governance at most levels. This problem of coordinating governance arrangements themselves has often been recognized but the challenge of forest metagovernance has not yet been met.

Forests and food security

Fred Kafeero, Food and Agriculture Organization

The Food and Agriculture Organization (FAO) defines food security as a state where all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. The four pillars of food security are availability, access, utilization and stability. The nutritional dimension is integral to the concept of food security.

The challenges

Population growth

The United Nations projects the world population to rise to 9.1 billion by 2050,[1] with most of the growth taking place in developing countries. FAO estimates that overall global agricultural output needs to expand by about 70 per cent to meet the food needs of the population expected in 2050. Feeding an increased population means putting new land into cultivation and more pressure on existing natural resources, including forests and rangelands.

Economy

Soaring global food prices (especially from 2005-2008 and from 2010-2011), coupled with a weak global economy and high energy prices, have had a negative impact on food security. Poor people can spend between 50 per cent and 80 per cent of their income on food, and these global trends often increase their expenses without a corresponding increase in earning capacity. FAO estimates that more than 945 million people go hungry every day, with no means to produce sufficient food for themselves or to earn enough income to purchase it. Women, who are the principal food providers for families and communities and play a central role in production, processing and preparation of food, are especially hard hit.

Image: Sophie Grouwels, 2011

Shea Butter packaging by women from Mali

Climate

A range of human and climatic factors are expected to increase the scarcity of arable land, hence constraining future food security demands. Already in many places, large-scale deforestation and unplanned land-use changes triggered by increasing demand for food, fibre and fuel have caused biodiversity loss, reduced the productive capacity of systems, affected water availability and limited the possibilities for fuelwood collection by the poor, consequently affecting cooking and processing of food. Climate change is expected to put the food security of millions more people at risk in the coming years.

All these factors pose a threat to the multiple benefits forests provide, intensifying the challenge of achieving food security and nutritional well-being for the world's population. This further increases the vulnerability of poor people to various forms of shocks.

The role of forests and trees

Food

Forests and trees on farmland contribute to food security for millions of people around the globe. Providing fruits, edible leaves, tubers and nuts, they are a direct source of food, animal fodder and cash income for poor households that are nutritionally at risk.

Habitat

Forests are a habitat for wild animal species, including birds and their eggs, insects, rodents and mammals, which are often important components of the diet of people living in close proximity to forests and fallow areas.

Income

Trees are an integral part of the agricultural systems of many small-scale farmers, providing both cash and subsistence benefits. These benefits come from trees that are planted or managed on farms as well as from forest resources in communally managed, open-access or state-managed areas. In arid zone countries, with low forest cover, trees and shrubs enhance the productivity of agricultural and livestock systems on which many pastoral communities depend. Small and medium-sized forest-based enterprises, which have been successfully linked to markets, have enhanced income benefits for local communities, enabling them to purchase food to meet their dietary needs.

Fuel

Fuelwood and charcoal are the main sources of fuel for a majority of the population in developing countries and are necessary for cooking food. Availability of these resources therefore has a direct impact on the quality of the food consumed.

Future actions

Strengthening the positive contributions of forests and trees to food security requires a strong political commitment and working partnerships at various levels, from subnational to international. The FAO Forestry Department is involved in a range of actions that seek to improve the significant contributions that forests and trees make to sustainable livelihoods and the eradication of hunger and poverty.

Image: Tree Aid

Women in Burkina Faso plan to plant shea trees and sell more shea nuts

Image: Roberto Faidutti, 1999

Forest foods from a Brazilian market

Working towards sustainable development through small forest enterprises

Laura Schweitzer Meins, Sophie Grouwels and Rao Matta, Food and Agriculture Organization

All people need forests and trees — for clean air and water, for construction materials and furniture, for a wide variety of edible and pharmaceutical products and as aesthetic retreats. For some, however, that reliance is more deeply experienced. Estimates have indicated that as many as 60 million of the world's poorest people depend almost completely on forests for their subsistence and survival.[1] Through hunting, gathering and shifting cultivation, these populations consume a range of forest products, such as fruits, roots, bush meat, oils, gums, medicinal plants and fuelwood.

An even greater number make use of forests for cash income generation. Approximately 350 million rural people living in and around forests rely upon forest resources as a source of supplemental income. A further 500 million to one billion smallholder farmers grow trees or manage remnant forests on their farms for subsistence and supplementary income generation and 45 million artisans and other individuals work in or run informal forest-based enterprises.[2]

Small forest enterprises

Many forest-dependent communities have few options for generating income. Moreover, they lack the means for — and incentives to encourage — the caretaking of the forests around them. Under these circumstances, forests are often used as a source of quick and inexpensive or free resources. This is problematic because harvesting under these circumstances is usually carried out without sufficient knowledge of or regard for long-term sustainability of the forest ecosystem and its resources.

Small forest enterprises (SFEs) have generated a lot of excitement as a tool for sustainable development because they can serve as an engine for economic development and a driver for environmental conservation, most particularly in areas in which people are closely tied to the natural resource base. Already, SFEs represent as much as 80-90 per cent of overall enterprise numbers and can account for more than 50 per cent of forest-related jobs.[3]

While SFEs based on locally and sustainably harvested forest resources can provide a good income generation option for people in rural communities and can be a mechanism for achieving improved environmental protection, such outcomes can only arise if there is a supportive, enabling environment. This means having

Image: Roberto Faidutti, 1999

A market in Brazil selling traditional forest-based oils, creams, ointments and medicines

Image: Thibault Ledecq, 2011

A basket weaving enterprise in Lao PDR

supportive policy and regulatory frameworks, capable local leaders and technical and financial service institutions in place. In such an environment, entrepreneurs in forest-dependent communities are more likely to realize financial benefits from forest-based enterprises. In addition, once they are generating income, they are more likely to safeguard forests and forest resources so as to ensure they have a continued source of raw materials for their businesses into the future.

SFEs can also be effective in addressing and reducing systemic poverty. When successful, they allow entrepreneurs to earn and accrue monetary savings. This is critical if rural people are to be able to make long-term investments, such as in education for their children. Moreover, with money saved, rural people are less likely to be as severely and negatively impacted if a crisis strikes because they will have a financial buffer in place to cover the costs of necessary items such as food and shelter.

Rural entrepreneurs contribute their unique local strengths and knowledge to the process of building and operating their forest enterprises. This point is particularly significant in view of poverty being about more than simply lacking financial resources, but about being powerless, vulnerable and dependent.[4] Combating poverty will mean supporting income-generation opportunities, but should also work towards solutions that empower and foster a sense of self-reliance.

Empowering rural entrepreneurs through partnerships

Through the development and operation of SFEs, people often find that their businesses are more successful when they work together in cooperatives or producer organizations. Such connections can help entrepreneurs by allowing them to achieve economies of scale. In this way, they can overcome challenges faced by many small-scale businesses, such as not being able to compete or access finance. Cooperatives can also help to reduce challenges related to being isolated and remotely located by facilitating the coordination of product shipments to markets at which goods can be sold for better prices.

Productive cooperation amongst entrepreneurs can be instrumental in improving access to training, technical and financial assistance resources and peer-to-peer knowledge exchange opportunities, which are necessary elements for enhancing business and financial management skills. Such partnerships, particularly when they emphasize inclusion of traditionally marginalized groups, can also play an important role in strengthening the collective voice of local people to be able to speak for themselves and the needs of their communities in business and policy dialogues.

Looking to the future

As those working in developing countries around the globe strive, in cooperation with the international community, to build a more sustainable and equitable present and future, a variety of challenges are sure to arise, whether from climate change, population growth, natural resource shortages or other obstacles. The key for rural communities is not to insist that all future catastrophes be precisely predicted, but to ensure that mechanisms are put in place and capacities developed to enable them to deal with whatever the future brings. Small forest enterprises are a sound option because they respond directly to that need. They contribute to building local capacity and confidence, they support the establishment of financial buffers against crisis, they foster social cohesion and cooperation within communities and they stimulate a locally rooted sense of responsibility for environmental health and well-being. Through support for the development and strengthening of small forest enterprises, it is possible to go a step further and ensure that natural resource needs are met, now and into the future, while also upholding the dignity of rural people.

Image: Blanca Amado, 2009

A trade negotiation for Gnetum leaves in Cameroon

Image: Sophie Grouwels, 2011

Sign for the Coprokazan Shea Cooperative in Mali

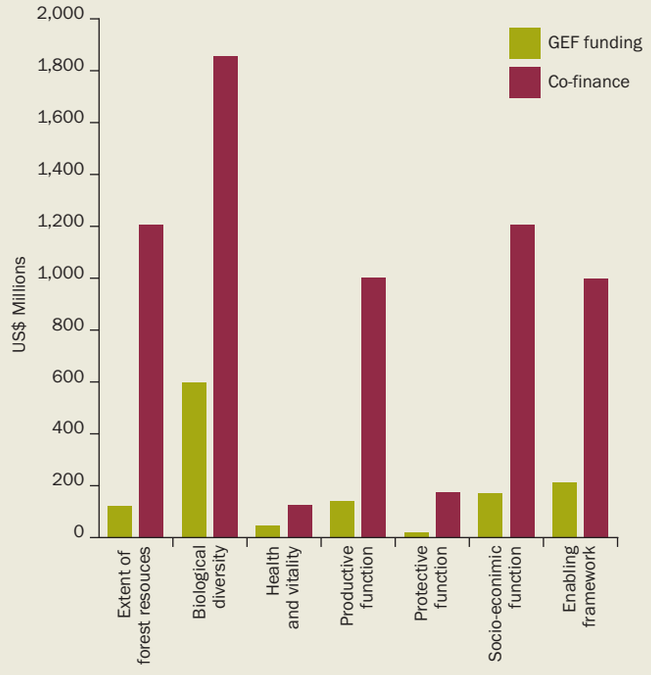
Two decades of forest investment best practice

Ian Gray, Ulrich Apel, Linda S. Heath, Jean Marc Sinnassamy, SFM/REDD+ Team and Gustavo A. B. da Fonseca, Team Leader, Natural Resources, the Global Environment Facility

For 20 years, the Global Environment Facility (GEF) has recognized the importance of forests for their role in sustaining biodiversity, their ability to provide a range of important environmental services and their potential to contribute to many countries' sustainable development plans.

The GEF has become an important supporter of developing countries' efforts to manage their forests sustainably. Since its inception in 1991, it has financed over 330 projects and programmes focusing on forest conservation and management in nearly 100 developing countries. The total GEF allocation to forest initiatives during this period amounts to more than US$1.5 billion, leveraging US$6.8 billion from other sources. Through the years GEF support has encompassed a mix of traditional forest management approaches such as protected areas and integrated watershed management, while also piloting new and emerging aspects such as the role of forests in climate change mitigation. GEF's forest approach now reflects a diverse portfolio of projects that either address individual GEF focal area aspects of forests or emphasize the multiple benefits of forest ecosystems. All types of forests, ranging from tropical and subtropical forests to woodlands and trees in the wider landscape, are covered by these projects. The portfolio also presents a wide spectrum of sustainable forest management (SFM)[1] tools that are promoted through GEF projects such as protected area management, certification of timber and non-timber forest products, community-based forest management and payments for ecosystem services (PES).

GEF funding to forest projects 1991-2011 by the seven SFM thematic elements



Source: GEF

GEF projects have financed projects addressing the seven SFM thematic elements as defined by the United Nations Forum on Forests (UNFF) and used by the Food and Agriculture Organization in its Global Forest Resource Assessment (2010).

In the current replenishment cycle GEF-5 (FY 2011-2014), the GEF is expanding and strengthening its SFM efforts, including in the field of climate change mitigation, to harness the opportunities for forests in the international Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (REDD+) agenda. The GEF's SFM/REDD+ strategy seeks to create multiple global environmental benefits from the management of all types of forests and the strengthening of sustainable livelihoods for people dependent on forest resources, in all 143 eligible countries. The GEF has established an incentive mechanism to encourage countries to invest significant fractions of their System for Transparent Allocation of Resources (STAR) funding allocations from biodiversity, climate change and land degradation focal areas into more comprehensive SFM/REDD+ projects and programmes. The STAR system determines the amount of resources that a given country can access from the GEF during the current cycle.

The allocation of resources to SFM/REDD+ projects and programmes draws on a transparent and equitable investment formula that provides an incentive in a ratio of 3:1. In other words, for every three dollars of investment from countries' STAR allocations, one dollar will be released from the SFM/REDD+ incentive mechanism to the project or programme proposed. In this way, the GEF expects a total investment of up to $1 billion into SFM/REDD+ during the current replenishment phase.

The SFM/REDD+ strategy is fully responsive to the guidance provided by the United Nations Framework

Convention on Climate Change and the Convention on Biological Diversity to the GEF. It is also in line with the United Nations Convention to Combat Desertification 10-year strategy, which focuses on efforts to prevent, control and reverse desertification and land degradation while contributing to the reduction of poverty in the context of sustainable development. Furthermore, the strategy addresses the focus of the UNFF Non-legally Binding Instrument on All Types of Forests, which supports international cooperation and national action to reduce deforestation, prevent forest degradation, promote sustainable livelihoods and reduce poverty for all forest-dependent peoples.

The collaborative nature of GEF forest projects and their ability to generate multiple benefits from forest ecosystems, while at the same time contributing to countries' sustainable development goals and improving the livelihoods of forest-dependent people, can be illustrated by several projects that highlight a range of approaches, from traditional efforts to expand and enhance protected area networks to community-based management and integrated agroforestry landscape approaches.

The Amazon Region Protected Areas Project (GEF-World Bank)

The Amazon Region Protected Areas Project (ARPA) is a three-phased, 10-year initiative designed to conserve biodiversity of global importance in Brazil's Amazon region. The project represented an innovative initiative in promoting a public-private partnership and participatory approach at a scale that had never been attempted before in the country. It also provided the framework to bring different levels of government, civil society and financing partners together in a coordinated and collaborative effort. The project, whose objective was to expand and consolidate the protected areas (PAs) system in the Amazon region, made a significant contribution to increasing the number and area of PAs. Specifically, 13 'strict protection' PAs of 13.2 million hectares (ha) and 30 'sustainable use' PAs of 10.8 million ha were created under ARPA's first phase. With respect to the consolidation of PAs, only one existing 'strict protection' PA (Reserva Biológia do Uatuma) covering some 938,000 ha in area had been classified as consolidated. Nevertheless, an additional existing seven PAs are currently in an advanced stage of consolidation, together with an additional three existing PAs, representing a total of 6.9 million hectares. An Endowment Fund was created to meet the recurrent costs of PAs, reaching a capitalization of US$18 million prior to October 2008. As the world looks to protect the Amazon as a globally essential carbon sink, the ARPA projects and efforts to create large PAs are seen as a critical investment in limiting unintended carbon emissions and maintaining high levels of ecosystem functionality.

Conservation and management of forests of the Eastern Arc Mountains in Tanzania (GEF-UNDP)

The forests of the Eastern Arc Mountains (EAM) in north-eastern Tanzania contain exceptional species richness of local and global importance. They are recognized by the World Wide Fund for Nature as a Global 200 Ecoregion, and by Conservation International as a terrestrial biodiversity hotspot. This project was aimed at conserving the biodiversity of the EAM forests at a level beyond what could be expected based on the prevailing management objectives of watershed protection.

To address the threats facing these forests and the carbon they store, this project was designed with two main components: a strategy component that aimed to develop a holistic conservation strategy for 12 mountain blocks in Tanzania, including a forested area of approximately 350,000 ha, and a site-based project in the Uluguru Mountains, one of the most important mountain blocks in the EAM in terms of global biodiversity values. This work has been complemented by efforts to strengthen institutional capacity to manage the network of 150 PAs in the area. The Nature Reserves Unit was established within the Forestry and Beekeeping Department (FBD) of Government, strengthening reserve management capacity.

The project has also contributed to building strong cooperation and capacity among its partners (CARE, Tanzania Forest Conservation Group and Sokoine University) that will be sustained within other similar programmes. Given the general emphasis on REDD+ and forest carbon projects in Tanzania, there is a great need for people with knowledge in the field. Inspired by the project's results, many people are now working on activities that follow in the project's footsteps.

Forest protection and reforestation project in Kazakhstan (GEF-World Bank)

Kazakhstan possesses a significant forest resource, with 11.5 million ha of forested land playing an important role in providing key environmental and economic services. Forests are a key factor in soil and sand retention in the face of the country's strong winds and they protect watersheds and reduce siltation of waterways and reservoirs. They have also been a driving force in the country's economy as a source of fodder, food, fuel, medicinal plants and recreation. About 300,000 people are directly dependent on the forest sector, while an estimated 2.5 million live in or rely on the forests for fuelwood, fodder and other forest products.

The project supports the development of cost-effective and sustainable environmental rehabilitation and management of forest lands and associated range lands, with a focus on the Irtysh pine forest, the dry Aral Seabed, and range lands of saxaul shrubs. It includes:

- Rehabilitation and effective management of 650,000 ha of damaged Irtysh pine forest in the north-east (Pavlodar and East-Kazakhstan Oblasts), including support for replanting about 41,000 ha, fire management and a small social forestry pilot
- Accelerating the spread of vegetative cover by planting up to 79,000 ha of dry Aral seabed and pilot rehabilitation of 6,000 ha of saxaul range lands (Kzylorda Oblast)
- Capacity-building of the Forest and Hunting Committee and associated organizations (policy analysis, information systems including mapping, human resource development and a competitive grant programme).

The project aims at reducing, preventing and ameliorating land degradation with a focus on restoring and maintaining tree and other vegetative cover. Multiple benefits include preservation of pasture and arable

Image: Ulrich Apel

The encouragement of local ownership amongst communities, indigenous peoples and forest-dependent groups will continue to play an increasingly important role in the management of forest resources around the world

land, increased biodiversity, improved shelter from wind, better air quality, wood and fodder products and increased amenity and recreation values.

Enhancing institutional capacities for REDD+ in Africa (GEF-World Bank)

Having wide participation within the various forest carbon-related forums is an important element in developing acceptable solutions. However, given the range of topics being addressed, local capacities are often to stretched to allow meaningful participation. The main objective of the project is to improve African countries' knowledge of and capacity for REDD+ issues and to help them to articulate this new concept within the broader agenda of SFM. To this end, the project is building capacities for measurement and monitoring of carbon stocks through various types of technical assistance. An important element of this project was a 10-day South-South Exchange on community forestry and REDD+, which took place in Brazil with participants from six African countries.

The exchange aimed to support countries to better understand the role that community forestry can play in their national REDD+ strategies. The activity brought together participants from Africa (Central African Republic, Cameroon, Democratic Republic of Congo, Gabon, Madagascar and the Republic of Congo) to discuss experiences of community forestry and REDD+ with various Brazilian counterparts, including federal and state governments, the private sector, civil society and indigenous peoples' organizations. By enabling these countries to engage in the new financing streams to be expected through REDD+, there is an indirect contribution to the conservation and sustainable use of forest ecosystems, including non-timber forest products. In addition, there will be an incentive for country governments to plan land use with less likelihood of outcomes that lead to conflict over land tenure.

Over its 20-year history, the GEF partnership has been a significant funder of forest activities in a wide range of countries and forest types and addressing a variety of issues and situations, touching on all aspects of SFM. However, only by promoting management systems which recognize multiple uses, functions, services and benefits will it be possible to develop long-term, sustainable approaches to maintaining forests, the goods and services they provide and the livelihoods they support. This experience has also made clear the importance of innovative projects to take advantage of opportunities and the benefits of working collaboratively with governments and other donors to maximize impact and ensure ongoing support for forest projects. This often incorporates wide-reaching issues such as policy change, land tenure conflicts and rural livelihoods development. The GEF's new Environmental and Social Safeguards provide a framework around which projects can appropriately address those key issues.

In developing SFM approaches, the provision of sufficient funding at appropriate levels — policy, planning, capacity-building and on-the-ground activities — is essential for lasting solutions. There is a particular need to acknowledge the long-term nature of forest management and forest use and for approaches to initiate, develop and mature at a pace appropriate to the needs and capacities of all the stakeholders involved. Additionally, the encouragement of local ownership amongst communities, indigenous peoples and forest-dependent groups will continue to play an increasingly important role in the management of forest resources around the world.

How bamboo can help bring about a pro-poor, green economy

Tim Cronin, International Network for Bamboo and Rattan

Bamboo is the fastest growing plant on the planet. It helps sustain the livelihoods of many millions of the world's poorest people, generates more than US$2.5 billion in annual global trade and provides food and shelter for some of the world's most vulnerable animal species, such as the mountain gorilla and the giant panda.

The pressure on our forests to provide food, fuel, fibre and fodder for a growing population is now greater than ever. Meanwhile, the threat of climate change promises to intensify this pressure even more in coming years. Bamboo's properties — its versatility, durability and renewability — mean it can provide an ideal substitute for timber and reduce this pressure on our forests. Strengthening local bamboo industries can help drive rural development, while protecting our forest resources. Moreover, bamboo's fast growth rate and ability to prevent soil erosion can play an important role in adapting to climate change, while also helping to mitigate climate change by storing carbon in the standing biomass of plantations and in durable bamboo products.

In short, bamboo can help the world transition to a pro-poor, green economy.

To do so, bamboo needs to be supported with the right silvicultural and processing practices, the right level of community awareness, and the right enabling policies. In some parts of the world, the potential for bamboo to bridge development and conservation objectives is already being supported and harnessed.

The International Network for Bamboo and Rattan (INBAR) seeks to realize the potential of bamboo to address the challenges of the 21st century. Established in 1997, presently INBAR represents 37 member countries, the vast majority of which are located in the bamboo-rich tropics and sub-tropics of Asia, Africa and Latin America. With its headquarters in China, and regional offices in India, Ethiopia, Ghana and Ecuador, INBAR is a strong platform for South-South collaboration.

Image: courtesy of the Anji Bamboo Society

China's bamboo industry is by far the most developed in the world. Exports of bamboo products from China were valued at more than US$1 billion in 2009. INBAR facilitates the transfer of knowledge and technology for bamboo development throughout its 37 member countries in Asia, Africa and Latin America

Image: INBAR

INBAR is working with partners in India to improve rural livelihoods by building local capacity in bamboo cultivation, processing and marketing

INBAR has developed a range of successful models for strengthening local supply chains to drive bamboo-based community development, designing appropriate policy approaches that protect the environmental services of forest ecosystems, and promoting consumer awareness of how bamboo can build resilience in landscapes and in livelihoods. These models are being replicated and scaled-up across the global south.

Affordable, versatile and durable

Bamboo is a resource for people. It requires minimal agricultural inputs, can be harvested every year, and be processed into hundreds of products, many of these requiring little capital investment. Bamboo can provide a reliable and sustainable source of income for farmers, artisans, builders and entrepreneurs; and it can do so at the household and smallholder scale.

In India, INBAR has been working with the Centre for Indian Bamboo Resource and Technology (CIBART), the National Mission for Bamboo Applications (NMBA) and many other partners to protect forest resources, enhance rural livelihoods and break down gender and caste barriers using bamboo.

In 2003, with seed funding from the UN International Fund for Agricultural Development, the partners joined forces to establish the Konkan Bamboo and Cane Development Centre (KONBAC), a community-based, non-profit enterprise situated on India's tropical west coast. KONBAC set up bamboo furniture, packaging, craft and construction units, which provided community members with access to technical training and equipment. The Centre also intervened to strengthen bamboo resources in the area, improving species diversity and sustainable management of plantations in order to protect natural forest resources and improve incomes for farmers.

In the eight years since, more than 750 local artisans, from 70 neighbouring villages, have gained regular employment, with average monthly earnings between US$60 and US$80. Two thirds of these are female. Coming primarily from the lower Mahar caste, most had previously been employed as seasonal farm labourers, or had no income at all. More than 4,500 local farmers have benefited from the demand for bamboo culms, while over 1.25 million bamboos have been planted since 2009 to supply the growing demand.

In many parts of India, bamboo has been considered a poor man's timber, associated with 'backward' castes such as the Mahar, who traditionally made their livelihoods through bamboo craft. So when KONBAC demonstrated what was possible with bamboo — and penetrated the high-end tourist markets of neighbouring Goa with its elegant, lightweight, durable furniture — the Centre was able to overcome bamboo's image problem and provide skilled jobs for these social outcasts. With these jobs has come pride, dignity and social acceptance. Increasingly, entrepreneurs and others from 'higher' castes in the region are recognizing the benefits of working with bamboo.

The model for bamboo-based community development that evolved in Konkan is now being rolled out in several other states of India, including Gujarat and Uttarakhand, as well as Ethiopia and Madagascar, in East Africa. With the institutional support systems like CIBART and NMBA already in place, and with the stigma of bamboo as the poor man's timber on its way out, India can provide an example to other developing nations for how to harness this remarkable grass.

Renewable, sustainable and replicable

Many of the same unique properties that make bamboo an ideal resource for strengthening rural livelihoods can

Image: INBAR

iINBAR is working with partners in Ethiopia and Ghana to promote the use of bamboo charcoal as a source of household energy, to reduce deforestation in the region

also help to preserve our forests. Bamboo's versatility, coupled with its strength and durability, means it can provide an ideal substitute for timber. Moreover, as bamboo can grow up to one metre per day, can be harvested after just three to four years, and regenerates without needing to be replanted, bamboo can provide a sustainable substitute for timber. This can reduce the pressure on our forests and help avert deforestation.

In many parts of Africa, demand for household firewood is one of the major drivers of deforestation. In Sub-Saharan Africa, more wood is consumed per capita than in any other region in the world, with up to 90 per cent of households relying on fuelwood and charcoal for their household energy needs. The demand for wood as biomass energy represents a major threat to forest resources and is projected to rise even further as a result of rapid population growth and urbanization.

INBAR is working with local partners in Ethiopia and Ghana, including the Ethiopian Federal Micro and Small Enterprises Development Agency and the Forestry Research Institute of Ghana, to promote the use of charcoal made out of bamboo as a way to conserve diminishing forest resources. The project is supported by the European Union.

As has been seen in India, a successful and sustainable project intervention, especially one that straddles the complex interface between conservation and development, is likely to require a multi-pronged approach. It needs the right skills and technology to manage the bamboo and produce the charcoal; it needs the right level of awareness for consumers to accept the product; and it needs the right policies and regulatory mechanisms to incentivize investment.

INBAR is working with local farmers to improve the sustainability and productivity of their bamboo groves and plantations, with local enterprises to introduce high quality charcoal briquettes, and with local policymakers to address perverse incentives and prohibitive policies that support unsustainable wood charcoal production. INBAR is using its platform for South-South collaboration to transfer technology from China, where research and development and bamboo charcoal-based industries are highly developed.

Just as bamboo can provide a renewable alternative for timber production of furniture, handicrafts, construction materials, household utensils, flooring and many other products, bamboo charcoal can help reverse the unsustainable reliance on timber for household energy in Africa. Important precedents for formulating effective policy and practice are currently underway in Ghana and Ethiopia, with a view to replicating the approach across the region. Not only will this help to preserve Africa's forest resources for future generations, it will reduce forest-based carbon emissions that contribute to harmful climate change.

The challenges facing forests and people in the 21st century are greater and more complex than ever. Overcoming these challenges will require political will, sound research, innovative thinking and a certain amount of trial and error. The notion of sustainable development has been around for a quarter of a century, and we are now in a position to evaluate, distil and share the models and approaches that have proven to be effective. The International Year of Forests provides an opportunity for just this.

The 'green' credentials of bamboo have long been acknowledged. Now, with organizations like INBAR having tested and refined specific models for bamboo-based development and conservation, we are in a position to take these models, adapt them, and apply them elsewhere. Bamboo is no silver bullet. But in many of the poorest parts of the world, using bamboo as a sustainable source of timber can be part of a tailored, nuanced approach to creating a pro-poor, green economy.

Multiplying socio-economic benefits from sustainable forestry

Cheah Kam Huan, Chief Executive Officer, Malaysian Timber Council

Malaysia has a long legacy of well-managed forests, in which responsible utilization of rich forest resources has been practised for over a century. The timber sector began to play a significant role in Malaysia's economy in the early 1970s, giving rise to the need to continually review and improve forest management practices in tandem with the changing societal requirements for balanced socio-economic development without jeopardizing the integrity of the natural forest ecosystems.

The framework for implementing sustainable forest management (SFM) was harmonized and laid out in the National Forestry Policy (NFP) which was approved and adopted by the National Land Council in 1978. The NFP was further strengthened by the approval of the National Forestry Act in 1984 and its subsequent amendment in 1993. Nonetheless the implementation of SFM was not without challenges and the trade in such timber was met with strong resistance from environmental communities, which advocated a ban on the sale of tropical forest products.

Against this backdrop, the Malaysian Timber Council (MTC) was set up in January 1992 through public-private collaboration between the Malaysian Government and the timber industry with the main goal of ensuring the sustainability of the industry. Taking on the holistic aim of maintaining the nation's tropical forests through SFM, MTC focuses its work on enhancing the values of the forests by promoting and facilitating the development and growth of the Malaysian timber industry and reinforcing the down-stream economic processes. Specific functions of the MTC include improving industry competitiveness,

Image: Malaysian Timber Council

Identification of trees were amongst the skills taught at the Forest Leadership Camp

Image: Malaysian Timber Council

Leadership camp participants getting up-close and personal with nature. Forest appreciation through jungle-trekking

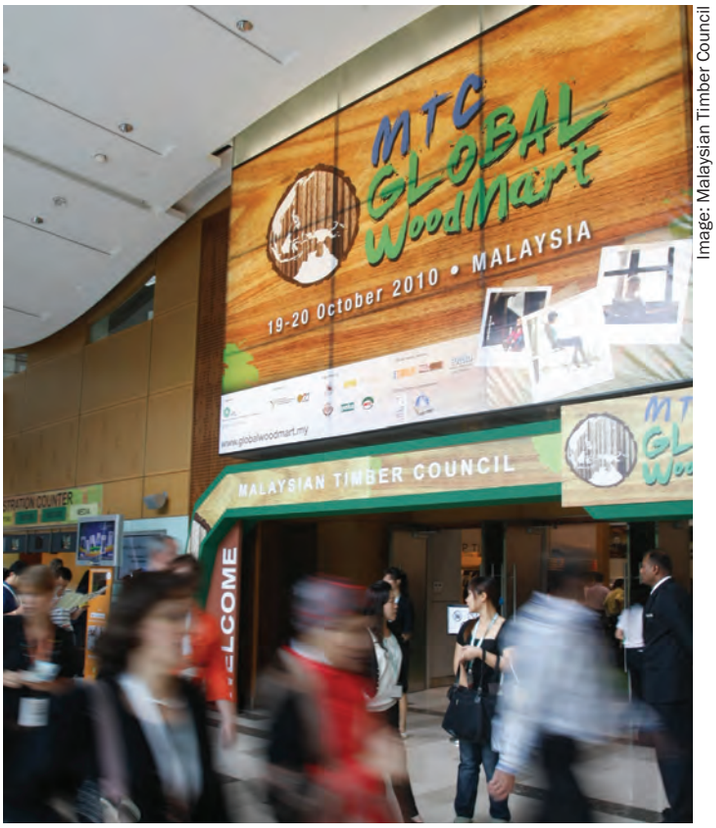


Image: Malaysian Timber Council

Malaysian Global Woodmart took place in 2010 at Kuala Lumpur Convention Centre

Image: Malaysian Timber Council

Foreign and local exhibitors and visitors attended the MGW 2010

enhancing market access and creating environment and trade opportunities, in addition to the overall promotion of SFM and trade in sustainably produced timber product at local and international levels. Malaysia has over the years been globally recognized as a leading country in sustainable management of tropical forests as well as a major producer of tropical timber.

National Timber Industry Policy

Complementary to the NFP, the pathway towards sustainable development of the timber sector was further supplemented by the National Timber Industry Policy (NATIP) which was launched by the Malaysian Ministry of Plantation Industries and Commodities in 2009. The aim is to achieve US$16 billion exports of timber product by 2020, requiring a sustainable net growth at the rate of about 6.5 per cent per year. Collaborations between various timber-related agencies such as the Malaysian Timber Industry Board, Forest Research Institute of Malaysia, Forestry Department of Peninsular Malaysia and MTC were further enhanced to achieve the over-arching goals of NATIP.

Market development

Whilst keeping pace with the evolution of international forestry policies, MTC launched and implemented market development initiatives and programmes that fit into the macro view of advancing and achieving SFM, to satisfy the prevailing timber market conditions and requirements. Among the most notable achievements were forward-looking concepts and initiatives that led to the formation of the Malaysian Timber Certification Council in 1998 and the Forest Plantation Development Berhad Sdn Bhd in 2006. Most recent was MTC's inaugural Malaysian Global Woodmart (MGW) 2010, a timber products supply exposition held in the Malaysian capital city of Kuala Lumpur. Hosting 108 companies from 19 countries, the event brought together wood industry players from all corners of the world to network and trade on a single platform.

The timber sector's contribution to growth

In 2010, the timber sector, which included major products such as sawn timber, veneer, plywood, moulding, furniture and medium-density fibreboard, contributed 3.7 per cent to the national gross domestic product, making up 3.2 per cent of total merchandise exports. Amidst a global downturn, the exports of Malaysian timber and timber products registered a positive growth of 5.3 per cent in 2010, an increase in the total export value from US$6.1 billion in 2009 to US$6.4 billion. The sector provides employment to over 318,000 people.

Increasing resource efficiency

Competent human resources and up-to-date technology are key ingredients that foster a productive industry and ensure efficient utilization of resources. Towards this end, a three-pronged approach was employed which included programmes for skills development, timber utilization enhancement and product diversification, as follows:

Image: Malaysian Timber Council

Improving capacity on environmental protection and health and safety measures through capacity-building projects under the European Union Forest Law Enforcement Governance and Trade (FLEGT) initiative

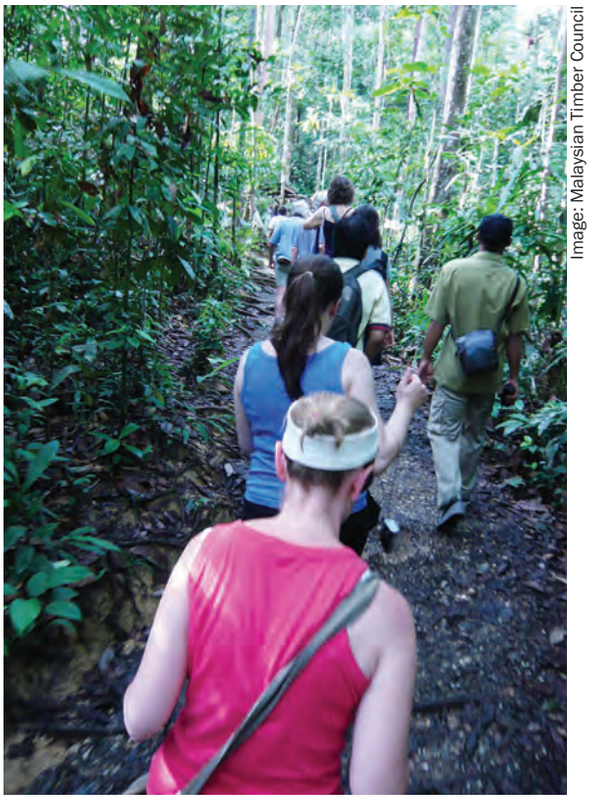


Image: Malaysian Timber Council

Creating awareness on sustainable forest management through familiarisation programmes for stakeholders

- Academia Timber Industry Consultative Forum — MTC currently sits on the curriculum committee of Universiti Malaysia Sabah, Universiti Teknologi Mara (Jengka) and Politeknik Sultan Salahuddin Abdul Aziz Shah
- Familiarization programme for university lecturers — exposure to latest machinery and good production management in an actual factory environment ('train the trainers')
- Technology study/acquisition missions — providing industry access to hi-tech factories and facilities in developed countries
- Guidebooks — Specifying Timbers and Incentives for Wood-based Industry, Design Data for Timber Engineering, On-site Timber Identification and Architectural Use of Timber in Malaysia
- Glulam Interest Group — comprised of industry members, engineers and architects, among others, who produced a Roadmap for the Development of a Glulam Industry in Malaysia.

Outreach and stakeholder engagement

Promotion of SFM and industry development comprises a range of outreach and stakeholder engagement activities. Apart from dissemination of information via bulletins and publications, regular seminars, workshops and dialogues are also conducted for more direct and meaningful interactions between various stakeholders on relevant topic and issues. MTC's stakeholder engagement activities include an annual familiarization programme for local and foreign journalists and the Malaysian Forest Dialogue (MFD).

The MFD Steering Committee is a multi-stakeholder enterprise comprising representatives from several stakeholder groups, including the WWF-Malaysia, Malaysian Nature Society, Business Council for Sustainability and Responsibility Malaysia, HSBC Bank Malaysia Bhd, Malaysian Timber Certification Council (MTCC) and MTC. The primary focus of MFD is to create a dynamic platform for a multitude of stakeholders to discuss various issues concerning sustainable development of forestry and the forest industry. Topics that have been covered since its inception include:

- Challenges and Opportunities in Financing Sustainable Forestry and Timber Trade (2006)
- Socio-economic Issues in Financing Sustainable Forest Management (2007)
- Strategizing Future Directions for the Timber Industry (2008)
- Forest, Land and People: An Opportunity for Understanding (2009)
- Code of Conduct: Strengthening Confidence in the Timber Industry (2011).

Conducted under the Chatham House rule, which protects the identity of sources to encourage open and inclusive discourse, the two-day dialogue generally attracts the participation of approximately 150 representatives from Government agencies, academia, environmental non-governmental organizations, social groups and industry members.

Celebrating the International Year of Forests, 2011

By and large, all activities implemented by MTC celebrated and amplified the contributions of the nation's

Image: Chew Chun Hian

Photograph of a forest scene, one of many high-quality entries in the MTC Photography Competition 2011

tropical forests to the society. In conjunction with the International Year of Forests, 2011, specific programmes and activities were held which included:

Forest Leadership Camp (30 May-1 June)
Organized in partnership with Yayasan Anak Warisan Alam (Children's Environmental Heritage Foundation), Forestry Department of Selangor and the Institute for Development and Environment of Universiti Kebangsaan Malaysia, the Forest Leadership Camp was aimed at nurturing future forestry leaders by creating awareness of the importance of forest conservation, SFM and economic utilization of forest resources among the youth. Using the concept of 'learning by doing', the camp was designed with young people in a leading role and was supervised by volunteers and facilitators. The three-day camp was divided into two modules covering topics on forestry and tree identification, forest and its environmental services, including climate change. Each of the modules included a combination of learning activities, training sessions, workshops, projects and experiments.

At a Forest Development and Training Office of the Forestry Department for the state of Selangor, 53 students ranging from 12-19 years of age received hands-on experience to hone their leadership, communication, teamwork and management skills while gaining understanding on the importance of ecological conservation and the practical considerations of various actions and their impacts on the environment and society.

MTC Photography Competition (15 July-30 September)
Launched on 15 July 2011 for the duration of six weeks, the competition attracted over 800 entries from contestants demonstrating their creativity in four categories: forest landscape, flora and fauna, wood products and uses and a special category on composition and form. Aimed at creating public awareness and instilling appreciation for the beauty and richness of Malaysia's tropical forest resources, the competition also revealed local talents in photography. The best photographs from the competition were put on display at the MTC Photography Gallery at the Malaysian International Commodities and Conference Showcase from 28-30 October 2011.

Future of forests beyond 2011

SFM as practised through the collaboration of various parties in Malaysia has demonstrated that forest conservation and timber industry development are not and should not be mutually exclusive. In a complex web of socio-economic interdependence, it is crucial that SFM and the corresponding timber industry remain economically viable to ensure that forested lands do not lose their economic value. The three pillars of sustainability must be kept in balance so that forests can be maintained in perpetuity. MTC will remain steadfast in promoting the development of the timber industry based on sustainably managed and renewable sources. It is imperative that these efforts are supported and not over-burdened with regulatory requirements and incorrect perceptions in the market.

Forests in a green economy

Niklas Hagelberg, United Nations Environment Programme, Nairobi, Kenya

The contribution of forest ecosystems to socio-economic development and human well-being — including construction material, food, energy and cultural identity — is undeniable, but is often sidelined in development decision-making. On the other hand, human behaviour and economic development continue to have impacts upon the quality and extent of forest cover, both positively and negatively. Human expansion has partly caused the extensive decline in forests, which today remain at almost half of their original cover of 8,000 years ago. Additionally, most remaining forests are disturbed, possess less biodiversity and have a lower level of ecosystem functioning and resilience compared to pristine natural forest.[1]

Even though forests today still cover some 31 per cent of the global land area, the reduction of forest cover continues, totalling approximately 13 million hectares (ha) per year. Globally, however, forest cover is recovering at a rate of about 5 million ha per year. This growth is attributable to secondary forest being regenerated through reforestation, mainly in Asia.[2]

Forest ecosystems have been recognized under the three Rio conventions as both a source of climate change and a solution to it, providing habitats for terrestrial biodiversity and helping to combat land degradation and fight poverty in dry lands. These ecosystems are even deeper at the heart of humanity when one considers the 350 million humans (60 million of them indigenous people) depending directly on them and the cultural identity that many people have built around forests. The contributions by the forest industry alone are estimated at 1 per cent of global gross added value

Although forests cover almost one third of the Earth's land area, they are declining at a rate of millions of hectares a year

Image: © 2011 UNEP/GRID-Arendal

Forests can help countries achieve their low-carbon development goals

and up to 1.4 billion people depend to some extent on forests for their livelihoods.

Furthermore, forest ecosystems contribute services and goods to many other economic sectors, for example energy (biomass and water flow for hydropower), tourism (landscape values and wildlife habitat) and transportation (water flows for rivers).

It is estimated that the value of the ecosystem services and goods lost annually due to deforestation and forest degradation is in the range of US$3.7 trillion[3] — almost eight times the estimated value of the trade in forest products of US$468 billion.[4]

These numbers alone demonstrate the important contribution of forest ecosystems to our economies. They also portray the gaps between current management of these ecosystems and the magnitude of change needed to maintain their participation in sustainable development and to realize their potential contributions to a green economy.

Opportunities in forest-based capital

At a time when countries are seeking a low-carbon development path, while sustaining and ensuring continued high growth, forests can provide inspiration, key services and goods to help them reach this goal. Furthermore, this is a development path that not only delivers reduced usage of hydrocarbons but also results in improved human well-being, social equity and socio-economic development, while significantly reducing social and environmental risks and ecological scarcities — a green economy paradigm.

In many countries, forest ecosystems already present a range of opportunities which can address self-reliance and security of food and energy supply, as well as respond to the raw material demands of growing domestic markets and to poverty reduction.

The low-carbon development and green economy strategies of Guyana and South Korea both strongly feature forests as one of the pillars of their growth. In these strategies, forest ecosystems contribute both services (climate change mitigation and adaptation, water and nutrient recycling) and goods (timber, biomass and high quality food products) and are invested in as such.

Additionally, forest biodiversity has been proven to be a key indicator of forest resilience towards external stresses, such as climate variability, extreme weather

Green economy

A green economy provides the economic vehicle for sustainable development and increased human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. In other words, in a green economy, the creation of income growth and increased employment is driven by investments that reduce carbon emissions and pollution, enhance efficiency and sustain biodiversity and ecosystem services.

Image: © 2011 UNEP/GRID-Arendal

Exploitation of forests for short-term returns often jeopardizes their long-term viability

and insect and invasive species outbreaks. Countries with an interconnected and healthy natural capital base and a growing knowledge of the traits of forest-based biodiversity and genetics stand to adapt comparatively well to a world marked by climate change, increased competition for resources and a changing global economy.

Forest products and services are often culturally accepted as humans have been using them for millennia (for example biomass as fuel and plants as medicine), providing a good foundation for forest-based solutions. Further examples of socio-economic contributions are the water regulating service forest ecosystems provide, including its importance for relatively low-carbon-intensity river transportation or for the prevention of coral reefs and hydrodam sedimentation.

Utilization of forest services and goods is often also labour-intensive and targeted investments in forest-based natural capital are believed to be able to generate millions of good quality jobs. Most of the increase in employment would occur via small and medium-sized enterprises, a segment that is considered effective in increasing employment and reducing poverty.

UNEP's Green Economy Report outlines that an annual additional investment of US$40 billion is required to halve global deforestation by 2030 and increase reforestation and afforestation by 140 per cent by 2050, compared to business as usual. Due to the ongoing austerity efforts in most developing countries, the additional investment at this scale is highly unlikely to come from governments alone – to put the figures into context, cumulatively available public funds from donor countries for REDD+ stand to date at approximately US$7 billion (the annualized figures are much lower). Hence investment from, and engagement of, the private sector, including financial institutions and financial intermediaries, is essential, particularly for implementation.

Public investments are, however, critical to foster enabling conditions, transparency, longevity and certainty and to lay the foundations that will stimulate entrepreneurship and 'de-risk' investments.

Enabling conditions

Unfortunately past and current investments in connection to forest ecosystems and their utilization have been more extractive and short-term and have outweighed investments into the multifunctionality of forest ecosystems and their underpinning role in our well-being. Forest ecosystems have often been seen as a source of land and a quick source of energy and raw material for both poor rural communities and more influential and economically independent individuals and organizations. This imbalance has been at the expense of long-term environmental and socio-economic benefits and, while it has provided a short-term return, that may have contributed to the national development, it has undermined the delivery of the full set of services and goods for human well-being.

To support the correction of this imbalance and foster a transformation of current forest management and

Politically motivated subsidies can be responsible for changes of use that lead to a reduction in forest cover

utilization patterns, governments have a range of policy tools that can be employed to provide enabling conditions for private sector (including individual and community) investments.

Knowledge

A first step in incorporating the full value of forests in decision-making is a solid knowledge base on the services and goods forest ecosystems provide. As an example of its support for generating knowledge, the United Nations Environment Programme (UNEP) is helping the Government of Kenya to conduct natural resource accounting of its forest services and analysis of the cross-sectoral linkages. This is supported by communication to key sectoral decision makers and pressure groups to generate awareness and political support for a paradigm shift in the management and utilization of forest ecosystems. Awareness and political support is crucial for any reform, and finding the optimal contributions by forests to the national economy and the well-being of people is no different.

Policy options and integration of forest into development agendas

Many of the drivers of deforestation and forest degradation lie outside of the forest sector in factors such as agricultural and urban expansion and energy consumption. In many developing countries, for example, the expansion of agricultural land either for subsistence farming or for industrial agriculture is the main reason for the decrease in forest cover and is often fuelled by subsidies or political interests. Target 3 under the Convention on Biological Diversity Strategic Plan 2011-2020 addresses these harmful subsidies and thereby also the need to mainstream forest biodiversity and forest ecosystems into the policies of other sectors and ministries to prevent the development of perverse policies.

Financial tools

Governments can stimulate entrepreneurship and investments into forests by fiscal measures such as laws, norms, subsidies and market-based instruments, such as taxes and permits. Overseas development aid can also be an effective way of supporting national efforts to reform and transform the management of forest ecosystem services.

Sustainable public procurement provides governments with a means to provide a market signal of the need for sustainably produced products and services. Public expenditure of GDP varies widely but it is substantial and ranges from 15-30 per cent in developing countries to 35-50 per cent in developed countries, representing a noticeable market force.

The Marrakech Task Force on sustainable public procurement, the Lacey Act and the EU Timber Regulation are examples of efforts towards the implementation of sustainable procurement. Other examples of financial tools are private-public financial institutions such as pension funds, which have the potential, with their equity, to influence investments in forest-related sectors.

Image: Stora Enso

A paradigm shift is required to achieve the goals of the green economy

International frameworks and markets

Due to the international flow of money, international frameworks and markets are key enablers for setting conditions of transparency, longevity and certainty. For example, while the voluntary market around REDD+[5] in 2010 grew 31 per cent compared to 2009, it is relatively small when compared to the compliance markets. Many carbon trading schemes, including the European Trading Scheme, still exclude forest and land-use carbon, which limits private investments in forest carbon. Financial institutions have, through the UNEP Finance Initiative, called for decisions by the parties of the UNFCCC, which can deliver private investments into REDD+.

Furthermore, governments can create quasi-market demand for REDD+ through bilateral agreements. For example, Norway and Indonesia have made an agreement for disbursement of US$1 billion to Indonesia upon delivery of the agreed emission-reduction targets.

Forest solutions

Forest ecosystems provide many key services and goods to human well-being and economic growth. Services and goods such as water, energy, construction materials and food all contribute to a low-carbon development path. Using the green economy as an economic vehicle is one way to foster appreciation of the multifunctionality of forests.

Many of the solutions we're looking for in terms of de-carbonizing our economy or creating jobs can be found in forests. Tried and tested economic mechanisms and markets exist, which can be replicated and scaled up, including from certified timber schemes, payments for ecosystem services, benefit-sharing mechanisms and community-based partnerships. Additionally, there are technological solutions that can help many countries to move forward with regard to resource efficiency.

Investments in forest ecosystems and their goods and services are also a key climate change adaptation and mitigation measure and can lead to a green economy transformation of forest management and utilization and provide opportunities for economic growth while de-risking REDD+. For this 'quadruple-win' situation to materialize, all policies related to forests (adaptation, mitigation, biodiversity and socio-economic) need to be linked with the national development agenda and the policies of key sectors in a true multisectoral manner. Further, the transformation necessitates collaboration between countries, the private and public sectors and communities.

Advancing the green economy paradigm shift is of key strategic importance to the mandates and objectives of UNEP and forests provide a practical example of the natural capital that can fuel economic growth and that underpins our economies and human well-being. Forests need to be not only recognized but also invested in and built upon for sustainable economic and human development.

German forests — nature and economics

Matthias Schwoerer, European and International Forest Policy,
Federal Ministry of Food, Agriculture and Consumer Protection, Germany

Germany has about 11 million hectares of forests, covering one third of the country. The forested area has increased by approximately 1 million hectares over the past four decades. Timber stands in Germany account for 320 cubic metres per hectare, with the annual timber increment totalling around 100 million m³ in accessible forests (approximately 10 m³ per hectare).

Forests are the result of a long history of human intervention reaching back to the Middle Ages, when large areas of forest land were first cleared for settlement or used for agricultural purposes. Since then, forests have been changed and partly degraded by littering, tanning and intensive use for livestock fodder and as an energy source, and they were devastated on a large scale during and after the two world wars. However, some forest areas have been cultivated and protected for hunting and recreation and new forests have been established.

Without human intervention, beech forests would prevail in Germany with 74 per cent coverage of the forest area. Over the course of forest history and especially due to massive reforestation of agricultural or devastated land, the tree species composition has shifted to a higher percentage of coniferous trees. The forest stands today are largely the result of the long-term efforts of German foresters and forest owners to rebuild high-yield, ecologically valuable forests. In the past few decades, more importance has been attached to a site-adapted and more natural tree species composition. While spruce still accounts for the largest proportion among the tree species, mixed stands make up 73 per cent of German forests today. The oldest high-quality production forests are more than 200 years old.

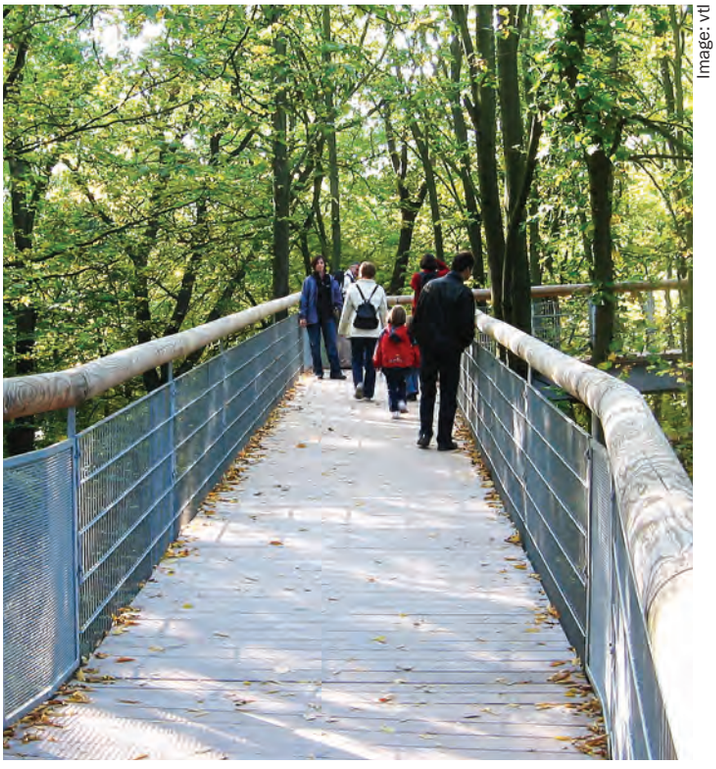


Image: vtl

In Germany, anybody can use the forests for recreational purposes

In 1713, Hans Carl von Carlowitz first came up with his concept of sustainable forest management, the spirit of which gave rise to modern forestry in Germany and established the country's reputation as the cradle of sustainability. The concept of sustainable forest management, which initially focused on timber, was gradually developed and expanded to encompass forest services. It is a living concept which has its principles but also requires that those responsible listen and respond to the evolving demands of society, taking new scientific knowledge into account.

Germans traditionally have a close relationship with their forests, which are a source of inspiration and the setting of almost all fairytales. From the myths of the ancient Germanic tribes through the paintings of the Romantic artists to the present day, the forests are inseparably linked with our culture. To understand the social demands to which forestry has to react, one needs to be aware that in Germany, anybody can access forests for recreational purposes at virtually any time and place. Today, forests play a key role in this densely populated, industrialised country as places for recreation, tranquility and the restoration of physical and mental health. Access is a right to which citizens are entitled, but it also obliges them to act responsibly. Forest and nature conservation legislation restricts access to certain areas and there are bans on smoking and open fires.

Only 30 per cent of forests in Germany are owned by the state. The remaining forests are owned by millions of individuals and municipalities, as well as the church and other institutions. There are currently around 4,300 forestry groups with more than 400,000 members representing a total ownership of 3.8 million hectares of forest. Participation is therefore largely concentrated on policies, strategies and legislation on forests but is not related to single management decisions. Many people in

Image: FNR/Lydia Pohlan

The establishment of multifunctional forests is a priority

rural areas are deeply engaged in forestry by virtual ownership, often following decades or even centuries of family tradition.

The first nature conservation area in Germany was established in 1836. At that time, the early nature protection initiatives were greatly influenced by foresters as nature protection organizations did not yet exist. A system of diversified protected areas evolved in the subsequent decades. Today, biodiversity functions take precedence over forestry operations in approximately 25 per cent of the forest area, approximately 17 per cent of which is covered by the 'Natura 2000' EU protected area network. Over the total forested area, the incidence of rare flora, fauna and habitats is supported by targeted measures.

Forest utilization in Germany today makes an important contribution to the national economy and the country ranks among the key 'wood countries' in terms of production, as well as foreign trade in wood and wood-based products. Despite the incomplete exploitation of the annual timber quota and thanks to intensive recycling, Germany is in a position to cover its wood requirements to a great extent from its own resources. Total wood consumption in 2010 amounted to 108 million m³ of roundwood, with supply from forests accounting for 70 million m³ and waste paper from domestic production for 45 million m³. Timber as a valuable domestic source of energy is enjoying an unexpected revival in the face of the increase in energy prices and increasing demand for CO_2-neutral raw materials. In spite of these and other demands, due to the efforts of German foresters and forest owners to maintain a viable resource base, Germany holds the largest total growing stand of timber in Europe at around 3.4 billion m³.

According to current surveys, the forest and timber industry, including processing and paper as well as printing and publishing, accounts for nearly 1.3 million jobs with an annual turnover of about €170 billion. The socio-economic importance of forestry and the wood-based industry in Germany has so far been seriously underrated by business, scientific communities and policymakers and does not lag far behind other major economic sectors. More specifically, small- and medium-sized forest-based enterprises play a major role in rural employment structures.

The task of German silviculture is to shape multifunctional forests, which allow several forest functions and services to be centred in the same area. This approach has resulted in a multitude of silvicultural treatments and regeneration methods. The following principles are generally pursued today:

- Conservation and establishment of structurally diverse and close-to-nature mixed forests
- Use of site-adapted and stable tree species and provenances
- Use of natural regeneration where soil and previous stands permit
- Elimination of clearcutting as far as possible
- Multilevel forest structure, where possible, to make maximum use of soil and air space
- Adaptation of the intensity of silvicultural treatment to suit individual stands
- Stand-conserving wood harvesting
- Maintenance and improvement of soil fertility
- Use of foreign tree species only after the ecological and economic benefits have been examined.

Image: vtl

The economic and ecological demands on forests are increasing

Historic developments demonstrating early reactions to economic, social and environmental demands on forests gave rise to another noteworthy movement in the form of close-to-nature forest management. Long before modern science evolved to support many of their original hypotheses, some foresters in the early 19th century advocated developing both ecologically and economically valuable forests by making use of natural processes and avoiding clearcutting and bare forest soils. Much of this early practical experience paved the way for later forestry developments, including an increasing proportion of structurally diverse mixed stands, long regeneration periods and natural rejuvenation methods. Many valuable old forests in Germany — both in terms of timber and biological diversity —result from these initiatives. In variable 'plenter forests', trees of different age classes stand side by side and regeneration takes place on a more or less continuous basis. Selective cutting or group-selection cutting allows for natural regeneration to develop or existing regeneration to be used in the spaces opened up by cutting. This method of forest management by individual tree species and multi-storeyed forest structure has had a stimulating effect on many other silvicultural methods over many decades.

According to studies, there are only minor differences regarding species diversity between close-to-nature forests and unmanaged natural forests. The aim is to implement close-to-nature forest management throughout Germany. High forest management is the predominant silvicultural system in Germany now. The stands are either naturally or artificially regenerated at the end of a long production period extending from 80 to 200 years or more, depending on the tree species.

New developments

Forests remain of crucial importance for the national economy, nature and society and Germany will continue to need a productive forestry and wood-based industry in the future. Especially in light of the climate and energy objectives of the EU, and the recent decision of the German Government to end nuclear power production and reinforce renewable energies, the role of wood has to be seen in an even wider perspective. In relation to the EU, recent studies are predicting a wood shortage of between 150 and 420 million m³ by 2030. The role of CO_2 sequestration inside and outside forests, and in long-life timber products, needs to be considered and optimized. At the same time, there are increasing demands to increase the proportion of set-aside areas, in particular high-quality old beech forests, for which Germany has a specific global responsibility, or to reintroduce wilderness areas. Discussions and scientific analysis on the best possible strategy to protect forest habitats and species are ongoing.

With both the economic and ecological demands on forests increasing, two years ago the Federal Ministry of Food, Agriculture and Consumer Protection launched discussions on a new National Forestry Strategy 2020. After a broad, intensive and controversial public debate, this strategy, which follows the latest National Forest Programme Decisions of 2004, was adopted

Image: Michael Reitz 2011 / www.kunstingenieure.de

Timber as a source of energy is enjoying an unexpected revival

Image: Michael Reitz 2011 / www.kunstingenieure.de

A national procurement policy promotes timber from sustainably managed forests

by the Federal Government in September 2011, just in time for International Year of Forests, 2011. Its main aims are to forge a new balance between the diverse demands on and capabilities of forests and to pursue the multifunctionality objective for German forests, while maintaining and enhancing conditions for non-state forest owners to manage forests profitably. Where forest utilization is concerned, the aim is to strike a balance between CO_2 sequestration within forests on the one hand and timber use on the other. For German forests, this means maintaining the present utilization rate without striving to increase it much further. Instead, an increase in the efficiency of wood and energy use, ideally in line with cascade use, is gaining more and more importance. Where it relates to forests, the National Forestry Strategy 2020 will complement the existing National Biodiversity Strategy.

As Germany is a federal republic, responsibility for the forests lies mainly with the regions. Steps to implement the new strategy must therefore be discussed with the German *Länder*. The Federal Government can set the legal framework and offer incentives, such as promotional measures. It was in this context that the decision was taken in 2011 to introduce a new forest climate fund from 2013. Among other things, this fund will aim to promote measures to increase the resistance of forests to climate change and related natural disasters. It will also promote measures to improve the contributions of forests and timber to combating climate change.

Germany has been an active partner in most of the global debates and initiatives to conserve and sustainably manage forests. Its objective in the field of international forest policy is to ensure that the multiple contributions of forests to food security, the alleviation of poverty and the protection of rural livelihoods, as well as to environmental conservation, climate protection and a green economy, are more widely acknowledged at all levels. Forests should also be safeguarded and fostered through sustainable forest management, which takes all the existing and potential products and services provided by forests into account. To this end, an effective coordination of the diverse international efforts to control deforestation and forest degradation and to promote sustainable forest management is required to enhance their impact. Apart from measures abroad, Germany also actively supports the activities and legislation of the EU against trade with and consumption of timber from illegal sources. A national procurement policy that promotes timber from sustainably managed forests and an initiative to develop a fingerprinting methodology for timber to identify timber species and origins at customs points are among the support measures implemented.

Forest are a genuine treasure. All efforts need to be done to maintain them in their substance and beauty. Forests 2011 offers an extraordinary platform to communicate this message to a wider audience. The 300th anniversary of Carlowitz's striking idea of sustainable forest management in 2013 will show whether we have understood this message.

Finland — A green economy and rural livelihoods in Europe's most forested country

Marjukka Mähönen, Department of Forest, Ministry of Agriculture and Forestry, Finland
and Fran Weaver, TMI Francis Weaver

Finland's vast forests, which cover more than three quarters of the country, are central to both the national economy and people's everyday lives. Most forests are family-owned and everyone in Finland has the legal right of access to forests, which are widely used for activities from hiking and skiing to hunting, picking wild berries and mushrooms, or just relaxing in natural surroundings.

The forest sector generates as much as 5 per cent of Finland's gross domestic product and accounts for almost 20 per cent of exports by value, the highest for any European country. As many as 200,000 of Finland's 5.4 million inhabitants are employed in the paper and timber industries, forestry and other forest-related businesses.

Successive National Forest Programmes (NFPs), including the current NFP 2015, have long been used as a basis for policymaking across many administrative sectors. Thanks to the systematic planning of forestry at national level since Finland's independence in 1917, forest resources are profitably and sustainably utilized in industry and construction, and also increasingly to produce renewable bioenergy.

Although the state owns large forest areas, particularly in the sparsely populated northern and eastern regions, Finland's forest industries must also obtain wood from a uniquely large number of small suppliers. About 60 per cent of the country's forests are small private holdings owned by families, and as many as one in eight Finns own forest holdings. A unique national programme encourages these private owners to consider biodiversity when managing their forests.

The timber stocks in Finland's forests have increased in recent decades and today amount to 2,200 million cubic metres of wood. Although there is no need for afforestation programmes, legislation ensures that viable new stands are established after felling, using acceptable planting or natural regeneration methods. Finland's forests constitute a considerable carbon sink, estimated to compensate for more than half of national greenhouse gas emissions.

Multiple uses of wood

There are about 50 pulp and paper mills in Finland and to compensate for recent capacity reductions, investment is now aimed at the production of innovative new wood-based products and the increasing use of wood to generate energy.

Wood already accounts for about 20 per cent of Finland's total energy use, due to the intensive use of by-products from pulp- and paper-making processes to generate heat and power. As part of the EU's efforts to combat climate change, Finland aims to generate 38 per cent of its energy from renewable sources by 2020, compared to about 28 per cent today. To bridge this energy gap, Finland's renewable energy policies envisage a massive increase in the use of woodchips at local heating plants, in step with a wider increase in the industrial use of wood.

Large piles of 'energy wood', consisting of branches, tree crowns, stumps and young trees thinned out from growing stands, are already a common sight by roadsides in rural Finland, drying out in preparation for chipping and transportation to local heating plants.

Finland is also pioneering the development and use of innovative biorefinery products derived from wood that can be used instead of fossil fuels in industry, heating and transportation, as part of a national drive to create a green economy.

Sustainable products and services

The NFP is boosting the demand for wood by supporting the development of local wood processing businesses. Timber construction is gaining ground with wooden houses as well as larger buildings and structures such as bridges and football stadiums. The NFP and regional rural development programmes are also encouraging production of a wide range of non-wood forest products including game, foodstuffs, medicinal products, cosmetic ingredients and textiles.

Finland's forests — and particularly protected areas such as national parks — are increasingly used for nature-based tourism, recreation and environmental education. This income-producing trend has been promoted through a wide-ranging programme for the development of nature tourism and the recreational use of nature (VILMAT).

The human dimension

First drafted in 2008, NFP 2015 is designed to ensure systematic planning at national level while also meeting the needs of forest owners and other stakeholders at the local level. It was extensively revised in 2010 to reflect changes in economic conditions and new forest-related policies within the programme of the new Finnish Government elected in spring 2011. The programme incorporates a detailed action plan, which helps administrative sectors and agencies to obtain the necessary support and funding. It receives substantial contributions from the private sector in addition to public funding.

The importance of the NFP is recognized across Finnish society, thanks to the uniquely wide scope of stakeholder participation in the drafting of the

Image: Hannu Vallas

Forests cover more than three quarters of Finland

Image: Ministry of Agriculture and Forestry

Forestry work is conducted responsibly, safely and professionally in Finland, where 95 per cent of all forests are covered by forest certification schemes designed to guarantee that products are made from sustainably harvested wood

programme, and the comprehensive monitoring and evaluation of its implementation, conducted by independent research institutes in collaboration with the Finnish Forest Research Institute (Metla).

The key body responsible for shaping and assessing the NFP is the National Forest Council (NFC), whose members include representatives from the national forest owners' association, the forest industries, forestry, sawmill and papermaking unions, environmental NGOs and the indigenous Sámi people's parliament, as well as senior personnel from Government agencies and the ministries of agriculture and forestry, employment and the economy, the environment, finance, social affairs and health, and education and culture.

Building a bioeconomy

The NFP complements other national strategies and policies, including Finland's Strategy for Sustainable Development, the National Climate and Energy Strategy, a national renewable energy package announced in 2010, and the National Strategy and Action Plan for Biodiversity in Finland 2006-2016.

The NFP's mission — to generate increased welfare through diverse sustainable forest management — acknowledges the multiple roles of forests in providing both economically valuable products and non-material benefits. The programme's vision sees Finland as 'a responsible pioneering country in the future global bioeconomy, where forest-based livelihoods are competitive and profitable, and biodiversity and the other environmental benefits derived from forests are enhanced'.

The NFP is based on three objectives derived from the vision: strengthening forest-based business and increasing the value of production; improving the profitability of forestry; and strengthening forest biodiversity, environmental benefits and welfare implications. The attainment of these objectives is supported by the diversification and strengthening of know-how in the forest sector, along with increased Finnish contributions to international and EU-level forest policy development.

New opportunities

The related goals of strengthening forest-based businesses and increasing the value of forest-based production are implemented through the complementary Strategic Programme for the Forest Sector, drawn up by the Ministry of Employment and the Economy in 2009. This programme includes projects and initiatives designed to identify and enhance business opportunities, promote wood construction, expand wood-based energy production and support related research and development work.

The NFP has ambitious targets for increasing the amounts of wood harvested annually from 50 million m^3 today to 70 million m^3 by 2015, corresponding to about 70 per cent of the total annual growth of Finland's forests. The programme particularly aims to promote the use of wood and refined wood-based biofuels.

These increases should generate plenty of new employment in forestry, transportation and energy production in rural areas, but there is an urgent need to implement cross-sectoral policies to ensure the availability of suitably trained workers and transportation infrastructure.

Image: Jouko Parviainen, Wenet

Logging residues are widely collected and chipped for use generating renewable energy. The increased use of sustainably harvested energy wood is a key element of Finland's forest policies — and also provides welcome extra income for forest-owners

Support for forest owners

Individual forest owners are increasingly benefiting from the subsidized forest utilization and management planning and advisory services provided by the 13 regional forestry centres and 105 local forest management associations that provide services for forest owners.

Forest owners planning certain types of forest management and improvement measures (including the tending of seedling stands, improvements in young stands and the construction and improvement of forest roads) may apply for subsidies under Finland's Act on the Financing of Sustainable Forestry.

In 2010, subsidies amounting to 80 million euros were paid out to finance sustainable forest improvement measures in 71,000 forest holdings across Finland. Forest legislation and official guidelines on sustainable forestry are to be revamped under NFP 2015 to further encourage forest owners to manage their forests responsibly and sustainably.

Conserving biodiversity

According to the major State of Finland's Forests 2011 report, produced by the Finnish Forest Research Institute, 'safeguarding the biodiversity of forest environments has been established as a standard point of interest in forest management alongside wood production'. An impressive 13 per cent of forests are under protection, but protected areas mainly encompass relatively unproductive forests in the north, and there has long been a need to protect biodiversity in regions where commercial forestry is more prevalent.

The METSO forest biodiversity programme for Southern Finland has been set up in parallel to the NFP to help achieve national biodiversity goals. This programme differs from previous Finnish nature conservation policies in that landowners are not obliged to participate in compulsory purchase schemes, but instead receive compensation for entering into voluntary agreements that establish private nature reserves in forests that remain their property.

Compensation for forest owners

Forest owners have keenly participated in competitive tendering schemes, which allow them to leave trees standing in their forests while receiving compensation for the lost income they would otherwise have gained from timber sales.

Compensation is also paid for tailored forest management measures to enhance biodiversity in specific sites, selected for features such as natural springs and streams, mature trees, nutrient-rich soils or abundance of decaying wood.

Experts from Helsinki University have devised a tool known as Zonation, which applies GPS data on a wide range of ecological parameters to target the most valuable sites, enhancing the connectivity of protected areas to establish 'green corridors'. The Zonation tool has been piloted in the South Savo region with favourable results.

New climate of collaboration

By replacing a top-down approach to forest protection with a bottom-up approach, METSO has successfully built up a climate of cooperation between landown-

Image: Hernan Patiño

Petri Mattus's reindeer graze freely in forests near Inari in Finnish Lapland during the winter. Finland's forest policies are shaped to ensure the preservation of the traditional reindeer-herding livelihood of the Sámi, Europe's only indigenous people

Image: Kare Liimatainen

Finns readily take advantage of their legal right of access to all forests for recreational purposes such as harvesting natural products including wild berries and mushrooms

ers, the authorities and environmental NGOs, in stark contrast to the conflicts that earlier arose in Finland in relation to compulsory conservation programmes such as Natura 2000. Forest owners particularly appreciate the chance to maintain their property rights while receiving fair compensation for their participation in conservation initiatives.

The METSO programme for 2008-2016 is based on an earlier pilot programme that gained the backing of stakeholders ranging from landowners' associations to environmental NGOs. The new Finnish government plans to spend 40-50 million euros annually to enable the METSO programme to protect forest biodiversity and support related research work. The programme's groundbreaking approach to forest protection has attracted interest in other countries where social acceptability represents a potential barrier to nature conservation schemes.

Protecting state-owned forests

The METSO programme finances measures to protect and enhance biodiversity in state-owned forests administered by Metsähallitus. This government agency operates as a commercial forestry concern while also striving to conserve nature and provide free recreational facilities in state-owned lands, including Finland's 36 national parks.

Metsähallitus recently issued new environmental forestry guidelines to be followed in state-owned forests. Produced through collaboration with WWF Finland, the guidelines emphasize measures to safeguard ecosystem services, including biodiversity, carbon sequestration, nutrient cycles, water protection, flood prevention and recreational amenity values, as well as the production of wood and other forest products.

In the Inari region of Finnish Lapland, Metsähallitus recently resolved a serious conflict by defining new logging limits acceptable to environmental NGOs and associations of reindeer-herders, whose animals require mature forests for winter grazing.

A favourable future

One important indicator of the sustainability of forest management across Finland is the fact that 95 per cent of the country's commercially managed forests are independently certified under the PEFC Finland scheme. The Forest Stewardship Council (FSC) forest certification scheme, preferred by many NGOs, is also beginning to gain ground.

The State of Finland's Forests 2011 report attests that 'The state of Finland's forests has improved over the past 20 years. Forests, forest bioproducts and ecosystem services are estimated to continue to form an important part of Finland's national economy in preparing to alleviate the impact of climate change and to produce well-being services for citizens'. This report is based on Finland's national criteria and indicators for sustainable forest management, which are in turn derived from the Forest Europe process.

Finland's growing forests will undoubtedly play a crucial role in efforts to achieve Finland's longer-term strategic policy goal of building a socially, economically and ecologically sustainable bioeconomy by 2050.

Investing in sustainable timberland: returns, environmental and social benefits, bioenergy and forest fuel

Reinhold Glauner, WaKa - Forest Investment Services AG, Winterthur, Switzerland

Forests have always provided and will continue to provide a major livelihood for people. Their environmental services and their function for providing goods are undisputed. However, beyond direct benefits, for example the provision of food, shelter and firewood and the economic functions of forests at local or global scale, opinions often strongly divert.[1]

Textbooks addressing the question 'What is the economic value of a forest?' could fill bookshelves. Values have been assigned for environmental services such as recreation, erosion protection, carbon stocks and sequestration and biodiversity. Even birds and individual trees have been assigned values. However, forest owners could rarely ever achieve these values in monetary terms. More tangible figures exists when it comes to land and timber values. Again, forestry experts are not in total agreement but volatility is much smaller and documented through concrete market deals when forests change ownership.

The histories of humans and forests are strongly interlinked and hunter-gatherers began to influence forest development 50,000 years ago. The evolution of agriculture some 10,000 years ago was a quantum leap in the development of the human race, and influence on forests was even stronger. One does not need to go far back in time: The Middle Ages deforested Germany to

Image: R. Glauner

Forest investments create skilled labour (FSC-certified investment in natural forests in Brazil)

Image: R. Glauner

Nurseries are the basis for carbon sequestration with forest plantations creating jobs in rural areas (FSC-certified nursery for *Acacia mangium* in Brazil)

Image: R. Glauner

Residual timber, here small branches and needles from pines in China, contributes to energy supply (China)

Image: R. Glauner

Investments in downstream processing combine traditional handicrafts skills with new technology (Teak processing in Thailand)

an extremely low level (now around 30 per cent) and after the war, reparation payments were partly made with timber.

Compared to the long coexistence and co-development of forests and people, the forest investment industry is very young.[2] Only recently, about 20 years ago, have forests been subject to an industry that purchases, manages and sells forest properties at a commercial and business scale. Market participants are pension funds, endowments, foundations, insurance companies and high net worth family offices, so-called institutional investors. These are investing increasing financial resources in forests and forestry activities. It is estimated that around US$50 billion[3] worth of forests are held by those institutional investors, most of which (80 per cent) are in the United States. Figures on the global market size are vague, however estimates suggest it to be in the vicinity of US$300 billion[4] to US$467 billion.[5] The trend to invest in forestry outside the US is strong and KPMG suggests that major areas of interest are emerging markets in Brazil and New Zealand (over 50 per cent of investors). Australia, Chile, China, India, Malaysia, Russia and South Africa attract attention (between 15 and 50 per cent of investors), whereas Uruguay, Indonesia and Viet Nam receive less attention (less than 33 per cent together).

The gap between potential and actual market size is wide. Many countries in the developing world expect an influx of funds into their forestry businesses and prepare for this by providing political opportunities and taking care of financial and legal stability. However, the time between sourcing investments and beneficiaries is long and volatile global financial markets are not likely to shorten this. Although institutional investors increasingly tend to prefer real assets like land, forests or other natural resources, their traditional interconnection with stock markets can only be dissolved in the medium term.

Despite the wait for greater funds to flow into forests outside the US, the question remains whether forest ownership or land lease in developing countries by international investors is a threat or a benefit. Brazil for example, in its efforts to slow land-grabbing, recently released a law that complicates land ownership by foreigners. African and Asian countries, where ownership is even disputed between governments and local people, need to come up with implementable concepts for conflict solution. A 2011 study by FAO pointed out that legal security is of the utmost importance to investors. The opportunity to attract investments may further contribute to legal transparency and security in recipient countries.

Investment in timberland can be through direct investments by investors themselves. More likely however, is the strategy to channel funds through highly specialized investment managers, in the US generally called Timberland Investment Management Organizations (TIMOs). Hancock Timber Resource Group for example, a large US-based TIMO, holds assets in forestry of around US$9 billion in the United States, Canada, Australia, New Zealand and Brazil (December 2010), and recently acquired a 200,000 hectares plantation licence in Australia. Similarly,

Image: R. Glauner

Weeding forest plantations is creating jobs, particularly for rural women as seen in a teak forest in Thailand

Image: R. Glauner

Forest investments are ideal training grounds for local and foreign student (Brazil)

the International Woodland Company in Denmark holds US$2.5 billion under management, distributed to the US (45 per cent), South America (33 per cent), Oceania (10 per cent), Europe (8 per cent) and new markets (4 per cent). The latter figure shows the level of funds flowing into these markets. However, 4 per cent of a total of US$50 billion equals US$2 billion. Compared to the vast available areas in developing countries, this is a drop in the ocean.

Forest investments have one dominant objective: commercial and competitive production of timber for sawn wood or pulp for local and international markets. While investments in conifers prevail in northern countries, *eucalypts*, pines, teak, and *acacias* are common in the south. Investment horizons rarely exceed ten years and commonly lie at minimum around US$10 million for one deal. Besides those funds channelled through investment managers in US$10 million parcels, there is a growing number of smaller projects, where private individuals buy land or shares of companies that plant trees at a much smaller scale. Particularly in Europe, a vast number of these providers offer investments in trees, mainly high-value plantations. Teak dominates the market, as timber prices rise steadily.[6] Marketing costs however are high and due at the beginning of the investment period and trees have to produce interest on them over timespans of up to twenty years. Thus, there are not only success stories but also failures. Investors lost considerable amounts because projects were short of maintenance costs for subsequent years after planting and had to be sold cheaply, or investors had to pump in additional money.

Does money from forest investors actually reach the people on the ground? Does it contribute to social development and parity in rural areas? And is the approach of investing in forestry on a commercial basis sustainable?

There are many positive examples but also exceptions to those. However, in general, positive answers can be given to all these questions. A study by FAO has revealed that sustainability is a major concern to the forestry investment community. They might not be primarily concerned with two of three pillars of sustainability, the social and environmental aspects, but the third pillar, economic, is their field of expertise. And there is one common lesson learned in many development projects: without sustainable economics, other values such as social and environmental benefits cannot be sustained.

Forest investment projects create monetary value in rural areas, where it did not previously exist before. The sustainable management of a natural forest significantly contributes to forest conservation in many terms, including area, biodiversity and environmental services. Employment is created in rural areas and people receive training and education, as many commercial projects see a tremendous benefit in having literate and educated staff. Rural schools and health stations normally follow the first wave of development, when forest workers bring their families to settlements around forest camps and saw mills. The establishment of planted forests equally contributes to rural development. Forest plantations are often established in formerly deforested grassland areas, which are of only marginal monetary benefit

Image: R. Glauner

Forest investments and food production are not mutually exclusive, as in this example of teak combined with sweet corn in a private investment in Ghana

Image: R. Glauner

Planned implementation of forest investments is the basis for sustainable forest management and provides opportunities for cross-border and cross-gender communication (Ghana)

to local people. Often degraded soils, fires, and erosion adversely affect income-generating production opportunities. People migrate away from these areas and seek their fortune in cities. Timberland investments can counteract this tendency by creating employment opportunities in these areas.

However, such investments have a political dimension too that needs to be carefully considered. Investors will remain business-oriented and will never become donors or come bearing gifts. Despite all social and environmental responsibility, investment managers are accountable for increasing the funds of investors. Their expectations are not high compared to expected returns on the stock markets, so the financial crisis has improved the relative attractiveness of timberland investments. Nevertheless, TIMOs have achieved returns between 8 and 12 per cent per annum before fees and taxes in nominal terms. Smaller investment projects also offer these terms, sometimes even higher. This in turn means that money is returned to investors and a limited amount will be available to sustainably flow to the vicinity and surroundings of the geographical investment area. The political dimension also requires that local populations render land as title or lease and consequently lose control – temporary or permanently. In the agriculture investment business this fact is even more prominent and land grabbing contributes to the global food crisis and increasing food prices. The fact that developed countries process foodstuffs — often produced in third world countries — to bioenergy further adds to this controversial discussion.

Land grabbing for forestry is not yet a point for discussion as forestry activities are normally restricted to soils unsuitable for agriculture or to steep lands. Local governments and rural communities see forest investments as providing extremely positive momentum, contributing to sustainable development in remote areas. The adverse effects of forest depletion, forest clearing and soil degradation can be slowed down or even reversed when forests are attributed with tradable commercial values. Rural timber industries can be developed and the use of residual timber can attenuate fuel shortages. The timberland investment industries and responsible investors can contribute to these positive effects in a world where government funds are becoming scarce and are channelled increasingly to high-debt regions in Europe or the US. However, industries have to adapt to market particularities in developing countries, accepting smaller dimensions, longer terms and higher risk-return ratios and taking higher levels of social responsibility. Investment managers and investors cannot do this alone; they are not development specialists and probably won't become them. They should get the assistance of development agencies and banks to reverse forest losses and migration to cities. These agencies in turn have to realize that money from investors is not a bad thing and that it can contribute to sustainable development. Rural areas need more attention as food and fibres are produced. They are the backbone of every society and forests and their products and services play a major role in their further development.

Obeying nature: forest management in Slovenia

Aleksander Golob, Senior Advisor, Slovenian Ministry of Agriculture, Forestry and Food

People have long been aware of their dependence on nature. Civilizations that exceeded the carrying capacity of their ecosystems usually declined, to be substituted by those better adapted to their natural environment. Observing nature's response to man's action has always been a key to successful development. Francis Bacon's statement "Nature, to be commanded, must be obeyed" is today as relevant as ever, in the face of environmental changes which will become more severe if the human footprint is not considerably reduced.

In Slovenia, landowners and foresters have always had a good reason to obey nature before commanding it. Although a small country, Slovenia is characterized by a variety of landscapes, including Mediterranean, Alpine, mountainous, hilly and, to a minor extent, also lowland landscapes, comprised both of calcareous and non-calcareous bedrock. They are accompanied by natural threats, such as strong winds, heavy rains, flooding, avalanches, snow and ice-breaks, as well as droughts, the frequency and seriousness of which have intensified in recent decades. Adapting land management practices to such variable conditions has usually not only been a key to success, but also, in many cases, to bare survival.

In Slovenia, forests cover close to 60 per cent of land surface. For Europe, this is a relatively high share, a consequence of a cognitive land management approach

Protection function of forests in the Alps was recognized by authorities several centuries ago

that lasted for centuries, where not only the suitability of land for agriculture had been taken into account, but probably even to a higher degree the protection function and other environmental, production and even social functions that forests played in various landscapes. Many of these functions were early recognized by those authorities who were in charge of all or more frequently part of the territory of today's Slovenia. The first ordinance regulating some forest-related activities dates back to 1406, while the first request for sustainable forest management was issued by the Austrian Empress Maria Theresa in 1771.

In parallel with the aim of ordinances to ensure the sustainability of the protection function of forests, many forest owners became concerned about the sustainability of wood supply and income from forests. In 1770 the first forest management plan to meet these concerns was drawn up for Trnovo forests and soon others followed.

The second half of the 19th and the beginning of the 20th century were particularly important in terms of the contribution of foresters in Slovenia to the development of sustainable forest management in a broader sense. The first achievement, which won a 'Grand Prix' at the Paris World Exhibition of 1900, was the successful afforestation of the region of Karst, which had been a rocky desert for centuries. Another was the unique selection system of forest management, adapted to harsh Karstic conditions, which Leopold Hufnagl developed and brought into practice through his forest management plan for the Kočevje region of 1892. It contained a provision, important from the nature conservation perspective, that several areas should be left to natural development only and no felling should take place. The third achievement was the combination of forest management planning, monitoring and verification, which was developed in 1906 in the Postojna region by Heinrich Schollmayer. The essence of this system was to determine the level of allowable cut of a management unit for a planning period on the basis of increment calculated as a difference between the change in growing stock in the previous planning period and the amount of timber harvested in the reference period. Growing stock was estimated by measuring all trees above 10 cm at chest height and the amount of harvesting was duly noted for every compartment. The main principles of this approach have spread throughout the country and are still applied in forest management planning in Slovenia although, for the estimation of growing stock, permanent sample plots are now used.

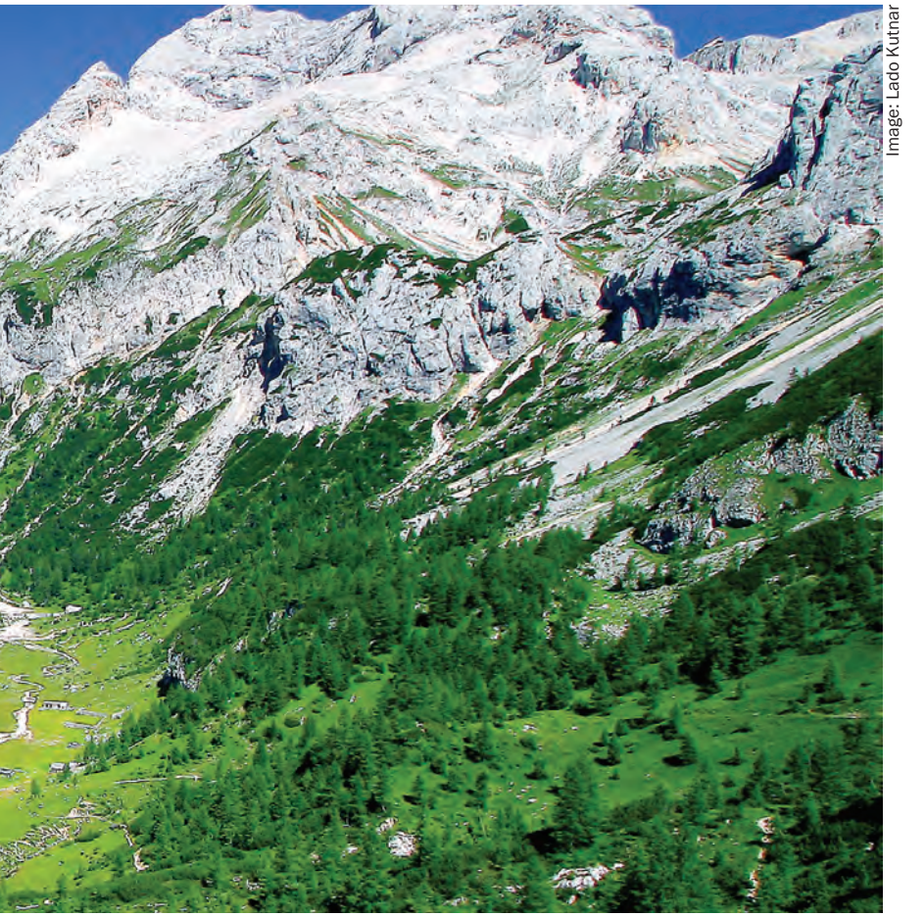


Image: Lado Kutnar

The former Yugoslavia adopted the Forest Act in 1947, which contributed to improvement of forests — especially through the prohibition of clear-cutting and goat pasturing as well as the requirement that forest management activities are based on forest management plans. A clear orientation towards close-to-nature forest management began in the 1950s with Professor Dušan Mlinšek who, in collaboration with Swiss Professor Hans Leibundgut and some other professors of silviculture from Middle Europe, developed close-to-nature forest management theory further and introduced it into practice. Mlinšek's work did not remain unnoticed in the world forestry community and he became the head of the International Union of Forest Research Organizations (IUFRO). The result was the organization of the IUFRO Forestry Congress in Ljubljana in 1986 and the establishment of ProSilva Europe, an international association for close-to-nature forest management, in Robanov kot, Slovenia, in 1989. These international events gave impetus to the quality of work of the Slovenian educational and research institutions, the Department of Forestry of the Biotechnical faculty, the Slovenian Forestry Research Institute and the Forestry Secondary School and Training Centre.

After independence, Slovenia adopted the Forest Act of 1993, the aim of which is to ensure sustainable, close-to-nature and multi-purpose management of forests, long-term and optimal functioning of forests as ecosystems, and to enable their functions. The Forest Act, the decisive elements of which have so far remained unchanged, does not only represent the continuity of traditional forest policy supporting sustainable and close-to-nature forest management, influenced by the UN Forest Principles, but also contains some original approaches in order to meet the requirements of the market economy.

The basic provision concerning sustainable forest management which is derived from the Constitution of the Republic of Slovenia and is particularly important because of the predominant share of private ownership (78 per cent of forests in Slovenia are owned by 400,000 private forest owners) is that rights of

Image: Lado Kutnar

Close-to-nature forest management mimics natural structures and processes, which are studied in remnants of primary forests

forest ownership shall be exercised in such a manner as to ensure their ecological, social and productive functions. According to the Forest Act, the owner of a forest must therefore manage the forest in accordance with regulations, management plans and administrative decisions. They must also allow free access to and movement in the forest to others and allow beekeeping, hunting and the recreational gathering of fruits, herbs, mushrooms and wild animals in accordance with regulations.

The National Forest Programme (NFP) and plans for forest management represent important prerequisites for achieving the aims of the Forest Act. The Forest Act stipulates that they shall be aimed at finding the balance between the preservation of natural stands, production of timber and provision of all other benefits society expects from the forests, in line with the general orientation towards close-to-nature forest management. They also have to contain measures for successful natural regeneration of stands and enhancement of resistance of forests to various disturbances, and have to take appropriate advantage of natural productivity of forest sites.

The forest planning system consists of four levels: national, regional, management unit and stand. The levels are very much interrelated in the sense that upper levels take into account lower levels and vice versa. The system also represents a cognitive approach to forest management, where reactions of the structure of the forests to management activities are periodically and systematically observed in order to achieve the optimum ratio between inputs and outputs from the forest ecosystems in terms of all their economic, environmental and social functions. On every level, the model of the plan-do-check-act cycle is applied, where 'plan' means setting objectives, guidelines and measures for achieving the objectives, 'do' means simply execution of the planned activities, 'check' means analysis of the effectiveness of the measures in relation to the objectives set in the plan and 'act' means setting new, corrected objectives for the next planning period. The planning periods for regional and management unit plans are ten years, while the NFP and operational level plans are renewed when the 'check' phase shows the objectives and guidelines might not be appropriate any more.

The participation of stakeholders is crucial for the effectiveness of the forest planning system. On the national and regional levels, stakeholders are more numerous, while on the management unit and stand level, stakeholders are mainly forest owners. According to the Forest Act, they have the right to participate in the procedures for adopting forest management and wildlife management plans and in the preparation of forest silviculture plans. Their needs, proposals and requests have to be respected as much as possible and must be consistent with ecosystemic and legal restrictions.

Image: Lado Kutnar

Forested landscapes are widely visited for recreation

So far, the Slovenian Parliament has already adopted two NFPs, in 1996 and in 2007. In both cases, the reference lines for discussion with stakeholders have been the EU forest-related policy and international commitments, especially the United Nations environmental conventions UNFCCC and CBD, as well as non-legally binding commitments of the UNFF and Forest Europe, in addition to the analysis of the situation in the domestic forest sector. All the sectors that are most relevant for creating forest policy, such as environment, agriculture and rural development, wood-based industries and tourism, collaborated actively with forest owners and forestry education and research organizations. The result is a balanced set of objectives and guidelines covering all aspects of sustainable, multifunctional and close-to-nature forestry, including management of forest-related wildlife. The guidelines have to be respected in forest management plans.

Forest management plans for regional units, comprising around 100,000 hectares, and management units, comprising around 5,000 hectares, have been created for the whole country every ten years since 1970 and for some management units continuously even since the beginning of the 20th century. The main purpose of the plans is to define optimal management of forests on the level of management classes and compartments, including the setting of allowable cut and forest protection and silviculture measures. The management classes are formed on the basis of phytocenological maps and maps showing the importance of forest functions, such as soil and water protection, biodiversity, recreation and tourism and education as well as production of wood and non-wood forest products. The decisions contained in the plans are based on data gathered on the national grid of permanent sampling plots on which mainly internationally agreed parameters are measured. Forest monitoring thus represents just one important element of the planning process.

Silviculture plans are created to implement measures of the forest management plans on the stand level. They are particularly important for the setting of site-adapted guidelines and for ensuring the proper implementation of silvicultural activities, including rejuvenation, tending and forest protection. Based on the plans and after common selection of trees for felling, the Slovenian Forest Service (SFS) issues administrative orders, which have two functions: as licences to forest owners, which are required before any harvesting takes place, and requirements to carry out activities for regeneration, protection and tending of young stands.

Together with the Slovenian Forestry Research Institute, the SFS forms the public forestry service which is financed from the national budget. It monitors the state and development of forests and keeps records and databases concerning forestry, draws up plans for managing forest, cares for the protection of forests and the building and maintenance of forest roads, provides seedlings of tree species of suitable origin and quality,

Image: Lado Kutnar

Biodiversity conservation is integrated in management decisions

offers consulting services and training to private forest owners and controls the quality of activities in the forest if they have been co-financed from the national budget. In particular, these activities include silviculture and protective activities, as well as activities for maintaining the habitat of wild animals in private-owned forests, measures for the prevention of forest fires, building and maintaining forest roads as well as the restoration of forests damaged by fires and natural disturbances. Some of these activities are also co-financed from the European Agricultural Fund for Rural Development.

Other provisions of the Forest Act regulate forest protection, silviculture and exploitation of forests. Among them, there is also the prohibition of clear cutting as a form of forest management. The implementation of the Act is supervised by the Forestry Inspectorate.

It has so far not been identified whether the regulatory and institutional framework requires any major changes to be able to continue sustainable forest management in Slovenia. However, in the context of the national budgetary restrictions as well as the EU, pan-European and global forest-related commitments, forest policy in Slovenia will have to find ways to better address challenges and fulfil future expectations, particularly: activating management of private forests, transferring more responsibility for sustainable forest management from the State to forest owners, improvement of competitiveness of the forest sector, maintenance and enhancement of health and resilience of forests in conditions of climate change, conservation of forest biodiversity with active management and development as well as marketing of ecosystem services and non-wood forest products. We believe that these expectations can well be met following the principles of close-to-nature forest management and through the fostering of coordination and communication among forest owners, other sectors and groups that have interests in forests, as well as most important decision makers. The United Nations International Year of Forests, 2011, with the theme Forests for People, contributes excellently to improving the participation of all those involved in meeting forest-related expectations of today and future.

A national forest programme run for people and by people

José M. Solano, Head of Forest Planning and Management,
Ministry of Environment and Rural and Marine Affairs, Spain

As a consequence of the great changes that Spain experienced after the introduction of the 1978 Constitution, its national forest policy was revised. Spain had a considerable number of international commitments associated with the Resolutions of the Ministerial Conferences for the Protection of Forests in Europe (now Forest Europe), in addition to those arising from joining the European Union in 1986. Spain was also involved in environmental United Nations forums that grew out of the Río de Janeiro Summit, including the Forest Principles and related Intergovernmental Panel on Forests (IPF) and Intergovernmental Forum on Forests (IFF) proposals for action on biodiversity, climate and desertification.

The Spanish forest sector was maturing, with more private companies and mechanization on the rise. Consciousness-raising about the value of the environment and the public's support for protection of natural resources resulted in high demand on the forests for a large variety of goods and services. Under these conditions, there was a need for a less interventionist forest policy.

Image: BDN

Dehesa, a typical Mediterranean forest

The new national governance structure that accompanied the 1978 Constitution resulted in Spain moving from being one of the most centralized countries in Europe to one of the least. The 17 Autonomous Governments are competent in forest management, leaving on the national level the coordination of forest policies, national level planning and international relations in this sector. A lengthy process to transfer public forest management, materials and human resources to the new regional governments ended in 1985.

The National Forest Service started the process of defining a new forest policy for Spain that would take into account the new conditions and also allow for a phenomenon new to Spain: public participation. The decision was taken to phase in the changes, starting with a general consensus resulting in a binding Spanish Forest Strategy document that would allow the later inclusion of a Spanish Forest Plan and also a new Forest Law.

Strategy for sustainability

The value of the Spanish Forest Strategy is that it was intended from the beginning to reflect a national consensus among all actors related to forests. The process started in 1996, but at that time there were difficulties concerning public participation, as the former political system did not allow for public participation. There were not even lists of stakeholders available, giving the planning team the long and tedious job of identifying relevant individuals and organizations. When a new stakeholder was contacted, other prospects were often introduced. As a result of this process, after some months a list of more than 900 stakeholders was available.

While the Spanish pulp, paper, particle and fibreboard industries had strong and well-structured associations, less capital-intensive businesses such as saw mills and furniture manufacturers were mainly very small and often family-run, with a very low degree of organization. There were some forest owners' associations, but the many small, mostly local or regional associations were unable to speak with one voice. Professionals were very weakly united and trade unions were not well represented. Environmentalists worked with two main groups of international origin (Greenpeace and WWF) but there were thousands of small local and special-

Image: BDN

Water and forest interaction

ized groups forming almost daily. Another problem was that there was no institution that could represent the rural and forest-based municipalities. Some organizations were not able to sit at the same table with others, or tended to flag old issues independent of what was on the meeting agenda.

All these circumstances led to the development of a completely new system to achieve consensus. Firstly all known stakeholders were divided into three groups: administrative organizations such as ministries, regional forest services and municipalities. Sector groups included forest owners, communal forest associations, industries, contractors, importers, retailers and other economic actors. All the others were integrated in a social group, including forest professionals, education and training institutions, research institutions, environmentalists, consumers and trade unions.

A first draft was discussed in the three groups and all those attending were asked to give their comments in writing. During the process, many of those involved in the first round, particularly from the social group, felt it was not relevant to their institutions, so they abandoned the process.

A new draft was generated, reflecting most of stakeholders' requirements. There were eight concrete issues on which opinions were divergent. To find solutions for these issues, antagonists sat at the same table for the first time. Groups were formulated to include at least three participants — to avoid 'one against one' situations — and with a clear focus on the issues to be discussed.

Finally, the last two or three paragraphs on which differing opinions existed were resolved in a special meeting of dissenting parties with a strong facilitator, and the text was drafted. The Strategy was finally born two years after its inception and was presented to the public by the Minister of Environment at the beginning of 2000.

The Strategy document provides an overview of forests and the forest sector, analysing and explaining the main problems and challenges for Spanish forests and also for the associated economic sector. It also presents a vision for forests in Spain and outlines long-term objectives although it only briefly touches on how and when these problems should be solved.

But the real benefit of this process was not so much the final document as the changes in the sector that have been driven by it. There has been very fluid communication among stakeholders and governmental institutions, based on mutual confidence that has facilitated later work. Communication with other governmental departments has commenced and in particular, the relationship with regional forest services has improved substantially. The spirit today is that we all have a common objective and must cooperate to reach it. Another effect was the restructuring of the forest sector. New and larger associations have been created and today there are unique counterparts for almost every cluster of the sector. Finally, the model of participation has changed, as all stakeholders agreed on the need for an institutionalized participation council.

As immediate and practical consequences of the Strategy, we can mention new tax legislation for forests that is more favourable for owners. Also, the creation by Royal Decree of the National Council of Forests is a major step forward. A national standard for sustainable forest management was approved and Spanish versions of the Resolutions of Forests Europe and the Mediterranean Forests Management Declaration were published.

A plan for sustainability of forests

The Spanish Forest Plan was drafted following the establishment of the Strategy. It formed part of the electoral

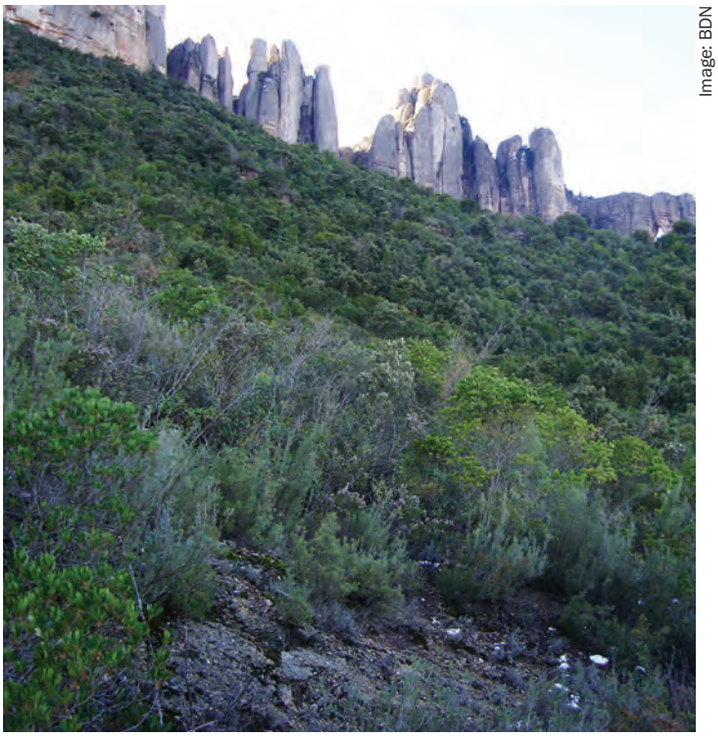


Image: BDN

In Spain there are some forests with no trees

programme with which the Government won the general election of 2000, so a very strong direction was applied from the political level to the planning team. Finally a draft was presented to the 64 members of the National Forest Council in its first meeting in January 2002. This participatory institution included all the parties mentioned above.

From 30 papers received while drafting the plan, 581 concrete statements were extracted and organized in a database, of which 40 were general statements on issues not covered by the plan. A further 312 were accepted for inclusion in the draft, while 119 were rejected, either because they did not fall within the scope of a national planning instrument or because they did not fit in with the spirit of the Strategy. The remaining 110 allegations were tabled for discussion in a Council meeting, which considered three issues: how the policy should deal with privately owned forests, matters regarding production and productivity and the cost and budget of the Plan itself. Debates on these issues took place in two sessions, and after formal approval by the Council and by the coordination system with the regional governments, the Government gave its formal approval to the Spanish Forest Plan at the beginning of July. This planning was considered flexible enough to allow regional policies to be developed, while setting common objectives for all of them in an inclusive manner, demonstrating equity and proportionality to foster cohesion between territories.

A legal framework for sustainability

The existing Spanish forest legislation dating back to 1957 was retained as the basis for a new and more political act. A draft of the new law was updated while changes were made to the Forest Plan, as its main purpose was to translate the elements of the Plan into legal language.

A draft of the new Forests Act was provided on 9 January 2003 to the members of the National Forest Council and on this occasion 43 comments were received, with more than 1,200 questions raised about the legal text. The process tested with the Plan was repeated, trying to address as many of these issues as possible. Two more drafts were discussed, with many compromise solutions suggested. Finally, on 24 February, with 37 votes for, 3 against and 10 abstentions, the Council approved the final text. The entire process took only 6 weeks.

The final text was immediately sent to the Government, which, following legal consultations, approved it as 'legislative project' on 21 March — World Forest Day — and sent it to Parliament. It was modified in both legislative chambers and finally signed by the King on 21 November. In a fitting finale to this crucial piece of legislation, it was the last act approved in the legislature before Parliament was dissolved.

The example of Navarra

In the Foral Community of Navarra in Northern Spain, 64 per cent of the million hectares of land consists of forests, with 24 per cent growth in the last 20 years. As in the rest of Spain, this region experiences high climatic diversity, so it is well suited to pilot projects.

The Forest Service in Navarra decided to modify the legal scheme for forest planning that was in force in the rest of Spain and to create a system more suited to its own forests. The methodology for elaboration of planning documents was radically changed, including all uses, resources and values of the forest, analysing their compatibilities and setting different objectives for each part of the tree-covered areas, shrub areas and pastures. In addition, requirements for habitat and species conservation were integrated.

Relationships among trees, cattle, protected species and other resources and values were integrated in the planning instrument with a view to creating a more flexible planning system to ensure natural regeneration. There was also a substantial decrease in the price of the instrument itself and an increase in its potential to be applied to smaller forests.

At the same time, procedures for the active participation of owners (mainly municipalities) were set in place, making them more involved in forest planning, improving tender procedures by demanding applicants have knowledge of the territory and its conditions and that they work in multidisciplinary teams. This resulted in the creation of local technical teams that today continue advising forest owners on technical matters.

During these years, there have been continuous updates to the scheme, both as a consequence of its implementation and due to emerging situations, such as those related to forest certification. Nowadays indicators of sustainability for the two main certification schemes present in Spain (Programme for the Endorsement of Forest Certification and Forest Stewardship Council) are included in the planning instruments, allowing the owner voluntarily to join either or both of them. Simpler instruments have also been introduced for small privately owned forests.

As a consequence, today more than 60 per cent of forest land benefits from a planning instrument (the average in Spain is about 12 per cent) and 43 per cent is certified, with 84 per cent of regional timber being certified. It must be said that these figures reflect true management as the Forest Service verifies the data, which are accepted by all those involved.

National forest policy and programme development in Serbia

Predrag Jović, National Forest Programme Focal Point and Dr Saša Orlović, Director, Ministry of Agriculture, Trade, Forestry and Water Management of Serbia — Directorate of Forests

A national inventory of Serbia's forests undertaken in 2008 showed that the country's forests account for 29.1 per cent of the territory. The total area occupied by forests is 2,252,400 ha, with natural forests covering 621,000 ha (27.6 per cent), coppice type forests on 1,465,400 ha (64.6 per cent) and 174,800 ha (7.8 per cent) accounted for by forest plantations. Other cultivated land occupies 382,400 ha. The total area of forests and forest-related land is 2,634,800 ha.

The total afforestation level of 29.1 per cent falls short of the optimal percentage of 41.4 per cent to which Serbia aspires. In addition, the volume (161 m^3) and volume increment per ha (4 m^3) are regarded as insufficient. Almost two thirds of forests are coppice type and conservation is lacking (there are 608,000 ha of dispersed forests and 55,200 ha of devastated forests across 29 per cent of the forest area). Age distribution in the natural forests is also very unfavourable (38 per cent young, 20 per cent middle aged, 13 per cent mature and 29 per cent overmatured). In coppice forests, the respective percentages are 51 per cent young, 33 per cent middle aged, 7 per cent mature and 9 per cent overmatured).

Image: MATFW Serbia

Private forest owners' association in the village of Rastiste (Mt. Tara, Western Serbia)

Planned natural regeneration has not occurred in significant parts of the high forests covering an area of 268,000 ha, and poor health conditions prevail, especially in terms of chronic decay of oak forests. Other problems include unbalanced volumes of wood, forests affected by proximity to roads at a level of 11.86 metres per hectare, and poor utilization of potential benefits of forests such as non-wood forest products and biomass production.

State forests represent 53 per cent (1,194,000 ha) and private forests 47 per cent (1,058,400 ha) of the total ownership of forests. Small private forests represent a significant problem for efficient forest management under the current forest policy. The estimated number of private forest owners (PFOs) is 900,000 and forest property size per owner is approximately 1.27 ha with 3,900,000 parcels of an average size of 0.30 ha. More than 72 per cent of owners have properties smaller than 1 ha, 26 per cent own property between 1 and 10 ha, and only 2 per cent of forest owners have forest properties larger than 10 ha.

In sum, the private forest sector in Serbia is characterized by high fragmentation of properties, a large number of parcels and owners, and insufficient organization of forest management. Whatever their size, the significant timber volume and annual increments in privately owned forests are similar to those of the state forests, emphasizing their importance as a resource.

State policy measures stimulate PFOs to organize themselves in local owners' associations in order to achieve their mutual and individual goals. In addition, the national association (created in 2010) needs to act as a strong body across a wider area in order to establish cooperation regarding the key concepts and measures of forest policy and to provide technical support to the activities of local associations.

Numerous workshops for PFOs during the development of the Forestry Development Strategy and National Forest Programme (28 workshops in total) have resulted in increased interest in working together. From 2006, private forest owners' associations (PFOAs) were formed in different parts of Serbia and today there are 17 such organizations. Individual owners manage their own forests, while the association coordinates joint activities such as forest infrastructure and joint marketing activi-

Image: MATFW Serbia

Charcoal production provides a valuable source of income for private forest owners in Eastern Serbia

ties. Training and cooperation with other associations and institutions is carried out jointly.

It is expected that further development of PFOAs will eventually lead to the establishment of forest management associations. The PFOA in Podgorac is considering this possibility and has made progress with efforts to develop a forest management plan for the whole associated forest area.

Even though all the existing PFOAs have only been in existence for the past several years, some of them, such as those in Eastern Serbia, already represent a good example to other associations and unorganized forest owners. They perform the following activities:

- Representation of the members' interests
- Joint work on forest infrastructure
- Joint forest management
- Joint marketing of forest products.

This association has 49 members who own 510 ha of forests. They are active in charcoal production, timber trade and services in state forest harvesting as contractors to the public enterprise '*Srbijasume*'. Representatives of these PFOAs have participated in preparing the Forest Development Strategy of the Republic of Serbia and the National PEFC standard. They have also applied for state financial incentives for forest road construction and training for their members.

Other associations are less active at the moment. Some have been established but their members are experiencing communication problems regarding their activities, while others are building on the experience of the successful PFOAs in Eastern Serbia and cooperating with them.

In order to enable PFOs to practise sustainable management in compliance with regulations and their own economic interests, there is a need for state support to organize activities aimed at advising and educating forest owners.

The public forest service (PFS) has the authority to conduct programmes of advisory support. Activities include motivating forest owners; providing professional and administrative support to PFOAs; training forest owners' and associations' members in sustainable management; and training PFOs and their associations for qualified safety work in their forests. The basic goal of the service is to establish and develop small and medium enterprises in forestry, in turn increasing the share of the forest sector in the economic and social development of the Republic of Serbia.

Extensive development of the SME sector in Serbia had occurred by 2001 when, in the process of restructuring PE *Srbijasume*, staff reductions took place and former employees were offered the chance to participate in a social programme to establish SMEs in forest utilization, working as contractors for the PE.

Within the framework of the Forest Sector Development in Serbia project, marketing analysis and development methodology has been tested as a possible approach for the forest advisory service, with the purpose of identifying possibilities for the establishment and work of SMEs in forestry. Support for SMEs through financial incentives given to PFOs and their associations is an ongoing process and represents a significant field for development of services in forestry, in particular the private forest sector.

The forest development strategy adopted by the Government of Serbia in 2006 defined the main goals and measures for forests and the forestry sector in general and provides a good framework for the development of the Forest Law and National Forest Development Programme 2011-2020. The strategy defines the roles of the various stakeholders with a special emphasis on private forests and forestry, as well as the roles of neighbouring sectors and their institutions, cross-sectoral and international cooperation, forestry education, research and development and participation.

Based on the requirements of the strategy, a new Forest Law was adopted in 2010. Public interest in forests is

Image: MATFW Serbia

Community participation is key to evolving the Forest Development Strategy

clearly defined through activities such as 'establishing and maintaining special services for private forests, while continuously supporting PFOs and PFOAs' as well as setting up a Forest Fund as a main source for financing forestry activities linked to the development programme.

Institutional reform, based on the Forest Law, comprises:

- Redefinition of roles and responsibilities at all levels and of relations between institutions
- Increased share of the private sector in providing goods and services
- Development and strengthening of capacities in the NGO sector, institutions and organizations at the local level
- Definition of forestry's role in rural development and transparency.

In the framework of redefining roles and responsibilities, the significance of the private sector is emphasized, with special attention to the development of adequate advisory services for PFOs.

The previous model of support to PFOs through public enterprises has proved inefficient, as has the earlier approach within municipality services. Public enterprises do not have either sufficiently developed capacities for advisory support, or adequate interest in conducting activities in private forests, which is a significant problem. It was necessary to overcome existing issues related to organization and structure of employees and in services for professional and technical affairs in private forests, and to improve their capacities, either at the level of public enterprises, or via other solutions outside public enterprises. Direct financial measures of support were in most cases oriented towards the afforestation of private forest land.

Some indirect supporting measures exist in Serbia, but they are not in the form needed and are inadequate for the demands on them. The new Law on Forests will show efficiency in providing services for PFOs. Support for organizing PFOs within the Directorate of Forests is the initial phase and presently there are just 17 PFOAs with very low capacity to fulfil all the obligations arising from the new law.

According to the law, professional activities in small-scale forests can be performed by appropriately registered legal entities and entrepreneurs. Because of the large number of small-scale forest owners, it is a challenge to provide them with adequate attention from PFS, with the aim of enabling them to conduct sustainable forest management in all forests.

The total amount of financial resources for the implementation of all planned measures in the Forest Development Programme 2011-2020 over a 10-year period is nearly €900 million. The commitment of public funds needed for realization of the proposals is around €18 million (average for the whole period) for co-financing of activities in forests. In the area of financing of forestry activities, Serbian Forest Law is completely in accordance with modern tendencies. Foresters succeeded in establishing a Tax for Ecosystem Services for all legal entities that do business in Serbia in an amount of 0.025 per cent of their total income. This generates a finance source for forestry activities that is four times higher than before. The future will show whether the solutions offered in the Law and NFP are adequate for continuous development of private and forests in general.

In the forestry sector, based on the new Forest Law, organizational constraints should not exist. This observation is based on a short period of implementation of the law (adopted in May 2010, and in force from November 2010). To date, there have been no objections to the proposed solutions. This is the case especially in private forests, where much more freedom was given to PFOs and especially PFOAs in planning, utilizing and selling wood.

It is quite clear that Serbia has made a significant step towards prioritising forestry issues in general, especially with solutions that support private and state forests on equal basis. This is especially noteworthy given that, up to this point, the forestry sector has borne the entire burden of financing forestry issues alone with only small amounts of financial contributions from other sectors.

Thirty years of sustainable forest management in Africa

Ken B. Johm, Manager, Natural Resources & Environment; Olagoke Oladapo, Principal Agro Economist and Albert Mwangi, Senior Forestry Officer, African Development Bank

Forests in Africa have multi-faceted uses, incorporating economic, social and spiritual dimensions. The continent's total forest cover is estimated at 674 million hectares, accounting for 23 per cent of the land area and 17 per cent of global forest cover.[1] These forests have immense potential to contribute to the continent's social and economic development as they provide a range of ecological, economic and social services, including the protection of water and soil resources. The African Development Bank seeks to promote sustainable economic growth and reduce poverty on the continent and the forestry sector is an important contributor in achieving these goals. Forest products form the foundation of many local and national economies across the continent and provide about 6 per cent of GDP in many African countries.[2] Although most forest products are consumed domestically, forestry contributes significantly to total exports in countries like Liberia, Central Africa Republic and Cameroon.

Image: African Development Bank

Taungya teak plantations in Ghana Community Forest Management Project. Note the plantains and cocoyam food crops intercropped with the teak seedlings

The Food and Agriculture Organization of the United Nations (FAO) estimates that Africa lost 3.4 million hectares of forests per year during from 2000-2010, somewhat less than the previous decade, which saw a loss of 4.1 million hectares per year. Despite this improvement, Africa's forests are still threatened by a combination of factors, including agricultural expansion, commercial harvesting, increased fuelwood collection, inappropriate land and tree tenure regimes, uncontrolled livestock grazing, accelerated urbanization and industrialization.

The inhabitants of the African forests have over the years developed a symbiotic relationship with their immediate environment, using the local plants and animals to produce foods and medicines without harming them. Exploitation of forests by the state apparatus is the main reason that degradation has been on the increase across the continent. The felling of trees and the opening of roads on the part of forestry companies encourages poaching, which, along with the increasing demand for forest products, affects the availability of wild game and other products which are of interest to populations living on the fringes of the forests.

Sustaining forestry development in Africa

Sustainable management of African forests has always been a key agenda item for the Bank, which began interventions in the continent's forestry sector in 1978 and in 1994 adopted a forestry policy to guide its lending to the sector and to assist its Regional Member Countries (RMCs) in their efforts to arrest deforestation and environmental degradation. The policy emphasizes the need for the sustainable management of Africa's forest resources to ensure environmental protection, sustainable wood supply and a steady flow of non-wood forest products. It provides for a strategic framework to enable the Bank to play an effective role in the protection, conservation, management and sustainable use of forests in Africa. The operational guidelines for the policy were reviewed in 2010 to ensure that interventions in the sector take cognizance of emerging issues and lessons learned. To this end, forestry issues are part of the larger focus of Natural Resources Management under the current Agriculture Strategy. The Bank's policy focuses on forestry, sustainable land management (SLM) and climate change mitigation and adaptation. Interventions by the Bank will aim to improve the management of vital renewable natural resources.

Image: SAWLOG. Uganda 2007

Deforestation in Uganda

The Bank's policy supports reforestation/afforestation, rehabilitation of degraded lands, community-based management of natural forests and planted woodlots, conservation of forest resources and watershed management, especially around major river basins, as well as all other activities that mitigate the threats to the stability of the ecosystems. The strategy aims to contribute to extending the area under SLM by supporting interventions that will help in reversing land degradation trends and sustaining the productivity of the natural resource base. It also supports the maintenance of soil fertility, increased productivity per unit of resource used and the halting of practices that utilize the resource base beyond its regenerative capacity.

These interventions are playing a catalytic role in encouraging governments and other development partners to invest more in the sector. At the close of 2010, the Bank's forestry portfolio comprised 12 projects with a commitment value of UA190 million (about US$290 million). The 12 projects were located in 9 countries, namely: Benin, Burkina Faso, Burundi, Cameroon, Ghana, Kenya, Niger, Rwanda and Uganda. The focus of these projects included natural resource conservation and management, rehabilitation of degraded indigenous forests, agroforestry, community forestry and institutional capacity-building. These projects take a participatory approach and local communities have a key role in their implementation. Most of the projects are also integrated with other sectors such as agriculture and water resources. Overall, these projects are having positive impacts through the provision of wood and non-wood forest products as well as providing environmental benefits. The projects have supported more than 360,000 beneficiaries, including organized associations and groups, through training and capacity-building. Other donor agencies, non-governmental organizations and private sector operators are also working with the Bank member countries.

Countries that have benefited from the Bank's investment in forestry projects during the last thirty years include Liberia, Cote d'Ivoire, Nigeria, Togo, Mali, Burundi, Malawi, Mozambique, Cameroon, Democratic Republic of Congo, Benin, Rwanda, Ghana, Uganda, Kenya, Burkina Faso and Niger. The Bank's active portfolio currently comprises five projects with a commitment value of over US$110 million in Benin, Burkina Faso, Burundi and Kenya.

Image: SAWLOG. Uganda 2007

A private pine plantation in Uganda

Building on the positive outputs and impacts of the current portfolio of projects, the Bank's pipeline interventions are focusing on sustainable forest management at national and regional levels. These include the proposed regional interventions in the Upper Guinea Forest Ecosystem in West Africa as well as national actions to consolidate the development of forest management capacities.

In addition, the Bank has begun to generate knowledge through economic and sectoral work in order to strategically reposition the sector as an engine of economic growth in the RMCs where this could be achieved. In this regard, the Bank has undertaken a comprehensive study of the Liberian forestry sector with a view to identifying investment opportunities in a post-conflict setting.

The Bank carried out a forestry project in the Liberian forestry sector from 1978 until the late 1980s, when the country was devastated by war until 2003. The project supported institutional capacity-building, plantation development, training and forest assessment studies.

Case study evidence from different parts of the world has shown that where forests are accessible and there is an authority capable of exercising control over them, it is possible for forests to be used to finance conflicts.[3] In a post-conflict scenario, before forest management improves and institutions are strengthened, forests may suffer further from overexploitation. In Liberia's case, there have been efforts to establish effective cross-sectoral coordination mechanisms for forest management through the Liberia Forest Initiative, which was started in 2004 by USAID and was shortly thereafter supported by a variety of other donor agencies. The first phase of the LFI has ended and consultations among partners on the best way forward are ongoing.

Forestry and climate change issues

Communities in forest-adjacent areas in Africa tend to have high levels of forest dependency but lack the capacity to adapt to climate change due to poverty. The impacts of climate change are likely to be higher for the continent compared to other parts of the world as it is exacerbated by key drivers of deforestation such as clearing of land for small-scale agriculture. Weak institutions, lack of adequate data for planning and poor policy frameworks present additional challenges.

Climate change interventions are a key priority in the Bank's forestry portfolio through its participation in the

Forest Investment Program (FIP) with the backing of the Climate Investment Funds. Ghana, Burkina Faso and the Democratic Republic of Congo are participating as pilot countries, having been selected in 2010. The Bank is collaborating with the World Bank and the International Finance Corporation to prepare and finance several initiatives under the FIP to support the investment phase of Reducing Emissions from Deforestation and Degradation in Developing Countries (REDD+).

The Bank is committed to supporting capacity-building through the design of bankable projects, monitoring, reporting and auditing to enable adaptation to and mitigation of climate change in Africa. A number of small projects are already being funded by the Congo Basin Forest Fund in the Democratic Republic of Congo in support of the National REDD+ Strategy. The next United Nations Framework Convention on Climate Change Conference of Parties (COP 17) is being held in Africa at the end of 2011 and the Bank is also using this opportunity to sensitize the world to forestry challenges and opportunities in Africa.

The Liberian forestry sector

Liberia has a total land area of about 96,320 square kilometres. Forest cover is about 4.8 million hectares, representing almost 50 per cent of three main vegetation zones, namely coastal vegetation (savanna woodland, tropical rainforest and the northern savanna)

- Liberia currently has the largest remaining portion of the Upper Guinea Forest Ecosystem with an estimated 42 per cent of the total
- The 2006 National Forestry Reform Law inter alia states that 'All forest resources in Liberia are the property of the Republic, except communal and forest resources privately owned which have been developed through artificial regeneration'

Prospects for sustainable management of Liberia's forests

- Well-developed policy frameworks which employ three forest management regimes known as the 'three Cs', namely commercial, community and conservation forestry
- High potential for revenue development
- Poor governance structure occasioned by weak institutions
- Ambiguity in national forest policy framework and weak implementation of the policy strategies
- Liberia has a total land area of about 96,320 square kilometres. Forest cover is about 4.8 million ha, representing almost 50 per cent of three main vegetation zones, namely coastal vegetation (savanna woodland, tropical rainforest and the northern savanna

Towards sustainable forest management

A number of constraints make it difficult for the majority of African countries to implement sustainable forest management practices. Forestry has historically been assigned a low priority compared to food security, health, education and other urgent issues. As a consequence, insufficient budgetary allocations hamper attempts at sustainable forest management, which requires that countries take a long term view.

Weak forestry institutions in many African countries have resulted in the failure to achieve adequate conservation and sustainable management of the continent's forest resources. In addition, mutually reinforcing market and policy failures promote unsustainable management and use of forest resources. A mechanism to promote the participation and involvement of local communities and the private sector in sustainable forestry management initiatives is lacking.

Partnerships for change

In the last two years, the Bank has increased collaboration with other partners to enhance private sector forestry development in Africa. It has committed US$20 million to the Global Environment Fund Africa Sustainable Forestry Fund to enhance private sector participation in forestry and forestry-related companies in Sub-Saharan Africa. These interventions are playing a catalytic role in encouraging governments and other development partners to invest more in the forestry sector.

An appropriate policy environment will ensure that partnerships that promote benefits for all stakeholders, including local communities, are strengthened. Forestry is closely linked to agriculture, food security and sustainable water resources management, which are key issues that are being addressed in the Bank's interventions.

Climate change has become a major threat to sustainable economic growth and poverty reduction and could ultimately threaten political stability in some regions as competition over available natural resources increases. Africa is still highly dependent on fuelwood and charcoal as sources of energy and there are no obvious alternatives in the short term. Addressing this challenge requires both supply-side and demand-side interventions. More plantations for fuelwood supply will be required, along with more efficient technologies for using biomass. In addition, adoption of various renewable energy options is imperative in order to meet the energy demand.

The forestry sector has been adversely affected by increasing populations, weak forestry institutions and significant social, economic and political demands on forest resources. Conflicts and wars in some regions have created conditions for illegal exploitation and destruction of forest ecosystems, exacerbated by the influx of refugees. Private sector operators also continue to plunder forest resources without regard to environmental conservation and resource sustainability. Concessions and licence holders need to be regulated and encouraged to adopt efficient extraction and utilization technologies as well as sustainable forest management principles. Furthermore, they should be encouraged to respond to the social needs of affected communities as part of their corporate social responsibilities.

It is imperative that countries and development partners work together to ensure that poverty reduction interventions meet environmental sustainability criteria. Financing and technical capacities for the forestry sector should also be enhanced and interventions in agriculture, infrastructure and irrigation should complement forestry sector investments to ensure sustainability.

Encouraging trends

Despite the many difficulties African forestry faces, the Bank has noted emerging positive trends in the sector in some African countries, which have reorganized their forestry institutions and reformed their policies and laws to make them more responsive to current challenges. This allows local communities and the private sector to take on more significant roles and responsibilities in the management of forest resources. A greater appreciation of the global value of forests is also evident. Against this background, the Bank is committed to working with governments and other development partners to ensure maximum benefits to Africa's people.

Sustainability indicators, decision-making and people

Diana Vötter, Marja Kolström and Rach Colling, European Forest Institute

There are different dimensions of sustainability: economic, environmental, social and cultural. But no matter what the dimension, they all ultimately have an effect on people. The economy matters, not only for economic reasons, but because it affects people (employment, the chance to make a living). Environmental impacts are so striking because besides the environment itself, they also affect people (for example, through health problems due to pollution, water shortages, landslides or forest fires threatening settlements).

Take the example of forests. They are vital because they provide oxygen, water, energy, shelter, wildlife, biodiversity, carbon storage, livelihoods, myths and stories, beauty, tranquillity, recreation, construction materials and non-forest products — for people.

The people affected by forests and forestry can be directly or indirectly involved with the forest-based sector. They can live near to local forests or even far away in urban areas and still be linked to forestry and forest products. Therefore, sustainable management and practices in the forest-based sector matter, as do the decisions that are made. Their impacts can be felt a long way down the chain.

But how can decision makers know what the impacts on forests are from an economic, environmental, social or other point of view? These impacts can be quantified and assessed using different types of sustainability indicators. The assessments do not produce a 'right' or 'wrong' answer — but do help decision makers to

Image: EFI

People can be affected by forests, wherever they live

understand the wider consequences of their choices by illustrating the different impacts different development scenarios can make. In order to cover different aspects in a balanced way, each of the above-mentioned dimensions matters.

Environmental sustainability in relation to forests, for example, can be assessed with indicators like the amount of decaying wood, the area of forests for remaining biodiversity use and production of energy and greenhouse gas emissions from wood chips or timber. The economic aspects can be assessed with indicators like local added value and the production costs of wood-based products. Employment and wages are typical indicators for social sustainability but there are other possibilities too: for example, the number of hunters, hikers or berry pickers to describe the importance of recreation or the number of occupational accidents to show the level of occupational health and safety. Comprehensive indicators like carbon and water footprints can also be used when they can be determined for a product.

All these indicators help planners and decision makers to study how changes in the forest-based sector have an effect on different aspects of sustainability — and how, in the end, they affect people. For example, the Northern ToSIA project,[1] which assessed the sustainability of forest-based activities in various northerly regions as part of the EU's Northern Periphery Programme, used different sets of indicators to assess the impacts of alternative decisions in forestry and regional development on forest wood-based chains. These included tourism, the bioenergy sector and indigenous Sámi reindeer husbandry livelihoods. The region's forests are used in many ways and resource planners have to perform a demanding balancing act to ensure economic, social and environmental sustainability at local, regional and national level.

A case study in Swedish Lapland illustrates the challenges faced by various users of the same forest resource for different purposes. Malå municipality is located in the county of Västerbotten in Northern Sweden. Forestry is one of the basic industries for the development of society in this area and is thriving, together with electric power plants, a mining industry, car testing, tourism and outdoor recreation. Alongside these activities, reindeer husbandry has been present in the area for centuries. This places competing demands on forest resources — as well as the demand for timber, local indigenous Sámi reindeer herders need mature forests with winter lichen in the winter grazing pastures for their animals, while summer grazing areas need to provide food and cover when the calves are still young.

Using the innovative Tool for Sustainability Impact Assessment (ToSIA), the project was able to assess contributions to local employment from both sectors through their activities, influences on cross-sector production costs, carbon sequestration and forest growing stock. These assessments aimed to find out what impacts different forest management practices

Image: EFI

Decisions affecting the forestry sector can have an impact a long way down the chain

Image: EFI

Resource planners must balance social, environmental and economic demands to ensure the sustainability of forest products

might have on forestry and reindeer husbandry and if it was possible to identify mutual benefits to both. The assessments included business-as-usual scenarios (current forest management practices) as well as scenarios favouring reindeer husbandry, nature considerations and a combination of both.

The results and the approach were positively received by the parties involved and have paved the way for continuous dialogue between industry and the indigenous people.

A study in Scotland examined the impacts of alternative development strategies for the region around the Cairngorms National Park. This is Britain's largest national park, containing a wide and varied range of mountainous landscapes, diverse wildlife and unique habitats. It is also home to around 16,000 people and is visited by over a million people a year. Forests here are particularly valuable as amenities for conservation (especially as a habitat for rare birds), cultural heritage and recreational activities, as well as being used for timber and wood biomass production. Resource planners are again performing a delicate balancing act, between social, environmental and economic demands.

The ToSIA tool was used to assess policy requirements, such as increasing woodlands for aesthetic and biodiversity reasons, with respect to the different interested parties – a range of industrial, environmental and community enterprises. The impacts of various options were analysed using a set of quantitative and qualitative indicators, including:

- Gross value added, calculated from the costs and the value of the timber at each phase of production, extraction and transport
- Forest biodiversity, scored according to structure, species diversity, composition, naturalness and connectivity
- Employment, measured in hours/ha or m^3 timber
- Site suitability to preferred tree species
- Visibility from roads and tourist paths
- Wind and slope factors.

Following this analysis, the various stakeholders were presented with map-based recommendations, taking into account sustainability impacts and site suitability aspects. Such analysis can aid consultation with local interested parties, helping to ensure local engagement and improving partnerships and alliances.

Image: EFI

Sustainability impact analysis helps to preserve forests for the future

A case study in North Karelia, Eastern Finland examined the impacts of increased use of forest wood chips for heating. Use of this local fuel creates more benefit to local people because of increased employment and income to the region. However, care needs to be taken that intensive harvesting does not threaten the biodiversity of forests or disturb their multiple uses such as hunting and berry picking.

Here, public organizations used the ToSIA tool in the context of the local regional development strategy. A target of sustainable use of forests is included in the Regional Forestry Programme, which is prepared as a participatory process of stakeholders. Another regional initiative, the Climate and Energy Programme, includes a target of a 'heating oil-free region' (this currently used fuel can be substituted by wood chips and pellets).

The impacts of this target were assessed using indicators of greenhouse gas emissions of fossil fuels, employment and local added value. The analysis showed that targets to improve regional development and decrease greenhouse gas emissions would be met due to the shift of fuel from imported (heating oil) to local (wood chip). Assessing the different indicators (economic, environmental and social) at the same time improved the understanding of the stakeholders of the impacts on local people. The process also enabled them to plan how to achieve the regional development programme targets.

Sustainability indicators, therefore, are a vital tool for quantifying and assessing the impacts potential development decisions can have on forests and thus, in the end, also on people. They are a means for helping decision makers to understand the wider, sometimes far-reaching, consequences of their choices at different levels. They illustrate the issues (economic, social and environmental) which are important for people – and are a useful way of encouraging and generating stakeholder participation, partnership and communication of all parties involved and affected. Because in the final analysis, sustainability is about people: ourselves and the world we live in.

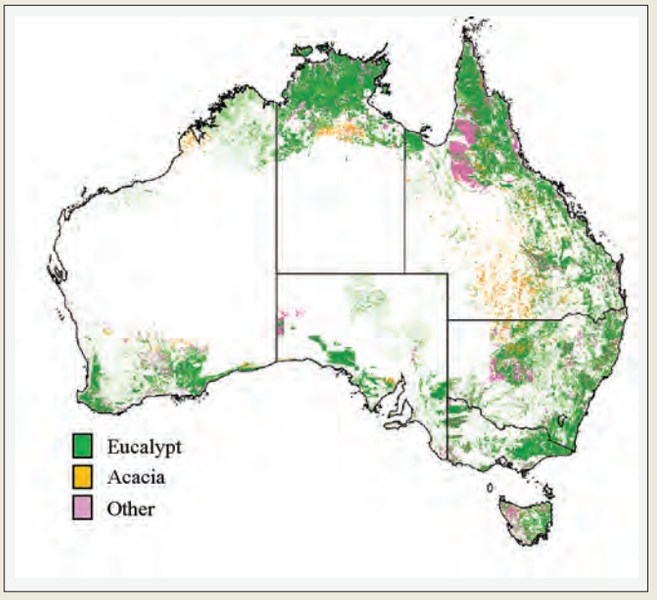
Sustainable forest management in Australia

Australian Government Department of Agriculture, Fisheries and Forestry

Australia has a long history of forest management and use since European settlement, dating back to the early 19th century in native forests and the early 20th century in plantations. Since then, Australia's forest industry has developed into a legitimate, useful and important industry. In the past decades, Australia's forests have increasingly been recognized and valued for the role they play in sequestering carbon, addressing environmental degradation issues, and conserving and providing habitat for biodiversity, as well as for their social and cultural values. Australia's forests also provide a sustainable timber product which contributes to rural and regional employment throughout the country.

Forests occupy 19.4 per cent of Australia, equivalent to 149.4 million hectares of the country. Of this forest area, 147.4 million hectares is native forest, dominated by eucalypt (79 per cent) and *acacia* (7 per cent) forest types and 2.02 million hectares is occupied by plantations.[1] Australia is divided into six states and two territories and both state and territory governments have constitutional responsibility for forest management. The Australian Government coordinates a national approach to sustainable forest management.

Australia's forest cover



Source: Australian Bureau of Agricultural and Resource Economics and Sciences

Forest policy in Australia

Successive Australian, state and territory governments have sought to implement the vision of ecologically sustainable management for Australia's forests and plantations.

The National Forest Policy Statement, which was finalized in 1992, brought together the vision shared by successive Australian, state and territory governments to manage Australia's forests and plantations in an ecologically sustainable manner. Eleven broad national goals constitute the statement, which provides a robust framework for the holistic management of forests in Australia. The statement resulted in the establishment of a comprehensive reserve system for Australia's forests and provides continued support for a range of innovative, competitive and sustainable forest-based industries. These industries use forests and their resources in an efficient, environmentally responsible manner and are responsive to community and market signals. The statement continues to have relevance and underpins Australia's forest management to this day.

In developing and implementing the National Forest Policy Statement, governments were mindful of the important conservation values of Australia's forests, and of the contribution that forest-based activities make to the national economy and rural and regional communities. This is reflected in the Regional Forest Agreements which are a key mechanism developed to achieve several outcomes of the statement.

Regional Forest Agreements are 20-year agreements between the Australian Government and state governments for a balanced and sustainable approach to managing Australia's native forests.

The 10 Regional Forest Agreements, currently implemented in four states, have three key objectives:

- To protect environmental values and a world-class system of national parks and other reserves
- To manage all native forests in an ecologically sustainable way
- To encourage job creation and growth in forest based industries, including wood products, tourism and minerals.

The Regional Forest Agreement process was initiated with scoping agreements to identify key government obligations, regional objectives and interests, and broad forest uses. Criteria for a comprehensive, representa-

Image: Department of Agriculture, Fisheries and Forestry

Eucalypt tall open forest — south-western Australia

tive and adequate reserve system were nationally agreed. This was followed by groundbreaking scientific comprehensive regional assessments of forest values and uses. Wide stakeholder consultation was undertaken throughout the process.

The social assessment process, which forms part of the comprehensive regional assessment, was a major development in land management policy, garnering international attention for ensuring the inclusion of social values in production forest management. Through the social assessments, Australian and state governments collated information about how regional and rural communities use and value their forests. This information ensured that a balance was struck between managing forests for timber production whilst ensuring that their community values were conserved.

In addition to Regional Forest Agreements, new strategies that build upon and complement the National Forest Policy Statement have been developed and implemented, including Plantations for Australia: the 2020 Vision, the National Indigenous Forestry Strategy, and the Farm Forestry National Action Statement. Each of these strategies' outcomes are achieved through partnerships between the Australian, state and territory governments, key stakeholders and industry, and they provide robust frameworks for opportunities that sustainably develop the Australian forestry industry.

To measure and monitor how well its forests are being managed, Australia uses the international Montreal Process Criteria and Indicators as a basis framework. Every forest region of Australia is different, and so the application and importance of the criteria and their respective indicators vary between tenures and broad forest types. As such, Australia developed a framework for assessing the sustainability of forest management which could be applied across all its forests. Representatives of the Australian, state and territory governments developed 44 indicators used to track progress across the criteria. Australia reports on its progress towards sustainable forest management through the five-yearly release of its State of the Forests Report, the most recent of which was produced in 2008.

New influences on forest management

The past decade has seen a new dynamic in forest management. The drought experienced by parts of the country and the expansion of the plantation estate has caused some jurisdictions in Australia to be concerned about the impact of plantations on water availability. This is compounded by uncertainty regarding how climate change will impact different regions of Australia. Plantations can have positive environmental effects by lowering saline water tables, but some communities have become concerned that they may also reduce water availability for other uses, such as irrigated agriculture. Plantation development is one of the land-use changes covered by the 2004 Intergovernmental Agreement on a National Water Initiative, which provides a national framework for considering the impacts of activities that may intercept water. Some state governments are reviewing their water policies and water allocation mechanisms with the intention of requiring plantations to gain a water licence prior to being established.

Policies to address climate change and transition to a low-carbon economy have also gained momentum in Australia. It is recognized that Australia's forests will be affected by climate change and areas once suitable for commercial plantations may change. However, forests also sequester carbon and have an important role to play in addressing climate change. This was recognized by the Australian, state, territory and New Zealand government ministers responsible for the primary industries when they endorsed the National Climate Change and Commercial Forestry Action Plan. The plan is intended to guide action by the forestry industry, with the support of governments, to respond to climate change through adaptation and mitigation, underpinned by research and development and communication. The plan identifies knowledge gaps and proposes actions to assist forest industries to respond to climate change.

Partnerships with industry

The Australian Government has a strong history of partnership with the forestry industry through supporting research and development and providing grants for innovation. The most recent of these is the Forest Industries Climate Change Research Fund, a grants

Image: Australian Bureau of Resource Science

Boardwalk at Eco-Sensitive Site (south-eastern New South Wales, Australia)

Image: Department of Agriculture, Fisheries and Forestry

African mahogany plantation in northern Australia

programme to address major knowledge gaps about the impact of climate change on forestry and forest industries in Australia.

Research and development for the forest and wood products sector is primarily achieved by Forest and Wood Products Australia. This not-for-profit organization, which invests in research and development and provides results to the sector, is jointly funded by the Australian Government and the forest and wood products industry.

It is clear that the voice of the industry is valued by the Australian Government, as evidenced by the establishment of the Forest and Wood Products Council, a forest industry advisory body to the Minister for Agriculture, Fisheries and Forestry. The council is an effective high-level forum which aims to act as a means of liaison between the Minister and stakeholders in the forest and wood products industry.

Australia's international forest policy

In addition to supporting the Australian forestry industry, the Australian Government is involved in international efforts to foster the sustainable management of forests globally. This is achieved through multilateral and bilateral agreements with neighbouring Asia-Pacific countries, through initiatives such as the Asia-Pacific Forestry Skills and Capacity-building Program, and through participation in a range of international forums such as the United Nations Forum on Forests and the Montreal Process.

The Australian Government is also strongly opposed to illegal logging and the importation of illegally sourced products. As such, it is committed to identifying and restricting the importation of timber products derived from illegally harvested sources and is currently introducing new legislation to address this. Under this legislation, it will be an offence to import timber products into Australia that have been sourced from illegally harvested timber.

A robust approach

Australia has a comprehensive policy framework in place to ensure that the use of forest resources contributes economically and socially to Australia's communities and is appropriately regulated in terms of environmental management and responsibilities.

The National Forest Policy Statement continues to underpin ecologically sustainable forest management in Australia and its robustness ensures that emerging issues such as water security and climate change can be accommodated and appropriately managed. The Government's commitment to reporting against the 44 indicators of the Montreal Process Criteria and Indicators, in partnership with states and territory governments, ensures that Australia's forests are managed transparently.

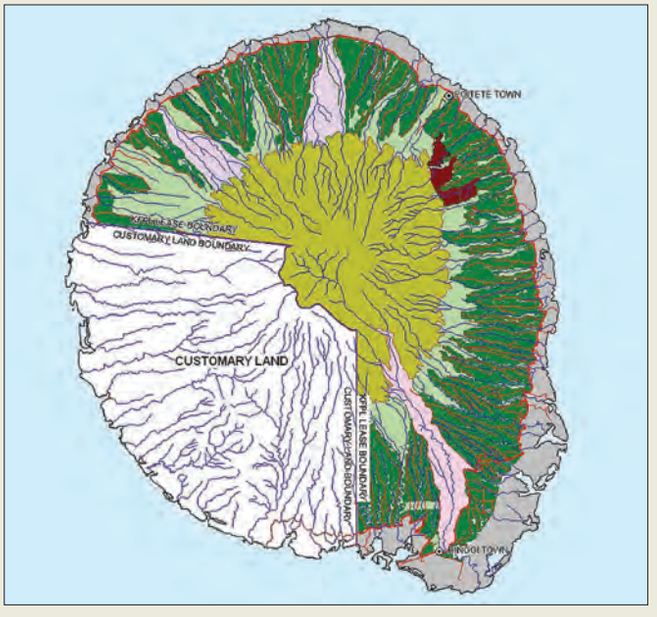
The Australian Government will continue to assist the forestry industry to grow, improve and capitalize on new opportunities while protecting the environment and contributing to prosperity and quality of life in rural and regional Australia.

Institutional investment in sustainable forestry

David Brand and MaryKate Hanlon, New Forests Pty Ltd, Australia

Investors acquire forests or 'timberland' to generate long-term returns from both the sale of harvested timber as income and the capital appreciation from biological growth of the tree crop.[1] Forestry investment by institutional investors has grown steadily since the 1980s, and it is estimated that approximately US$48-60 billion has now been invested by pension funds, insurance companies, foundations, endowments, and sovereign wealth funds.[2] This growth in forestry investment has come about because the annual returns tend to show low volatility, have limited correlation with other asset classes, and have a positive correlation with inflation, and also due to the fact that long-term investment in relatively illiquid assets such as forests provides a good match for the long-term nature of most institutional investor liabilities. Therefore forestry or timberland can provide both portfolio diversification benefits and a hedge against inflation.

The island of Kolombangara



The island of Kolombangara in the Solomon Islands demonstrates a mixed-use land-use system that combines production, conservation, and community land use zones in geographically distinct areas. Kolombangara Forest Products Limited (KFPL) holds a lease over approximately three-quarters of the island

Source: KFPL

Institutional investment in forests largely originated in the United States, where the bulk of invested capital remains today; however, in recent years the forestry asset class has expanded internationally. An increasing amount of institutional capital is directed to Latin America, Australia, New Zealand, and now also Eastern Europe, Asia, and Africa. As the level of investor interest has grown, specialist fund managers have emerged to offer regionally focused investments and also thematic funds focused on particular species or niche investment strategies. Such focused and thematic investment strategies offer the potential to harness institutional capital to support the expansion of sustainable forestry in key new markets. New Forests[3] expects institutional investors will play an important role in defining the future of the forestry sector, including bringing an emphasis on sustainability, placing capital in new regions with new market opportunities, and bringing new technology and management know-how to emerging markets.

Investor demand for sustainable forestry

Through its interactions with institutional investors, New Forests has seen an increasing emphasis on the ways that managers integrate environmental and social sustainability into their investment strategies. Generally speaking, institutional investors are paying increased attention to environmental, social and governance (ESG) factors throughout their investment portfolios, including in research and analysis, manager selection due diligence, reporting requirements, and operational management guidelines or standards. Some of these investors may be concerned that potential investments in real assets, such as timber, agriculture, natural resources extraction, energy, and infrastructure, may have negative social and environmental impacts. These negative effects may create significant risks for project cash flows as well as wider reputational risk for the investors. In order to help manage these risks, some investors require their managers to become signatories to the United Nations Principles for Responsible Investment (UN PRI),[4] develop comprehensive ESG policies and ensure their investments adhere to strict performance standards such as those developed by the IFC, Forest Stewardship Council or PEFC. Some investors are taking a long-term view and actively looking to invest in assets that may hedge against the potential impacts of climate change or

Image: KFPL

An excavator bunches logs and prepares them for loading onto a truck at Kolombangara Forest Products Limited

the increasing expectation of a price on greenhouse gas emissions. For example, a recent report published by the Mercer consulting group on climate change indicates that in some cases the best way to manage portfolio risk from climate change is to increase exposure to assets that are less susceptible to the effects of climate change and that are capable of adapting to low carbon development, such as forestry.[5]

For investors with such sustainability objectives, New Forests believes investment into certified, sustainable forest plantations can be an important addition to a portfolio seeking to strengthen ESG performance. Forest certification involves independent third-party verification of environmentally and socially responsible forestry practices and log tracking systems. Ultimately, forest certification can improve forest management and add value to existing assets by:

- Boosting cash flows, e.g. by securing a certification price premium on wood destined for environmentally sensitive end markets or by increasing operating efficiencies and reducing unit costs of production
- Reducing the riskiness of cash flows, e.g. by improving relationships with local communities and other stakeholders thereby reducing external disruptions to operations
- Increasing asset liquidity and value, e.g. by making forest management more transparent, asset managers can reduce information asymmetries between buyer and seller and enable buyers to use a lower discount rate for asset valuation, and strong environmental and social performance will attract a wider pool of potential buyers.

Forestry investment offers substantial opportunity to integrate ESG concerns throughout the investment process, and not just in the physical operations. Some of the key sustainability factors that may attract institutional investors include:

- The role of forestry and land use in mitigating and adapting to climate change, particularly for forests to sequester and store carbon in trees and soil, and for biomass energy systems
- Meeting growing global wood demand without compromising the future supply of natural resources
- Ensuring the provisioning of ecosystem services, including habitat for important wildlife species and functioning hydrological systems
- Increasing rural employment opportunities and supporting related local livelihoods.

Socio-environmental co-benefits of forestry investment

Environment and biodiversity

It is estimated that more than two thirds of the remaining tropical forests are either already subject to logging or are likely to be in the future,[6] and less than 10 per cent of tropical forests are in strictly protected areas. Numerous studies have shown that most plant and animal species survive selective logging as compared with conventional logging practices in the tropics.[7] However, biodiversity and other attributes of forests are threatened by conversion to non-forest land uses. Responsible forest management can provide local employment, revenue flows, and raw materials for processing industries. In addition, forest management can increase the value of standing forests, which confer additional socio-environmental benefits and stabilize land use pressures on native forests. Nevertheless timber harvesting in natural forests is controversial

Image: KFPL

A woman contractor plants a seedling at Kolombangara Forest Products Limited in the Solomon Islands

and most investors prefer to invest in plantations established on marginal agricultural or degraded land.

Investing in forestry may include acquisition of existing plantations or new unplanted (greenfield) plantation licence areas. In some cases, particularly in Southeast Asia, this may involve assuming management responsibility for heavily degraded natural forest with residual biodiversity values. In order to maintain, restores, and enhance environmentally sensitive areas, such as residual natural forest, natural forest cover on steep slopes, riparian zones, and other high conservation value areas, forest management plans can be created that intensify production in the most suitable areas while allowing for conservation-based management in others. Depending on local circumstances, in some of the most degraded areas (e.g. non-forest or immature secondary forests regenerating following agricultural use) investors may establish fast-growing, high-value hardwood plantations. By applying this integrated approach that preserves environmental values and increases productivity, forest management plans can result in natural forest/plantation mosaic landscapes producing timber and sustaining high levels of biodiversity over the long term. Emerging environmental markets for carbon, including programmes for Reducing Emissions from Deforestation and Degradation (REDD) and biodiversity can be used to support the investment model of intensive timber production combined with protection of residual natural forest areas. Income from environmental credits can be used to offset the costs of natural forest set asides and make the combined production and conservation model commercially attractive to investors. New Forests believes this environmentally sensitive intensification is essential for meeting global wood demand while alleviating pressure on remaining natural forests.

Society and Stakeholders

While institutional investment seeks primarily to generate returns that meet medium- to long-term financial liabilities, forestry investment presents economic opportunities that also reach local stakeholders, including communities and governments. This is particularly true in emerging markets, where natural resource industries play a significant role in development. Forestry investment in these areas offers a sustainable development pathway that brings revenue and livelihoods.

In remote areas and developing countries, rural community development is often tightly linked with the health and use of forest ecosystems. ESG integration can be useful in ensuring local rights are respected and reinforced. Investors can utilize specialized consultants and established processes such as free, prior and informed consent and high conservation value area assessments[8] to help assess and address these local stakeholder needs. For example, areas that have high cultural significance can be preserved for the long term when incorporated into a landscape system that diverts timber production and plantation development to degraded or less sensitive areas. However, in some cases local community needs may be incompatible with some types of intensive forestry, and investors following strong ESG and sustainability guidelines will be capable of identifying appropriate areas for investment.

Institutional investment also brings funding directly into local economies and can support livelihoods and local stakeholders. Employment is created through onsite operational activities, and regional or local specialist forest

Image: KFPL

Logs are loaded for shipping from the Solomon Islands to Viet Nam, sold to a furniture manufacturer seeking FSC-certified timber

managers contribute valuable expertise. FSC and other forestry certification schemes ensure that relevant labour guidelines and laws are enforced to promote worker health and safety. These measures also help ensure that employment is legal and non-exploitative. Additional livelihoods are sustained through indirect economic impacts, such as secondary processing and export-oriented activities. While the above benefits are important for supporting stakeholders and promoting livelihoods, forestry investors must be aware of potential negative impacts. It is possible that increasing incomes in rural areas can lead to social conflicts due to changes in community power structures, local inflation, and increased migration pressures.

The future of timberland investment

The case of KFPL is an early example of the potential for institutional capital to generate attractive and stable investment returns while at the same time creating and sustaining positive social and environmental outcomes within the forestry sector as an emerging market. As the responsible investment movement matures, more and more investors are looking beyond merely avoiding negative social and environmental impacts associated with their investments; these investors are now actively seeking opportunities to catalyse sustainable outcomes. With direct connection to ecosystems, consumer goods and rural livelihoods, the forestry industry offers ample potential for such sustainability-oriented investing. At the same time, the socio-environmental management of forest areas and plantations can directly improve the bottom line via risk mitigation, increased efficiency and long-term asset appreciation. As institutional investment in timberland expands its reach beyond the North American market, these opportunities for aligning commercial and socio-environmental returns are becoming more pronounced and allowing for transformative investment strategies in the forest sector.

Kolombangara Forests Products Limited

Image: KFPL

A KFPL employee near a 20-year old plantation *eucalyptus* tree about to be harvested near the edge of the buffer reserve

The case of Kolombangara Forest Products Limited (KFPL) in the Solomon Islands demonstrates how private capital and a sustainable investment approach can yield substantial benefits. KFPL was established in 1989 by the Government of the Solomon Islands, represented by the Investment Corporation of the Solomon Islands (ICSI) and the United Kingdom's development finance institution, then known as the Commonwealth Development Corporation or (CDC). While the Solomon Islands have experienced widespread harvesting of their native tropical forests, KFPL was created as an example of integrated conservation and development. The 39,000-hectare KFPL estate comprises 12,000 hectares of hardwood plantations, including gmelina *eucalyptus*, teak, mahogany and other species, and over 25,000 hectares of natural rainforest under conservation and natural forest management. KFPL's operations achieved FSC certification in 1998, the first in the Pacific Islands.

In 2006, a majority shareholder position in KFPL was acquired by New Forests on behalf of an American investment fund, and CDC (at that stage renamed CDC Group Plc) exited the investment. The new deal was supported by a grant that enabled the Investment Corporation of the Solomons Islands to maintain its share in the company. At that time, KFPL employed more than 200 people with approximately 700 additional employment positions for contractors. KFPL's status as a producer of FSC wood was a critical factor in the acquisition, as it provided assurances on social and environmental management to the institutional investors.

The 2006 investment provided additional capital resources to help the plantation company meet its potential as a producer of tropical plantation hardwoods. The investor looked at long-term strategies and was able to cover short-term debt, enabling KFPL to invest in new equipment and resources to improve its production and become more efficient. The new investor was also able to bring the latest forest management expertise drawing from worldwide experience to modernize the systems at KFPL. This included improved description of the resource, updating the forest information, account systems, and databases to enable accurate analysis and reporting. These measures enabled better strategic and operational decision-making that ultimately improved the asset value and ensured that KFPL remained a strong example of sustainable forestry investment yielding multiple local benefits.

Sustainable forest management in New Zealand

Alan Reid, Ministry of Agriculture and Forestry, New Zealand

Contemporary forestry approaches in New Zealand reflect some key decisions and developments from past decades. They also reflect the unique character of our relatively slow-growing and strongly endemic indigenous forests, the majority of which now reside within the Government-administered conservation forest estate. The transition of production forestry from dependence on indigenous forest timbers to the introduced species-dominated, and largely privately owned, commercial planted forests introduced in the second half of the 20th century marked an important change for forestry.

The mature planted forests that made this change possible began with experimentation work, starting in the late 19th century with a range of Northern Hemisphere tree species, leading to later decisions by the Government and private companies to establish commercial planted forests. Field assessments in the same period showed that indigenous forests would be unable to provide continuing supplies of timber in the future. Much of the first generation of New Zealand's planted forest estate, and eventually the resource base for the timber processing industry, commenced in the late 1920s and continued through the years of the Great Depression.

From the 1970s deeper public engagement in forest and forestry issues and more general debate around environmental values, especially related to the remaining indigenous forests, coupled with 1980s changes in the administration of forests, had further far-reaching effects. All events along the timeline from the earliest work have shaped the New Zealand model of sustainable forest management (SFM). Changing perceptions and understanding about SFM have continued to shape the New Zealand view. The influence and role of the Maori people in the evolving ideas around forests, and their involvement in a broad range of economic, social and cultural issues on forests, have also had an impact.

These events are important in the contemporary New Zealand approach to SFM and how we see the challenges from climate change and the influence of a broader array of social, environmental and economic values. Forests are embedded in New Zealand's physical, social and cultural landscape. All of New Zealand's forests — plantation and indigenous — deliver numerous services including soil conservation, enhancing water quality, biodiversity and recreation. Planted forests deliver most of New Zealand's timber supply.

Changing role of New Zealand's forests

New Zealand lies in the southern Pacific Ocean, 1,600 km east of Australia. It is made up of the North and the South Islands and a number of smaller islands, with a total land area of 26.8 million hectares (ha). In the relatively short time of human influence, and particularly during the last 200 years, New Zealand's forests have played an important role in the country's economic and social development.

Before the arrival of the first human settlers, about 80 per cent of New Zealand was forested. In pre-human times natural forests dominated the landscape. Isolation over a long period from other land masses resulted in high endemism and unique plant and animal biodiversity. Polynesian inhabitants cleared large areas, a process that continued with greater intensity after European settlers arrived in the mid-19th century and into the 20th century. Over time the forest area was extensively cleared and modified through logging, expanding agriculture and settlement, and the effects of human-introduced invasive pests and weeds.

Today, forests cover approximately 8.3 million ha, or 31 per cent, of New Zealand's land area. Of this, 6.5 million ha (24 per cent) are indigenous and 1.8 million ha (7 per cent) are planted forests which support a well-established processing industry. 99.9 per cent of timber harvest comes from commercial planted forests and forestry is New Zealand's third largest export earner after dairy and meat products, while contributing over 3 per cent to the country's gross national product. About 5 million hectares of the approximately 6.5 million ha of indigenous forests remaining in New Zealand are managed within the Crown Conservation Estate by the Department of Conservation for biodiversity conservation, natural heritage and recreation purposes.

Planted and indigenous forests share some common values. In particular, planted forests, as well as being the mainstay timber source, also have social and environmental roles and thereby play a key complementary role to the unique biodiverse indigenous forests. All forests provide a range of wood and non-wood forest products as well as social and environmental services. These services include: recreation and tourism, enhancing cultural development, biodiversity, diversification of urban and rural landscapes, employment, conservation, protection of soil and water, rehabilitation of degraded lands and carbon sinks.

Statutory and policy framework

New Zealand adopted a clear administrative and functional separation between the substantially reserved

Image: NZ Ministry of Agriculture and Forestry

Planted commercial forests provide most of New Zealand's timber supply

indigenous forests and largely introduced species-based commercial planted production forest estate following reforms of New Zealand Government agencies in the 1980s. From that point the Government ceased to be a significant player in ownership and management of planted forests, although it retained its key role in managing the indigenous forests in the Crown conservation estate. The Government's role then focused on maintaining a broad policy framework and stable macroeconomic and regulatory environments throughout the economy. The Government has also continued to support some land stability programmes, manages biosecurity and quarantine services and sets the conditions for how forests participate in the rapidly emerging carbon market.

Planted commercial forests are mainly owned and managed by the private sector. A significant proportion of planted forests have also been transferred from Government-owned to Maori iwi (tribes). This has taken place through Treaty of Waitangi settlements (the settlement of historical claims against the Crown).

Maori have a strong social, cultural and spiritual identification with forests which has shaped the place and values of indigenous forests in New Zealand society. Maori participation in the commercial plantation forestry sector is also significant. Some 238,000 ha of plantation forests are on Maori-owned land under long-term forestry leases. Maori incorporations and trusts are assuming direct responsibility and management as leases expire and Maori move to more direct management of their assets.

New Zealand's current natural resource statutory and policy framework took shape in the 1980s reforms and includes statutes with ecosystem or environmental management provisions applying to natural and physical resource management generally, and to forests more specifically.

With the commercial forestry sector largely privatized, New Zealand's statutory framework, rather than operating through a single national forest plan or programme, is based on broad sustainability principles that guide the management of the forest estate and the business of forestry. This includes statutes covering sustainable management and conservation of natural resources, and Government initiatives related to biodiversity, industry development, land stability and response to climate change.

The Resource Management Act (RMA) 1991 controls all natural resource management and land uses in New Zealand, the core principle of which is the sustainable management of natural and physical resources. Regional policy statements and district plans under the RMA set out the operative framework within which resource

Image: Alan Reid

Rimutaka Range in Welllington, where indigenous forest provides important cover on geologically active steeplands

users (including forest owners) use natural and physical resources. The Forests Act 1949 regulates the sustainable management of indigenous forests, including limited commercial timber production from indigenous forests on private lands. The Conservation Act 1987 controls the Crown Conservation Estate, which includes indigenous forests in Government control managed for conservation, habitat and species protection and other non-timber purposes.

These policies are complemented by a number of collaborative forest industry and environmental group initiatives focused on forestry environmental issues, which help to ensure that production forestry is sustainable. These include the Forest Owners' New Zealand Environmental Code of Practice for Plantation Forestry (revised 2007) and the New Zealand Forest Accord (1991), an agreement between the forest industry and conservation groups on limiting the clearance of indigenous forests and guiding where afforestation takes place. Collectively, Government policies and industry provide an integrated approach to land management.

New Zealand forests in the wider landscape and across sectors

Forests fit into a wider New Zealand landscape characterized by:

- A high proportion of plant and animal species found nowhere else on the planet
- Indigenous species-dominated remnants, on lands used for agriculture and forestry production, where introduced forest and pasture species are the basis of New Zealand's commercial farming and forestry systems
- A very active, geologically young landscape.

Sustainable use of land is a complex balancing act between a range of stakeholders and working towards effective solutions is vital. Despite the historical loss of much of the original indigenous forest and many of the associated fauna species, New Zealanders increasingly recognize that they are the guardians of unique national indigenous biodiversity. Conservation, especially that of the poorly represented lowland forests, has been enabled through both Government-led policies and private initiatives.

Significant areas of New Zealand's hill country carry unstable soils. Afforestation programmes and regeneration of indigenous forests aim to stabilize soils and counter the effects of erosion and flooding. In other cases, forested water catchments provide water supply and on farmlands, trees provide shelter for stock and landscape.

Image: Ian Platt

Pureora Forest in Central North Island is lowland indigenous forest dominated by large podocarp species

Environmental services provided by forests

Biodiversity — New Zealand's indigenous forests are the location and habitat of many unique and, in some cases, endangered plant and animal species. The country's long isolation from other land masses enabled the unique and endemic biodiversity to evolve largely in the absence of introduced species. The modern extent of indigenous forests is a fraction of the historical cover and there has been significant species loss from the impact of pest and weed species introduced to New Zealand from the days of human colonization, especially from the mid-19th century. The indigenous forests are nevertheless an important refuge for species and habitats and there are efforts to control pest species, especially those threatening indigenous avifauna, and to maintain and restore at least some natural habitats and ecosystems and viable populations of our native species.

Planted forests share some role in biodiversity conservation, providing cover and habitat for some species, as well as through water catchment protection.

Water and soil protection — New Zealand steepland and alpine forests continue to play a protective function in water catchments and help to counter soil erosion generated by ocean-borne storms and active 'young' geology, including the impacts from earthquakes.

Overall nearly 10 per cent of New Zealand's land area is prone to severe-to-extreme soil erosion and over half the country is prone to moderate-to-slight soil erosion. Soil erosion affects not just on-site environmental and commercial values, but can have major impacts on downstream properties, infrastructure and community services. Both planted and regenerating indigenous forests are playing a major part in stabilizing erosion-prone sites and helping maintain downstream agricultural lands.

Water quality is of increasing concern in New Zealand and forests provide efficient filters. Many domestic water supplies are sourced from forested catchments, emphasizing the importance of forestry in maintaining high-quality drinking water. This role as a filtering agent is becoming increasingly important in New Zealand, as agricultural activity is intensified.

Carbon storage and sequestration — The ability of forests to sequester carbon is becoming a critical factor in national and international efforts to address global climate change. Additional forestry planting and changes to the management of New Zealand's existing forests will increase the store of carbon; for example, through a range of species and longer rotations. Using forests as a carbon sink is an important mitigation measure but only part of the effort needed to gain other long-term solutions that countries will need to address their energy demands and industrial output.

Biosecurity

New Zealand's isolation is no longer a significant barrier to introduced species in the modern era of global transport of people and goods and this poses an ongoing challenge for New Zealand. Biosecurity measures at the border aim to counter pest and disease incursions that can threaten the agriculture and forest systems that are a main basis for New Zealand's natural resource-based economy. These include threats to commercial planted forests and to indigenous forest species and habitats.

Research

Forest research in New Zealand was founded on early work in indigenous forests and the breeding, management and improvement programmes that accompanied the planted forest establishment. Contemporary research reflects current forest and forestry issues such as; biomaterials, techniques in species improvement, silviculture and timber quality, and also biodiversity, environmental and ecological issues.

A forest is more than wood

The demands on forests are becoming more complex. Besides the traditional production outputs from forests and the array of environmental services that forests also provide, communities, including a majority of urban dwellers, are claiming a role in the use and future management and conservation of forests. The indigenous and planted forests in New Zealand share the expanding burden of catering for the public good and commercial benefits.

Benefits of sustainable forestry management

Peter Clinton, Brian Richardson and Margaret Horner, Scion, New Zealand

Forestry is New Zealand's third largest export earner, contributing 10 per cent of the country's total overseas earnings. The economic strength of this industry is based on exotic softwood species that achieve growth rates among the highest in the world. But these forests are much more than wood and fibre factories. They offer environmental and social benefits that make plantation forests an integral part of New Zealand's landscape and culture.

The evolution of plantation forestry

New Zealand is one of the world's youngest nations. Up until 1,000 years ago, its islands in the South Pacific were uninhabited and almost entirely covered in forest. Once people arrived these indigenous forests began to recede. While Maori began the process of clearing land for crops, deforestation was greatly accelerated when Europeans arrived in the 19th century. The slow growth rates of native trees meant the forests were unable to recover from this increasing onslaught.

Realizing that the forest resource was fast running out, the pioneering Government initiated a programme of reforestation using fast-growing introduced tree species. By the early 1900s, these forest plantations had become the basis of an industry that could supply the nation's timber needs, while eventually enabling protection of the remaining native forests.

The New Zealand forestry sector now returns about $NZ4.4 billion per year of export earnings in addition to annual domestic sales of approximately $NZ1.8 billion. This contribution to the economy is based on 1.8 million hectares or 7 per cent of New Zealand's land area.[1]

Some 30 per cent of the commercial forest estate is now in the second rotation, and approximately 20 per cent of the forests are in the third rotation. The area harvested is predicted to be nearly 49,000 ha per annum from 2009 to 2019, and to exceed more than 83,000

Image: Scion

Native and plantation forests form an integral part of the New Zealand landscape

Image: Scion

Early pine logging in central North Island, circa 1950

Image: Scion

Native kauri logging, circa 1900

ha per annum on average from 2020 to 2022. By this time, a high proportion of planted forests will be in their third rotation, and some forests will enter their fourth.

On a global scale, New Zealand forest plantations account for 1.1 per cent of the world's total supply of industrial wood produced from only 0.05 per cent of the forested area, making it a highly productive, sustainable resource. Over 52 per cent of New Zealand's planted forest estate is environmentally certified through the Forest Stewardship Council, and approximately 40 per cent of wood products have chain of custody certification.

A key step in the evolution of the forestry sector was the signing in 1991 of the New Zealand Forest Accord between the forestry sector and the New Zealand Rainforest Coalition.[2] This agreement limited the expansion of plantation forests onto land occupied by indigenous vegetation while recognizing that plantations of either introduced or indigenous species are an essential source of renewable fibre and energy.

Indigenous forest management

New Zealand's remaining natural forests cover approximately 6.5 million ha or 24 per cent of the total land area, most of which is conservation estate. Timber production from natural forests on privately owned land is approximately 10,000 m^3, which is very minor in comparison to the 24.8 million m^3 harvested from planted forests. Harvesting of native timber is controlled by sustainable forest management plans and permits administered by the Ministry of Agriculture and Forestry.

Numerous landowners, interest groups and Maori, in particular, are interested in re-establishing forests of key species such as totara and kauri in order to provide future supplies of indigenous timbers for traditional and contemporary uses.

Changing forest ownership

New Zealand's planted forests have undergone many changes in ownership with significant social consequences. The industry began as a Government initiative and many major forest plantations were owned by the Crown. During the 1980s, these public assets were sold to private companies in New Zealand and offshore. In some cases the land and trees were sold. In other cases, the trees were sold while the land remained under Crown ownership.

The only forests to remain under state management were those growing on land over which Maori had legitimate claims. Maori ownership of planted forests is being clarified through the settlement of claims made in relation to the Treaty of Waitangi.[3] The transfer of Crown-owned land to Maori tribes will add greatly to existing Maori land resources and business opportunities. These include areas of indigenous forests that Maori would like to enhance and manage for a range of goods and services, including timber production.

Research for a productive sector

Research activity funded by both Government and private interests in New Zealand has had a strong focus on the sustainable management of New Zealand's forests and has supported effective environmental stewardship. More recently, research has stimulated recognition of the broader role of planted forests in the provision of important non-timber benefits such as biodiversity habitat, clean water and carbon sequestration.

Image: Scion

Mountain biking is a popular activity in New Zealand plantation forests

The key provider of research on sustainable forest management in New Zealand is the New Zealand Forest Research Institute (known as Scion). Scion is a Crown-owned institute with the core purpose of driving innovation and growth from New Zealand's forestry, wood products and wood-derived materials. The intent is to create economic value and contribute to beneficial environmental and social outcomes for New Zealand.[4]

Scion was founded in 1947 as part of the New Zealand Forest Service. Since then it has played an important role in facilitating interactions between research, policy and management at a number of levels. Scion works with a wide range of stakeholders to develop research programmes, often in partnership with the Ministry of Science and Innovation, which is charged with driving the Government's investment in science in New Zealand.

Working closely with industry partners and Government departments, Scion undertakes direct research programmes at the request of non-government, Government and forest industry entities. Maori organizations increasingly include science, innovation and technology in their tribal strategies, to improve social, economic and environmental outcomes from their land. Science is also being applied to support an emerging interest in indigenous forestry using native species with commercial potential, through combining traditional knowledge with modern forest management tools.

Partnerships and alliances support management through shared goals

Scion has formed a number of partnerships to oversee research and development programmes. A key partnership is with Future Forest Research (FFR), which represents more than 80 per cent of the commercial forestry sector by land area and other key stakeholders, including the Ministry for the Environment, the Ministry of Agriculture and Forestry, regional councils, universities and Maori tribes or 'iwi'. FFR is New Zealand's key pathway for forest-growing research implementation.

There have been many lasting collaborations with local and international researchers, facilitated by scientific awards, travel grants and collaborative research programmes. One current example, supported by the New Zealand Government and the European Community, is the TRANZFOR programme, which promotes knowledge exchange in the general domain of forests and climate change between Australia, New Zealand and the European Union. This initiative supports staff exchanges in a range of core areas, including environmental services from forests.

Supporting forest benefits

There is increasing public recognition of the many benefits from planted (and natural) forests beyond the timber they provide.[5] To date there have been relatively few examples in New Zealand of policy that explicitly rewards landowners for providing these benefits, but more cases are beginning to occur.

The perceived value from planting forests is evidenced by the pattern of afforestation of erosion-prone steepland areas that had previously been cleared for farming. Such forests are often planted to reduce both on-site erosion and off-site sediment loss. More recently, this activity has been encouraged through direct Government incentives and indirectly through implementation of a carbon emissions trading scheme (ETS). The ETS provides forest growers with a source of revenue from carbon sequestration and is likely to provide an incentive for afforestation. The carbon sequestration capac-

Image: Scion

Maori have become important players in New Zealand forestry sector

Image: Scion

Scion has been the key provider of forestry research in New Zealand for over 60 years

ity of planted forests has been well recognized in New Zealand. Forests established after 1990 form a key part of New Zealand's post-Kyoto policy, greatly reducing the country's carbon liability.

Possibly of more importance to the wider New Zealand environment is the impact of extreme weather events in areas still dominated by pastoral systems on steep land. In these vulnerable areas, erosion can be reduced or prevented by planting forests. The focus of research is to understand and minimize erosion risks when the land is disturbed during harvesting operations.

Planted forests in New Zealand have been considered by many to be biological deserts. However, Scion has completed a large body of research that shows the full extent to which planted forests support biodiversity in terms of community structure and the conservation of endangered or threatened species.[6] Other research has shown that catchments in planted forests can have similar levels of indigenous aquatic biodiversity to natural forests and that levels are much greater than in nearby streams in pasture catchments.

Another study on the value of recreation benefits from planted forests provides evidence of the ways in which forest management practices can affect forest use by the community. For example, mountain biking has become a major activity in some areas, using tracks formed in forestry plantations.[7] Research is enabling managers to plan future forest operations (harvesting and replanting) so that their economic forest production decisions are not detrimental to recreational values.

Criteria for sustainable forest management

To maintain its ability to compete in the international marketplace, the forest sector needs to demonstrate responsible performance. The use of criteria and indicators (C&I) provides a framework against which this performance may be understood and assessed.

New Zealand is an active and vital partner in one of the world's most respected C&I frameworks, the Montreal Process.[8] Scion partners the Ministry of Agriculture and Forestry in this Process, providing technical and scientific advice on the development, use and measurement of sustainable forest management indicators. This Process continues to help shape forest policy in countries as diverse as Russia, China, the USA and Argentina, among others.

Forests for the future

New Zealand, like many countries around the world, is anticipating the effects of climate change over the next century. Scion is leading a number of research initiatives that will ensure forests continue to provide for existing needs in addition to new services.

While New Zealand's plantation forests were initially created to supply wood and fibre, there is growing recognition of the other ecosystem services they provide, such as carbon sequestration, erosion avoidance, control of water yield and quality, biodiversity, habitat or recreational activities. In addition, New Zealand has a major opportunity to use plantation forests as a renewable source of carbon-neutral energy, biochemicals and new bioproducts, such as wood-plastic composites.

How future forests will deliver these multiple functions, what tree species will be able to support them and how their usability can be tested in the New Zealand context is the focus of emerging research programmes. This research is beyond the present needs of the existing forestry sector but is supported strongly by central Government agencies, which recognize that the full benefits and services offered by forestry will only be gained through science and technology, combined with informed policy.

Progressive and sustainable practices in commercial forest management

Akito Kataoka, Sumitomo Forestry, Japan

Sumitomo Forestry is a private sector corporation headquartered in Tokyo, Japan, engaged in the worldwide supply, distribution and sale of a wide range of wood products and building materials for housing construction, based on a vertical integration business model. In Japan, the company is ranked number one in terms of the volume of products it handles.

The origin of the company dates back to 1691, when a family named Sumitomo started to operate a copper mine in a Government-owned forest in Besshi Village, Shikoku Island. By the 1880s, the copper mining and smelting operation had polluted the land, rendering it completely bare in some areas. The best-known case of such pollution during the same time period occurred in Ashio copper mine in Tochigi Prefecture. Teigo Iba, then manager in charge of the Besshi area of the company and later to become its Director General, decided to restore the forest land to its original lush condition, and implemented an ambitious project of planting one million seedlings every year. A decade later, the number was increased to 2.4 million per year. This was the origin of Sumitomo Forestry's sustainable forest management practice.

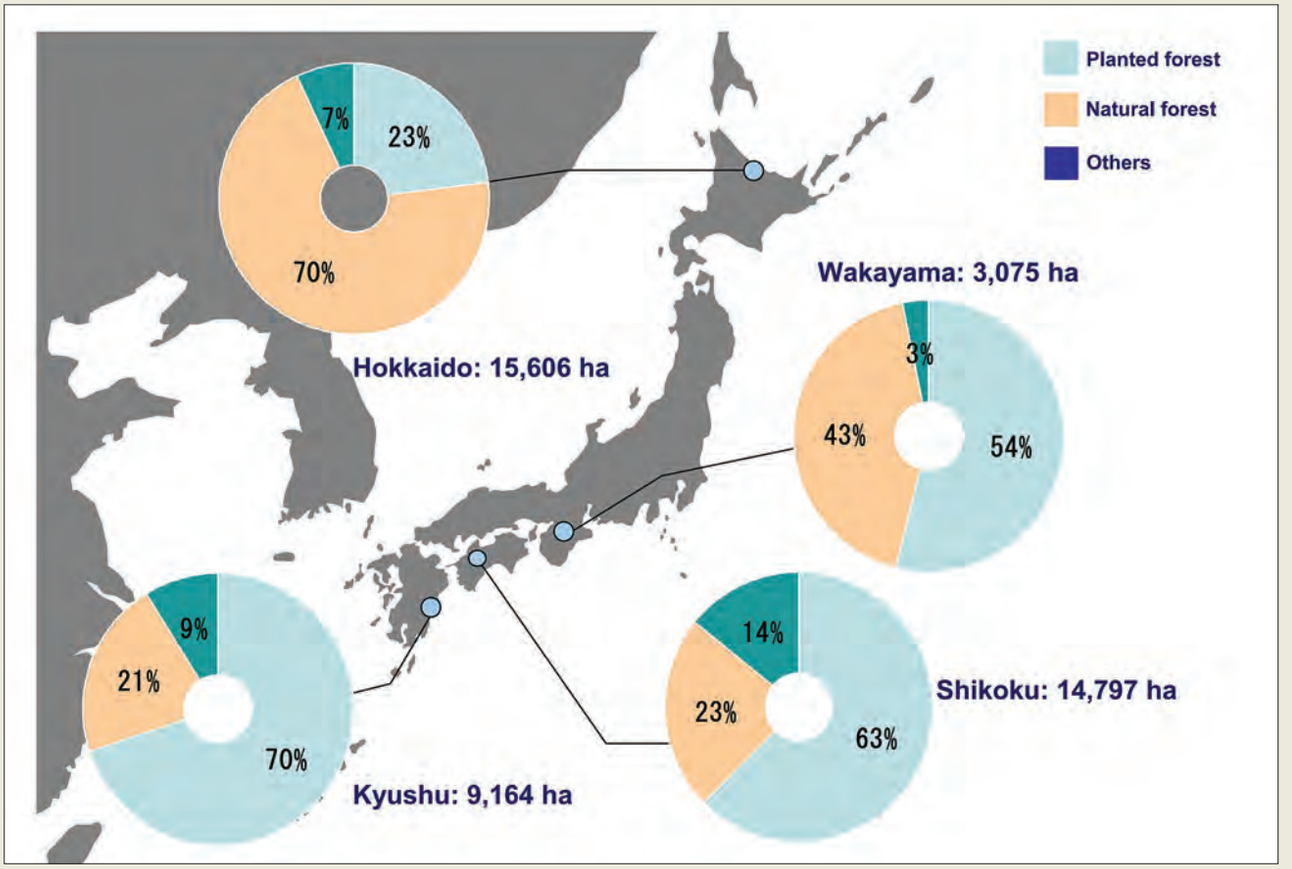
Sumitomo Forestry soon became the first private enterprise in Japan to design and execute Forest Operation Plans. Although the initiative came from the Government's forestry policy, the company studied European forestry management programmes and experiences and built a system of its own. Since then, we have accumulated extensive expertise in sustainable forestry management.

At the start of the 20th century, Sumitomo Forestry expanded its ownership of forest land in Kyushu and Hokkaido Islands. Currently, the company owns forest land in four locations throughout Japan, but is not the largest owner as the land holdings of the major pulp and paper manufacturers and the national

Operations of Sumitomo Forestry Group

Source: Sumitomo Forestry

Total area of Sumitomo Forestry's forests: 42,642 hectares (1/900 of the area of Japan)



Source: Sumitomo Forestry

forests are much bigger. In terms of the quality of forest land management, however, we take pride in the fact that ours are of the highest quality.

When World War II ended in 1945, Japan was in the midst of confusion and hardships socially and in the forestry management sector. During the war, an enormous number of trees had been cut down to be burned as fuel and to be used for building or other purposes. Many forests had been destroyed, with denuded slopes left behind. This increased the risk of natural disasters caused by landslides and floods. Timber harvesting continued or even increased, however, pressed by the ever-stronger demand during the post-war reconstruction era.

To address the situation, in 1950 the Japanese Government enacted temporary measures for reforestation, together with other political measures. As the demand for lumber continued to exceed the supply, private forest landowners saw a great deal of value in planting softwood, such as Sugi (Japanese cedar) and Hinoki (Japanese cypress). There were two peak years of the post-war tree-planting rush in 1954 and 1961, and one million hectares of previously cleared timber lands were restored in 10 years.

In Hokkaido, the northernmost island of Japan, where not much planted timber existed in the past, forest owners began to look for species that would make more economic sense than native fir or spruce, and selected Karamatsu (larch), a species indigenous to mountainous areas in Honshu Mainland Island, for forestation purposes. For the next 20 years, a considerable amount of the species was planted successfully.

During the same time period (1950s to 1970s), Sumitomo Forestry also planted Japanese cedar in one of its forest lands in Kyushu, the southernmost island of Japan, where the area's warm climate allows relatively faster tree growth. Today, this species accounts for approximately 70 per cent of the company-owned forest lands in Kyushu. In Hokkaido, larch was also the species selected by Sumitomo Forestry, but with a different purpose: one-generation planting for marshland soil improvement. Today, 2,000 hectares of the 15,000 hectares of company-owned forest lands are planted with these trees.

Current status of sustainable forestry

Operational guidelines currently implemented include efforts to maintain and increase forest resources, environmental preservation, effective and continuous use of timber resources, and sustainable forest management for continued profitability. Methods include zoning based on tree growth, value and efficiency, reviewing existing zoning to incorporate actual forest situations, classification into the two major categories of economic forests and environmental forests, and a shift from

Source: Sumitomo Forestry

Company-owned forest in Kyushu

selective cutting to small-bloc clear-cutting in areas with high site quality.

Initiatives are underway to ensure tree age diversification and proper distribution in post-war reforested timberlands. As a result of the post-war reforestation rush, tree age homogeneity is a common issue among private timberlands throughout Japan. Together with Sumitomo Forestry, forest owners are recommended to practise the small-bloc clear-cutting and replanting method to rectify the problem and to achieve more diversified tree age distribution. Careful attention to Sustainable Green Ecosystem Council (SGEC)-led biodiversity, especially in clear-cutting operations, will help forestry businesses to meet market demands. SGEC is a forest certification system established in Japan and takes into consideration the management of afforested timberlands in Japan.

Five-year Forest Operation Plans are currently required by law, although this is scheduled for review and change in 2013. Corporate Annual Plans are created in accordance with the budgeting system of the company and forestry operations are based on these plans. Each of the field offices in four locations has its own staff and plans, which are implemented under the control of Head Office. Management makes use of GIS tools (a combination of a mapping system and a forest database with operational history).

Collaboration between Sumitomo Forestry and forest owners in Hokkaido

In Hokkaido, Sumitomo Forestry owns both softwood-planted timberlands and natural forests of mixed species. Recently, we began clear-cutting the softwood timberlands in small blocs as some of the trees reached the age of 50 or older. For the second-growth natural forests, selective cutting is practised under our Forest Operation Plans.

Sumitomo Forestry has obtained SGEC forest certification for all of its company-owned or company-operated timberlands. Such certification and recognition by a third party provides solid proof and evidence to our customers and various organizations that we are managing forests in a sustainable manner and that the value of our forests should be recognized.

In Hokkaido's West Abashiri area, a total of 300,000 hectares of forests (including our company-owned forests, national forests, and other public and private forests) have already been certified by SGEC. The City of Mombetsu and adjacent small communities in the area were searching for ways to revitalize the local economy by maximizing the value of products from the surrounding forest lands. Sumitomo Forestry, working together with various groups of local people, decided to achieve this goal by obtaining SGEC forest certification because the certification means that our forests are managed in a sustainable manner and that biodiversity is ensured.

Efficient use of products from certified forests

SGEC has a system similar to the Forest Stewardship Council's Chain of Custody system, called the

Source: Sumitomo Forestry

Left side: Planted Todomatsu (fir) forest, Right side: Planted Karamatsu (Japanese larch) forest, a company owned forest

Separation and Labeling System. Through the use of the system, Sumitomo Forestry intends to cooperate with local businesses and suppliers in making SGEC-certified timber into final products, promoting them and using them for the homes we build.

Sumitomo Forestry's Housing Division only uses timber from Hokkaido for the structural members of the homes it supplies in Hokkaido. SGEC-certified timber is specified for use in certain parts, including posts. We intend to increase the use of SGEC-certified timber as we know our customers are happy with it. Other businesses involved in this endeavour are also trying to distribute more SGEC products in the market themselves. Processing companies, both large and small, and local medium-sized home builders have joined the efforts to promote the forestry products coming from the areas controlled by SGEC.

As was the case in Europe in the past, the challenge we are facing is the fact that Japanese consumers are slow to accept the costs associated with the value they can get from forest certification. They are willing to choose certified products, but do not want to pay higher prices for them. Elsewhere in the world, consumers appear to have started paying for the value they now recognize. This trend appears to have started when governments and other public organizations began to use forest-certified products.

In Japan, one suggestion is to start working on the Government sector. The mandatory use of SGEC products for the construction of public buildings and facilities would ensure increased production, which would, in turn, make the prices more agreeable and the value more widely accepted. Furthermore, it would help eliminate the use of illegally harvested products, domestic or otherwise.

Sumitomo Forestry will continue to strive to become a model case in Japan's forestry industry through its practice of sustainable forest management and SGEC certification. As part of this process, we urge Japanese private forest owners to start practising small-bloc clear-cutting to ensure proper tree age distribution and diversification of Japan's timberlands.

Replanting after clear-cutting is essential to Japan's forest lands because natural reforestation cannot be expected, due to climatic and topographic conditions. Sumitomo Forestry will build on its work in the field of low-cost timberland regeneration, providing high-quality nursery stocks to forest owners for post-harvest reforestation purposes.

There is no doubt that forest certification revitalizes local economies. Efforts should be made toward mandatory inclusion of building materials from certified forests in bidding proposals for the construction of public buildings and facilities. We believe that this approach should be incorporated into the legal framework as part of the Act for Promotion of Use of Wood in Public Buildings, which came into effect in Japan in 2010.

Sustainable plantation management through certification

Canecio Munoz, Sinar Mas Forestry, Indonesia

Sinar Mas Forestry (SMF) is the sole fibre supplier to Asia Pulp Paper (APP) in Indonesia. It manages plantation resources with a gross area of 2.5 million hectares (ha), and a net operational area of 1.5 million ha in Sumatra and Kalimantan islands of Indonesia. SMF directly employs over 9,000 people and develops plantations in both greenfield sites (barren lands) and degraded forest locations within Indonesia.

As a supplier to APP, SMF must demonstrate compliance with APP's environmental sourcing policy that requires "purchasing wood fibre for pulp-making operations from sustainably managed forestry sources, which conserve areas of outstanding habitat and operate in harmony with local communities."

Recognizing the need to clearly demonstrate compliance to this policy, SMF required a credible sustainable plantation certification standard (audited by a third party) to be implemented within all SMF-licensed companies.

The SMF forest certification programme started in 2007 using both the obligatory standard for sustainable forest management, and the voluntary Indonesian and international certification schemes. Of the different schemes tested, SMF and partner-forest management units (FMUs) decided to pursue a forest certification programme applying the requisite and non-compulsory Lembaga Ekolabel Indonesia (LEI) standards. The international scheme tested was found not practicable for application in the country's commercial plantation forest development.[1]

SMF decided to demonstrate its compliance with APP's fibre procurement policy through the gradual application of the Lembaga Ekolabel Indonesia (LEI) Sustainable Plantation Forest Management Certification System 5000-2 (SPFM 5000-2) standard, to encompass all licensed companies in addition to the compulsory requirement. A total of 1.4 million ha or 56 per cent of the gross area managed by SMF have been certified under this compulsory scheme.

Area certified under LEI standards in Indonesia

Sustainable certification type	Hectares
Natural forest	502,649
Community forest	25,170
Plantation forest	544,705
Total	1,072, 524

Source: LEI (2011)

The LEI certification standard

LEI first developed its natural forest certification standard from the framework of the International Tropical Timber Organization (ITTO) Sustainable Management of Natural Tropical Forest guidelines. These guidelines were recognized as building blocks for development of a national set of criteria and indicators[2] to be adopted at the formation of LEI in 1998.

In 2000 the natural forest certification standard was developed into SPFM 5000-2. This was designed for compliance with all social, environmental and labour regulations of Indonesia.

As at 1 October 2011, LEI had a total certified area of forest in Indonesia of over 1 million ha, as shown in the illustration below.

The SPFM 5000-2 standard also gives assurance that the entity under assessment is operating to, and in compliance with, local and national natural resource management regulations and that the entity is economically viable and supporting environmental, social and economic aspects of regulations relevant to plantation development.

LEI is currently engaged with FSC in the nascent stages of a harmonization assessment within a memorandum of understanding.

Goal of certification

The strategic goal for SMF is to have 2.3 million ha or 90 per cent of the concession area certified under SPFM 5000-2 standard by 2015. This area is expected to change, contingent upon acquisitions or disposals of companies into and out of the group.

As at February 2011, a number of SMF entities had passed the benchmark for demonstrating sustainable plantation management under the SPFM 5000-2 standard. These include:

- PT. Wira Karya Sakti Tanjung Jabung, Jambi 260,829 ha
- PT. Finnantara Intiga Sanggau, Kalimantan Barat 126,806 ha
- PT. Surya Hutani Jaya Kutai, Kalimantan Timur 157,070 ha

This represents 22 per cent of the gross area of 2.5 million ha of SMF managed companies.

Image: Sinar Mas Forestry

Empowering local communities

Image: Sinar Mas Forestry

Enhancing community livelihoods

Experiences in implementation

As at the time of implementation of the certification programme, SMF was in compliance with the International Standards Organization (ISO) 14001:2004 Environmental Management System Standard.

Establishing and mainstreaming the certification approaches initially required the ISO system to form the basis of the reporting requirements. The presence of that system also enabled an existing environmental reporting structure to be utilized in the implementation of the LEI Sustainable Plantation Management Standard needs. The presence of the ISO committee also provided a forum for dissemination and sharing of information across departmental boundaries.

To support implementation, a core team of support staff was recruited at the head office level. This team worked with environment teams at the company level and the operational teams at the site level in terms of training, coordination of data collection and improvements in reporting systems.

Mainstreaming of environmental monitoring and improvements in addition to the national requirements also required the existing environment management structures to be reviewed.

Key results of this action were information sharing with the operational teams and an immediate need to address the management of environment functions at the field level.

At the initiation of the programme, the management structure meant environment staff at the field and regional level reported to operational managers and operational directors respectively. This led to management issues when empowering local field staff to enforce additional company environmental standards. There was initially management confusion, with overlaps in human resource supervision and issues on sourcing of internal funding for proposed actions.

Achievement of the SPFM 5000-2 standard also required support from the departments managing land claims, enforcement/security, human resources, community engagement and social development, operational issues, land planning and mapping. To do this, all departments had to be able to work and operate in coordination rather than as individual units to address specific issues and functions.

These difficulties were overcome by implementing environmental key performance indicators while redefining the lines of reporting for the field environment teams.

Environmental funding improved through centralizing environment department budgets.

To improve coordination between various departments and functions, additional reporting and communications procedures were introduced. Individuals also assisted with improving communication between departments to enhance understanding of functions. Environment function reporting was amended directly to chief executive officer level, allowing for the same status as operational and other department chiefs.

Benefits of implementation

The key benefit of implementing the sustainable plantation management plan has been improvements in the capacity of teams in biodiversity and conservation management and social engagement. This has resulted from internal communication and training, but also from increased exposure to academic institutions and specialist organizations.

SMF supports flagship conservation programmes contributing over 150,000 hectares of natural forests (designated for industrial plantation development) to permanent conservation.

Image: Yayasan Pelestarian Harimau Sumatra

SMF supports flagship conservation programmes covering 150,000 hectares of forests, some of them providing protection for rare mammal species

The most prominent of these are the Giam Siak Kecil Bukit Batu Biosphere Reserve, the Taman Raja Wildlife Corridor, proposed Senepis Tiger Sanctuary, the Orangutan Conservation in Planted Forest Landscape and the newly proposed High Carbon Content forest programme in Riau.

These programmes (apart from being direct conservation efforts) are a key component of supporting the implementation of the sustainable plantation forest management programme in two ways.

150,000 hectares of the flagship conservation programme comprises natural forests featuring varying soil types, conditions and forest structures. The areas face multiple challenges, from illegal logging and land occupation to human-animal conflict. They are all micro-scale examples of the threats that are present in land use in Indonesia as a whole and they represent (from the SMF perspective) a source of learning for core teams on the key challenges faced in the field.

These locations allow new techniques to be trialled in controlled environments to resolve challenges and provide opportunities for staff to learn from leading academics in their field.

The role of plantations in providing protection and support as habitats for threatened and endangered species at the landscape level is also being expanded, giving key lessons for habitat and protection management within the plantation matrix.

Kutai National Park lies alongside SMF company Surya Hutani Jaya Kutai. Following engagements with a non-governmental conservation organization in 2008, it was estimated that 300-700 orangutans live in and migrate through the industrial plantation.

As a responsible plantation company certified under SPFM 5000-2, the entity must demonstrate that it protects, manages and, where possible, creates opportunities for the orangutan population to expand. This requires the plantation management unit to develop and implement specific management planning requirements to drive a balance between the recognized need of the species and the operational target of the plantation.

At the landscape level, changes in land use, encroachments and actions in national parks and interactions between indigenous groups and migrants are all interlinked with the conservation of the species.

The management of the orangutan plantation population cannot be viewed in isolation but has to be seen in the context of the landscape and the multiple land uses that include (in the Kutai landscape):

- Palm oil plantations
- Industrial wood fibre plantations
- Selective logging licences
- Open-cast coal mining.

This requires landscape-planning actions involving multiple actors from indigenous communities, civil society, land-use planning departments at district, provincial and ministry level, enforcement agencies, conservation groups and private companies.

All this contributes to improving team capacity, understanding and community engagement skills of the field staffs in these locations.

Image: Sinar Mas Forestry

Tasik, a unique hydrological ecosystem

Image: Sinar Mas Forestry

Ramin (*Gonystylus bancanus*)

As a component of this continued learning, companies within the SMF umbrella continue building on skills in peatland management practice.

Driven by international objectives to reduce greenhouse gas emissions from land-use change, tropical peatlands and the anticipated release of gases that may occur in development is now at the forefront of international and national policy debate, project actions and funding sources for conservation and civil society NGOs.

SMF programmes, in addition to the national requirements, enable a long-term monitoring platform for research and development into peatland management methodologies. Additionally, SMF has identified locations and is now engaging with third parties to identify finance mechanisms for continued maintenance of these.

SMF employs best management in peat land development, but understands that best management practice is a moving target and as more data and information come to fruition these approaches will change. This continual improvement is fundamental to the maintenance and expansion of the sustainable plantation forest management programme.

APP's fibre procurement policy has driven SMF to embark on a programme of sustainable plantation certification, with a focus on LEI's SPFM 5000-2. This certification programme is delivering internal and external benefits, improving capacity of teams and understanding among employees, and encouraging cross-departmental coordination.

Externally the actions have resulted in an additional 150,000 hectares of natural ecosystem being protected, improved communication and understanding with local communities and improving biodiversity and conservation management skills and activities.

Image: PT SBA, 2010

A 3-year-old *Acacia crassicarpa* plantation, which has the capacity to sequester about 30 tons C/ha/yr at age 5 years

Korea's National Forest Plans for green growth and sustainable development

Chong-ho Park, Director-General of Forest Resources Bureau, Korea Forest Service

The Republic of Korea is a mountainous nation with forests accounting for 64 per cent of the total land. Today it boasts beautiful land and rich forests, but forty years ago the land was denuded. As the result of excess cutting and exploitation during and in the aftermath of the Japanese occupation and the Korean War, forests were severely devastated. Moreover, forest degradation was accelerated by unsustainable forest activities including slash and burn farming. Despite the then deteriorating conditions, the whole nation and its people made collective efforts to rehabilitate degraded forests which consequently have turned into healthy green forests.

Image: Korea Forest Service

The Korean people have participated in forest rehabilitation

Compared to the forest status in 1970, forest resources have increased today by 11 times, and the growing stock has risen from 10 to 126 cubic metres. The public value of the forests has improved dramatically to around US$61 billion and economic value per year soared up to US$4.2 billion. Forests are emerging as the driving force of the nation's green growth. This successful forest rehabilitation has been achieved through sustainable forest management which can be an exemplary model for those countries suffering from forest degradation.

Remarkable success in national forest rehabilitation

The Republic of Korea has made a widely recognized success in forest rehabilitation in a short period of time. This achievement is attributed to a strong-willed leadership and government-initiated forest policy on forest conservation and plantation. Another key element of this success is the earnest participation and concerted effort of the Korean people, who were fully aware of significant potential of forests.

The Government of the Republic of Korea has designed and implemented ten-year national forest plans since the 1970s, and is now in progress with its fifth such plan.

The First National Forest Plan: Forest Rehabilitation Project (1973-1978): In the 1950s, forests were left in a state of extreme devastation as the result of excess logging during and after the Japanese occupation and the Korean War. The growing stock volume per hectare then was merely six cubic metres, six per cent of the current figure. With the aim of restoring these devastated forests, the National Forest Plan was established. After legal and institutional preparations in the 1960s, the Forest Rehabilitation Project was finally launched in 1973. The Government declared the Nationwide Tree Planting period (21 March-20 April) to draw out active participation from the public. More than one million hectares of denuded forest were restored with fast growing tree species through public participation. The ten-year project was completed four years in advance of its target.

The Second National Forest Plan: Forest Rehabilitation Project (1979-1987): This plan was devised to establish large-scale commercial forests that could develop into

sustainable timber resources for domestic demands on timber products. Various forest policies were forged and implemented in pursuit of objectives like forest rehabilitation, forest protection and foundation of forest development funds to support private forests. Along with reforestation projects, erosion control was also actively undertaken to prevent natural disasters, and advanced biotechnology was adopted to control forest diseases and pests as well. Under the Second National Forest Plan, 80 commercial forests were established, and 325,000 hectares were successfully reforested, with plantation of a total of 1.06 million hectares successfully completed.

The Third National Forest Plan (1988-1997): The third plan aimed at harmonizing economic functions and public benefits of the forests. The plan focused on establishing the foundation of a forest management infrastructure, including forest road construction, forest mechanization, and education for foresters and forestry workers. The Korea Forest Service (KFS) carried out forestry income enhancement projects and forest awareness-raising programmes, and supported overseas plantation projects with the aim of securing stable and long-term timber supplies. It also developed and implemented policies for improving public benefits of the forests, including the creation of recreation forests, water resources conservation and wildlife protection. To promote more effective forest management practices, the Forest Law was amended and enforced, and the Act on Promotion of Forestry and Mountain Villages was enacted in 1997.

The Fourth National Forest Plan (1998-2007): The fourth plan represented a transitional phase of forest policies from mainly focusing on economic functions to enhancing overall forest benefits, including public benefits, recreational and ecological values and urban forests. Therefore, the concept of sustainable forest management was reflected in forest policies and activities. The KFS put special emphasis on developing valuable forest resources and fostering a competitive forestry industry, thereby improving public benefits. The Government-led forest management policies turned into autonomic forest management in the private forest sector, based on the capability and capacity of forest owners. With the view of realizing objectives for sustainable forest management, the KFS consolidated legal and institutional systems by newly enacting the Framework Act on Forest, the Act on Promotion and Management of Forest Resources, the Act on the National Forest Management, the Act on Forest Culture and Recreation and the Act on Promotion of Forestry and Mountain Villages.

The Fifth National Forest Plan (2008-2017): The current plan builds on foundations and framework established under the fourth plan and has been designed to further expand the implementation of

Image: Korea Forest Service

These pictures, of the same area, show the transition from a denuded forest to a recovered forest as a result of erosion control works and plantation

Image: Korea Forest Service

Water quality improvement is just one of the key public values of forests

sustainable forest management in pursuit of maximizing forest functions. In particular, the plan highlights the importance of forest functions in responding to climate change. Under the plan, the KFS fosters the forests as important environmental and social resources, thereby establishing a foundation for a sustainable welfare society, and pursues forest-related industries as a 'blue ocean strategy' – which can contribute to the national economy. The KFS focuses on promoting systematic implementation of forest conservation and management for the purpose of achieving well-balanced land development and conservation. It also plays a central role in natural disaster prevention efforts, which is improving health and vitality of ecosystems and contributing to public safety and environment conservation. It further highlights forests' recreational and cultural functions for improving quality of life and living environments both in urban areas and mountain villages as well as providing welfare benefits for the people. The overall vision of the fifth plan is 'to realize a green nation with sustainable welfare and growth' by sustainably managing forests as key resources for strengthening national economic development, land conservation and improved quality of life.

Enhancement of diverse forest benefits and services for the people

Driven by the recently increased public awareness of the environment, the public value of the forests is surpassing their economic value. The total forest value was measured at US$14 billion in 1987 but has soared up to

US$61 billion as of 2008, which is 15 times its economic value. Key evaluation elements of public value are water storage enhancement, air quality improvement, erosion control and forest recreation. Other key factors include water quality improvement, landslide prevention and wildlife protection. Notably, public demand for recreational and healing functions is increasing due to population ageing, demographic changes and improved national income.

Recreation and mountaineering — Along with the increasing public demand for quality of life, recreational activities in forests are becoming more popular, evidenced by the growing number of forest visitors. Since 1988, the recreation forest project has been implemented to meet the public demand for forest recreation. As of 2009, 133 recreation forests are in operation. To enable visitors to enjoy nature as much as possible, the recreation forests are equipped with eco-friendly facilities to a standard unlike other outdoor recreation places. Visitors can spend quality time walking through forests and enjoying 'forest-bathing' and the natural surroundings. Moreover, diverse environmental education programmes are provided to give visitors a better understanding of forests and nature. The KFS implements various mountaineering policies for creating and maintaining hiking trails and operates mountaineering schools to ensure forest visitors and mountaineers can enjoy themselves safely.

Therapy forests — Korean society is ageing, having been industrialized and modernized at a rapid pace. There is a resulting tendency for environmental diseases, chronic illness and senile diseases to increase. It is said that conventional treatments for those diseases are rather limited, so it draws more attention to natural treatment. Forests are believed to have a wide range of natural elements good for health, such as phytoncide, anions, comforting scenery and natural soils. The KFS has created therapy forests in order to promote nature's healing power and improve public health. They are now in operation, equipped with simple sports facilities, visitor centres, meditation spaces, rest areas and healing forest trails. There is a 'model' therapy forest in the Saneum recreation forest in Gyeonggi Province, and more therapy forests are planned by local governments.

International forestry cooperation

The Republic of Korea is willingly disseminating its forest technologies and valuable experience from successful forest rehabilitation projects which have been internationally recognized. It continues to take part in cooperation projects in those countries suffering from forest degradation and desertification, building a bridge between developed and developing countries. Therefore, Korea can make advances in sustainable development as a green growth model nation.

As the first Asian country, Korea successfully hosted the tenth session of the Conference of Parties to the United Nations Convention to Combat Desertification (UNCCD COP 10) in October 2011. The COP 10 is evaluated as a landmark in the UNCCD history in many respects including the achievement of significant progress on key topics and bringing a new dynamic to the UNCCD process. One of the major achievements is that the Changwon Initiative, proposed by the Korea Forest Service at the High-Level Segment of the COP 10, was welcomed and successfully endorsed by the country parties. The Changwon Initiative aims to complement the UNCCD and the 10 year strategic plan and framework to enhance the implementation of the Convention (2008-2018), serving as a stimulant to breathing new life into the UNCCD process. Main components of the Changwon Initiative include: 1) enhancing the scientific process of the UNCCD, 2) mobilizing additional resources and facilitating partnership arrangements and 3) supporting a global framework for the promotion of best practices through organization of the Land for Life Award.

Support projects and desertification prevention projects for developing countries — The Korea Forest Service has been implementing forest projects which built on Korea's bilateral cooperation on forestry: plantation projects to combat desertification in China and Mongolia; the mangrove rehabilitation project and the tree improvement and nursery project in Indonesia; and the forest rehabilitation project of arid regions in central Myanmar. Further, the KFS has been facilitating sharing of forest rehabilitation and management technologies through training programmes, inviting 553 participants from 56 countries including Indonesia, China and Mongolia, since 1984.

Establishment of AFoCO — The Asian Forest Cooperation Organization (AFoCO) proposed by Korea is in the process of establishment with the view of addressing climate change and combating desertification in Asia. It aims to manage and conserve forests in an ecologically sound, eco-friendly and economically feasible way. Korea makes its continuing efforts to launch the AFoCO among the Republic of Korea and ten ASEAN member countries in 2011, and to extend the membership to other Asian regions in the near future.

Cooperation with the Democratic People's Republic of Korea (DPRK) — Forests in the DPRK have been deteriorating due to excessive cutting and overexploitation of forest resources, especially for fuel, which causes food shortage. Such environmental problems in North Korea are likely to cause negative impacts to forest ecosystem and water systems of the entire peninsula in the long run. The KFS is undertaking diverse endeavours to restore degraded forests in North Korea and carry out phase-in activities of forest rehabilitation in cooperation with FAO in the pursuit of realizing a 'Green Korea'. It supports North Korea's forest rehabilitation in line with securing carbon credits and responding to climate change.

The Republic of Korea was severely affected by the impacts of forest degradation and unsustainable forest management, but with significant effort and investment has reversed degraded forests into sustainable forests. We have successfully managed to re-green degraded forests with National Forest Plans.

Acknowledging that forests with valuable benefits and services can be a key solution to poverty eradication and environmental issues in developing countries, Korea continues to share its proven practices of forest restoration and sustainable forest management, which can help developing countries build their capacity toward sustainable development.

Changing perspectives on forests through broad stakeholder engagement: the Model Forest approach

Peter Besseau, Christa Mooney, Richard Verbisky, Virginie-Mai Hô and Nicolas Duval-Mace,
International Model Forest Network Secretariat, Natural Resources Canada – Canadian Forest Service

Nature does not recognize administrative boundaries, and yet historically we have managed it as though it does. The frequent result has been fragmentation, degradation, competing and often incompatible land-use activities, unreasonable expectations and conflict. Landscape-level approaches have increasingly been adopted in recent years by national and international agencies to support their efforts to manage natural resources sustainably. By working on a landscape scale, actors can assess resources as an interlinked, interdependent package, determine impacts of proposed resource use and make informed decisions. Overlapping issues of concern can be addressed simultaneously, providing an opportunity for approaches that have greater impacts and meet multiple needs.

In this International Year of Forests, we are seeing an increasing focus on the importance of the relationships between forests and the people who depend on them. Maintaining these relationships is a fundamental principle of sustainable forest management (SFM) and relies on sound forest policy in order to succeed. In its document, *Guidelines on the management of tropical forests*, the Food and Agriculture Organization advises that national forest strategies should be part of national land use policies. International priorities, policies and instruments, such as the Non-legally Binding Instrument on All Types of Forests, and agreements such as Agenda 21, the Convention on Biological Diversity and the UN Convention on Climate Change, also influence decision-making, from national to local levels.

Image: Théophile BOUKI, African Model Forest Network Secretariat

Dr Chimère Diaw, Director General of the AMFN Secretariat tours Lake Karago in Rwanda's Gishwati landscape, with the Honourable Stanislas Kamanzi, Minister of Natural Resources, and Dr J.J. Mbonigaba Muhinda, Chairman of Rwanda's Irrigation and Mechanization Taskforce

Effective application of policy requires the meaningful engagement of local actors operating at a landscape scale. Recognizing this, in the early 1990s Canada set out to test and implement a participatory, multi-stakeholder approach to SFM. The result was the Model Forest Program.

In 1992, at the UN Conference on Environment and Development (UNCED), Canada invited other countries to join with it in testing the new Model Forest idea. It pledged US$8.5 million to launch the International Model Forest Network (IMFN) with a view to eventually creating a global network that would serve as a conduit for disseminating best practices between Model Forests around the world. Today the IMFN has grown to almost 60 Model Forests in 30 countries.

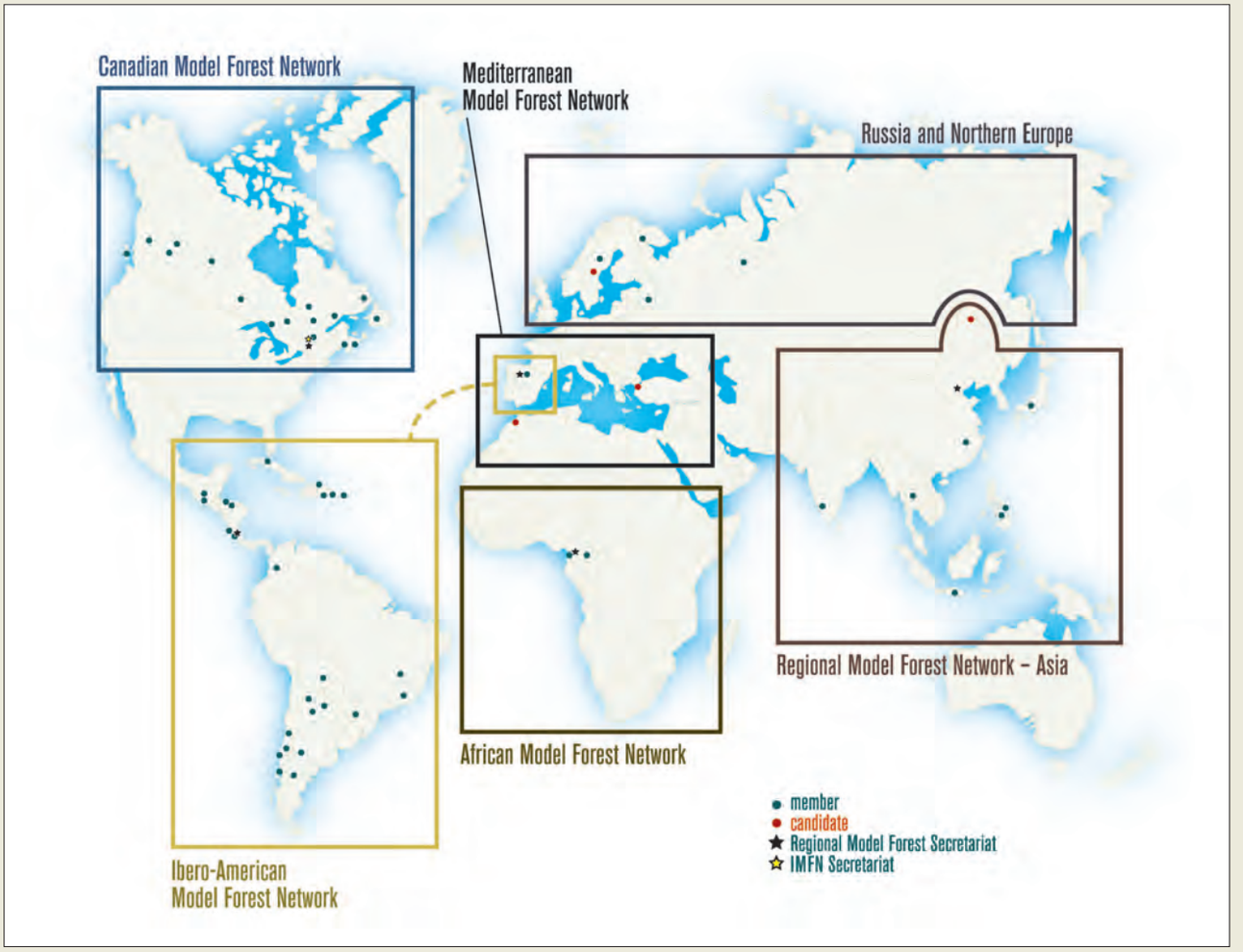
What is a Model Forest?

A Model Forest is an approach to sustainable resource management that addresses social, environmental and economic needs of local communities while ensuring the long-term sustainability of large, predominantly forest-based landscapes. Fundamentally, they are about people, the choices they make and the actions they collectively take to bring about lasting, positive change. Importantly, the approach responds to local needs and is country-driven.

Model Forests are based on six principles:

- Broad-based, inclusive, voluntary partnerships
- A commitment by all partners to work collaboratively in support of sustainable forest management
- A land base large enough to incorporate the main land uses and values

International Model Forest Network regional map



Source: IMFN Secretariat

- A governance mechanism that is representative, transparent and accountable to its members
- A programme of work reflective of its partners' needs and values
- A commitment to networking with each site being a 'model' from which others can learn and advance their own sustainability goals.

While each Model Forest determines its own priorities and programmes, IMFN members have identified a number of issues relevant to all sites which form the basis for more focused and deliberate collaboration between sites and regions. These strategic initiatives — climate change, environmental goods and services, and community sustainability — enable members to explore issues and implement activities that extend beyond any single Model Forest or country. In addition, an IMFN Circumboreal Initiative fosters international research and cooperation on common issues across the boreal region. The IMFN Secretariat, based at Natural Resources Canada — Canadian Forest Service and receiving support from the International Development Research Centre, coordinates these initiatives and the Network's overall development.

Regional Model Forest networks have been established in Canada, Latin America, Africa, Asia and the Mediterranean, with participating forests in Sweden and Russia as well. The nearly 60 sites that form the Network are supported by a variety of partners and stakeholders, including governments, which are important partners by virtue of their role in forest policy and as stewards of public lands.

Branching out in Africa

Established in 2009, the African Model Forest Network (AMFN) is the youngest regional network in the IMFN. Its development is supported by a Government of Canada contribution of US$15 million targeted at the Congo Basin and Maghreb regions. The AMFN's mission is to facilitate the development of a pan-African network of Model Forests. Two pilot sites were established in Cameroon in 2005, together covering approximately 1.5 million hectares. Morocco joined the Network in 2010 and many other initiatives are rapidly developing in Algeria, Tunisia, and the Democratic Republic of Congo and elsewhere in the Congo Basin.

The IMFN is particularly excited about new prospects for Model Forests to benefit Rwanda. The Government of Rwanda's new Forest Landscape

Image: Brian Kotak, Manitoba Model Forest

Cabécar ecotourism business in the Reventazón Model Forest, Costa Rica

Restoration Initiative is a highly ambitious, comprehensive national plan to restore forests, land, soil and water over the next 25 years. As a partner to this initiative, Canada announced that the IMFN Secretariat and AMFN will work with the Government of Rwanda to identify and support Model Forest development, tapping into the rich experience of its partners around the world in support of forest stewardship for this initiative.

Economic development and protected species: not mutually exclusive

The Araucarias del Alto Malleco Model Forest covers 150,000 hectares in Chile's IX region. This area is home to a significant number of Mapuche-Pehuenche indigenous peoples as well as the protected *Araucaria araucana* tree. Farming, livestock and logging are the main economic activities in the region, where 53 per cent of the population lives below the poverty line. The implementation of SFM is highly complex as the cattle ranching tradition is awarded a high cultural value while the value placed on forests is relatively low. Moreover, long-standing conflicts between indigenous and non-indigenous peoples has made cooperation across social lines difficult. A need for a coordinated participatory governance model and a policy to transform the forest into an engine for sustainable development helped spark the creation of the Model Forest in 2002.

In 2003, the Model Forest coordinated a research project with the University of Chile to explore options for developing a more diversified market for the piñon (the fruit of the Araucaria tree and an important source of protein in indigenous diets). This led to the Model Forest arranging for entrepreneurial training for rural landowners and indigenous women on topics such as haute and ethnic cuisine, flour and cookie production, and canned piñon. The results were dramatic: an 80 per cent increase in economic activity related to piñon production, processing and marketing. The success of the innovative venture attracted national level support and a second project was subsequently created to include additional community members to expand the piñon production chain. Because resource use is in the hands of local communities, the value placed on forests has increased alongside income generating activities, demonstrating that economic and environmental benefits are not mutually exclusive.

Meaningful partnerships effect change

The 87,000-hectare Ulot Watershed Model Forest was established on Samar Island in the Philippines to address small-scale timber poaching, slash-and-burn agriculture and unregulated wildlife collection. It was spearheaded by the Philippine Government with support from the Government of Japan, FAO, and the IMFN Secretariat.

Samar Island is rich in forest resources and its forests are officially set aside as a reserve to protect against commercial logging, timber poaching and exploitation. Fragmented and disconnected approaches to these issues had had little lasting effect, and the Department of Environment and Natural Resources worked with the Philippine Army, non-governmental organizations, academics, local communities and others to initiate Model Forest development in 2000.

The Model Forest stakeholders on Samar Island prepared an integrated watershed plan that eventually served as a pilot project for all watersheds in the area. Bringing together the various stakeholders in the planning process enabled them to actively examine and

Overview of Model Forest activities

IMFN Region, Country and Model Forest	Year MF joined the IMFN	Biodiversity Conservation & Stewardship	Bioenergy	Climate Change	Community Sustainability/ Economic Development	Criteria & Indicators	Eco-cultural Tourism Development	Ecological Processes / Natural Disturbances	Ecosystem Services	Education & Capacity Building	Indigenous People's Involvement & Partnership	Non-Timber Forest Products	Women & Youth Engagement
		Model Forest Activities											
AFRICA													
Cameroon													
Campo Ma'an	2005	•		•	•				•	•	•	•	•
Dja et Mpomo	2005				•	•	•			•	•	•	
CANADA													
Canada													
Clayquot Forest Communities	2008	•	•		•	•	•	•	•	•	•	•	•
Cree Research and Development Institute	1997					•							
Eastern Ontario	1992	•	•		•	•		•	•	•	•	•	•
Foothills Research Institute	1992	•		•	•	•	•	•		•	•		
Fundy	1992		•	•	•	•		•	•	•		•	
Lac-Saint-Jean	2007	•	•	•	•	•	•	•		•	•	•	•
Lake Abitibi	1992		•	•	•	•		•		•	•	•	
Le Bourdon Project	2007					•					•		
Manitoba	1992	•		•		•		•		•	•	•	
Newfoundland and Labrador	1992	•	•	•	•	•	•	•	•	•	•	•	•
Northeast Superior Forest Community	2007	•	•		•	•	•			•	•	•	•
Nova Forest Alliance	1998	•	•	•	•	•	•	•	•	•	•		
Prince Albert	1992	•	•	•	•	•	•	•	•	•	•	•	
Resources North Association	1992	•	•	•	•	•				•	•	•	•
Weberville Community	2010												
IBERO-AMERICA													
Argentina													
Formoseño	2000	•			•	•							
Futaleufú	1998	•			•	•	•			•		•	
Jujuy	2002	•			•	•				•			
Norte de Neuquén	2005				•	•					•		
San Pedro	2007		•			•	•		•	•			
Tucumán	2008					•							
Bolivia													
Chiquitano	2005	•	•	•	•		•	•		•	•	•	•
Brazil													
Mata Atlántica	2004				•								
Pandeiros	2005	•	•	•	•		•			•	•	•	
Chile													
Araucarias del Alto Malleco	2002	•	•		•		•			•	•	•	
Cachapoal	2005	•	•	•	•		•		•	•	•	•	•
Chiloé	1998				•		•			•			
Panguipulli	2005	•			•		•				•	•	
Costa Rica													
Chorotega	2011												
Reventazón	2003	•		•	•		•		•	•	•	•	•
Colombia													
Risaralda	2008	•	•	•	•	•	•		•	•	•	•	
Cuba													
Sabanas de Manacas	2008	•	•		•			•	•	•			
Dominican Republic													
Colinas Bajas	2010												
Sabana Yegua	2003				•				•	•			
Yaque del Norte	2007	•			•		•	•	•				
Guatemala													
Lachuá	2008	•		•	•		•		•	•	•	•	•
Los Altos	2008	•		•	•		•			•	•		•
Honduras													
Atlántida	2006	•					•		•			•	
Yoro	2007	•			•				•				
Puerto Rico													
Tierras Adjuntas	2007	•		•	•		•	•	•	•		•	
MEDITERRANEAN													
Morocco													
Ifrane – candidate													
Spain													
Urbión	2006	•		•	•		•	•				•	
Turkey													
Yalova – candidate													
RUSSIA & NORTHERN EUROPE													
Russia													
Komi	2006	•			•			•			•	•	
Kovdozersky	2005	•	•				•					•	•
Pskov	2006									•			
Sweden													
Bergslagen – candidate		•	•	•	•	•	•	•	•	•	•	•	•
Vilhelmina	2004	•	•	•	•	•	•	•	•	•	•	•	•
ASIA													
China													
Lin'an	1999	•	•	•		•	•	•	•	•		•	
Taihe – candidate													
India													
Kodagu	2005	•			•		•		•	•	•	•	•
Indonesia													
Margowitan	2004		•		•				•	•		•	
Japan													
Kyoto	2011												
Philippines													
Carood Watershed	2010				•					•			
Ulot Watershed	2000	•		•	•	•	•	•	•	•		•	•
Thailand													
Ngao	2000	•	•	•	•	•	•		•	•	•	•	•

This is not a comprehensive tracking of activities ongoing in Model Forests, but rather a listing of those activities common to all members

Source: IMFN Secretariat 2010

Image: The International Model Forest Network Secretariat

Pili tree, Ulot Watershed Model Forest, Philippines

address the sustainability of watershed resources and allowed them to express their own views and priorities.

In Samar, as elsewhere, stakeholders are motivated by the expectation that better management will lead to higher incomes and better opportunities for their families and communities. In Samar, this took the form of almaciga resin collection, coconut coir production and rattan processing, while resource base improvement through agroforestry and development of multi-purpose crops and ecotourism activities motivated stakeholders to participate.

Sharing best practices internationally

Networking and knowledge sharing between sites is a key Model Forest principle and motivator for joining the IMFN. Over the years, Canada's Model Forests have been particularly successful in sharing experiences internationally. For example, Canada's Prince Albert Model Forest is collaborating with Chile's Araucarias del Alto Malleco Model Forest and Vilhelmina Model Forest in Sweden in the IMFN's first tri-continental agreement to share knowledge and experiences between indigenous stakeholders. The Manitoba Model Forest recently concluded a three-year project with the Reventazón Model Forest, Costa Rica, where an ecotourism business was developed in collaboration with the Cabécar indigenous people; and Canada's Lac-Saint-Jean Model Forest is working with carpenters in Dja et Mpomo Model Forest, Cameroon, on establishing small enterprises turning exotic wood residues into marketable products such as pens.

Since 2007, the Government of Canada, the Canadian Model Forest Network and the Argentinean National Model Forest Network have been working together to transfer Canadian expertise to Argentina in the development of criteria and indicators (C&I) for SFM. A suite of local level indicators based on Canada's national C&I framework, designed to monitor progress towards sustainability, was developed in each of Canada's Model Forests in the late 1990s to enable stakeholders to track changes and trends in the condition of forests and in the economic and social benefits we derive from them. This initiative has allowed Model Forest experts from Canada to put tools and methodologies in place that will improve forest management in Argentina's national network, and provide an opening for further extension in the Ibero-American Model Forest Network.

Lessons learned

A Model Forest directly addresses the very challenging social aspect of the sustainability equation. It initiates and sustains a robust exploration of the collective demands that we place on our ecosystems, the trade-offs that these demands involve, and options for designing a sustainable future. Model Forests are about a shared investment (human, financial, intellectual, political) in finding effective, long-term solutions to shared challenges. The approach also has its limitations. For example, it cannot work in places where participants are unwilling to listen openly to each other, where the process is largely driven by a single organization, or where persistent and significant funding challenges exist. However, the overwhelming majority of Model Forests have succeeded, and continue to do so.

Twenty years of experimenting with Model Forests has taught us that delivery of SFM policy must be shared with the people who will live with the results. Meaningful engagement of local stakeholders is a prerequisite to sustaining buy-in, momentum, direction and support, and sustainable management of natural resources must provide an economic dividend to local stakeholders.

We have also learned that national forest and other resource-focused agencies are key enablers as well as beneficiaries and partners, and that there is high value in working at a large physical scale and across disciplines and administrative boundaries. Donors, managers and policymakers need to increase their tolerance for innovative approaches and recognize that building a sustainable future is a long-term process, not a project.

The case studies in this chapter are linked through the six Model Forest principles, which are flexible enough to be adapted to almost any context and landscape. Lessons learned are then shared through the IMFN and more broadly to accelerate progress towards sustainability goals.

Model Forests demonstrate that small-scale solutions to large national- or international-level concerns can make a difference. Issues such as transnational resource management, poverty alleviation and climate change provide opportunity for increased collaboration among IMFN members, as well as with other organizations with similar goals.

Next year will mark the 20th anniversary of Canada's announcement of the IMFN at the 1992 UNCED Summit. The message we carry forward as we look to the next two decades is firmly rooted in a view that the array of challenges Model Forests address are not developed or developing country issues; they are familiar in all our landscapes. However, both the range of issues considered and the options for addressing them are substantially enriched through meaningful, broad-based partnerships such as those found in Model Forests.

Forest management and sustainable development in Argentina

Mirta Rosa Larrieu, Director, Forestry Production Department,
Ministry of Agriculture, Livestock and Fisheries, Argentina

The Argentine Republic covers an area of over 3.7 million square kilometres (including the Antarctic sector), with a population of over 40 million and a density of 15 people per square kilometre.

Argentina has about 33 million ha of native forests and an additional 1.1 million ha of planted forests, covering a broad spectrum of ecosystems including humid, sub-tropical temperate, semi-arid, and arid forest types.

Eight to 20 million ha of land is available for afforestation, of which five million has no competition with alternative agricultural use, and can be complemented with other productive activities.

A variety of factors — such as the wide variety of climates, soils and species, an attractive legal framework for investment, low production costs, high growth rates and lower rotations, skilled labour and service companies for the activities of forest plantation management — offer special comparative advantages for the implementation of cultivated forests.

The country's forests have seen a paradigm shift from timber production to multiple use options, in response to various social demands. The Government of Argentina intends to position the country as a leader in the forest industry, being economically competitive, socially responsible, environmentally sustainable, socially equitable and integrated into different regions of the country and the world, aimed at high value-added markets.

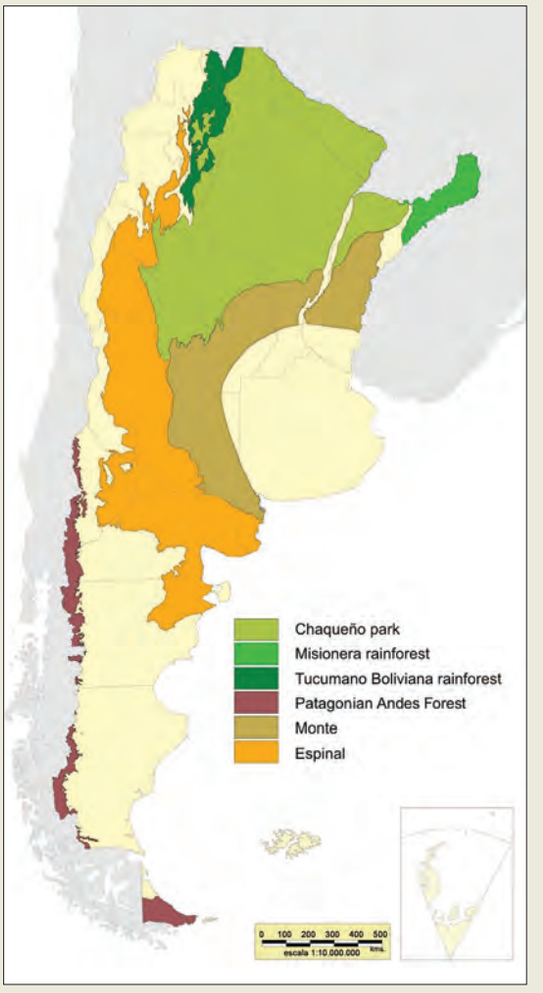
The main strategic areas of focus for Argentina are: expanding the area of sustainable production; increasing productivity in both the quantity and quality of raw materials; promotion and development of investment in the forest industry chain; quality job creation; increased added-value production and industrial forest products; development of domestic demand; increase in exports of all products tending to add value; institutional development, both in the public and private sector; the development of multiple socio-economic benefits of forests (environmental services, energy forests basins); the training of human resources development and technological innovation throughout the industry; the integration of forestry with other agriculture activities; and ensuring the realization of good business practices throughout the production chain.

Regulatory framework

Plantations — The area of planted forests, mainly concentrated in the regions of Mesopotamia, Pampas, Cuyo, Northwest and Patagonian Andes, has been the result of a national policy of incentives for afforestation. Currently in force are the National Law No. 25,080 extended by Law No. 26,432 Investment in Forestry.

Conceived with the aim of increasing forested areas, improving the efficiency of industrial forestry projects and encouraging the establishment of new industries,

Argentina's forest regions



There are 33 million hectares of native forest in Argentina

Source: SAyDS

Image: Las Marías Co

Pine plantations

Image: Garruchos Co

Eucalyptus ministumps

Image: Ederra Co

Poplar plantations

the national policy promotes the establishment of forests, maintenance, management, irrigation, crop protection and an integrated forest industry.

Non-refundable financial support is available for the planting of new forests, with amounts per hectare, varying by region, species and forestry. Funding is also available for silvicultural pruning, thinning, regrowth management and the enrichment of native forest. Such financial support can cover approximately 80 per cent of the cost of implementation, and provide the fiscal stability required for project success.

Native forest — The Minimum Budget Law Nº 26,331 on Environmental Protection of Native Forests provides protection for the environmental enrichment, restoration, conservation, utilization and sustainable management of forests and environmental services they provide to society. Categories of conservation of native forests are: Category I (red) — areas of high conservation value that should not transform; Category II (yellow) — areas of medium conservation value that may be degraded; and Category III (green) — areas of low conservation value that can be converted.

In this way the Government has undertaken the implementation of activities across the country involving the use of forests for economic development of the population and their conservation for future generations.

International cooperation

A sustainable management of natural resources project funded by the International Bank for Reconstruction and Development, called Sustainable Plantation Forestry, contributes to the sustainable development of the forestry sector, strengthening national institutions and provincial, private and non-govern-

Argentina's Model Forest Program

Image: SAyDS

Vicenta's orchard, Toba community Com'lec, Formosa Province

The Model Forest Program was launched in 1996 following an agreement between the Secretary of the Environment and Sustainable Development and the International Model Forest Secretariat, based in Ottawa. Argentina is a founding member of the Iberoamerican Model Forest Network, established in 2002 and hosted by CATIE, Costa Rica.

The Program promotes sustainable forest ecosystems management based on strategic partnerships between key stakeholders and networking, in order to contribute to local communities' progress, considering social fairness, local needs and global concerns.

Its vision is to achieve and maintain regional leadership implementing sustainable development initiatives through innovative strategies that encourage local stakeholders' partnerships and adaptive co-management of natural resources.

The Program has been developed to promote sustainable development within the conceptual framework of integrated natural resources management, to develop innovative methods, procedures, techniques and concepts for forest ecosystems management and to foster strategic partnerships and collaborative management.

A network of provinces — Misiones in San Pedro, Formosa in Formoseño, Jujuy, Tucumán, Norte Del Neuquén and Chubut in Futaleufú — implement local projects addressing a range of issues most relevant to those provinces.

Additional projects implemented by the National Agricultural Technology Institute promote the conservation of biodiversity and environmental management in agricultural and forest ecosystems.

The Model Forest Program also examines the relationships between ecosystem components in Argentina's national parks, nature reserves and protected areas, allowing it to preserve the variety of flora, fauna and natural processes.

Research and development projects on native forests in the Santa Cruz and Tierra del Fuego provinces of Patagonia include investigations into the design of silvicultural treatments, and in North Patagonia discussions on carbon capture, the processes of degradation of forest ecosystems, and the development of methodologies to quantify the processes to report the status of the forests in the region, province and nation are also being carried out.

Monica Gabay, National Coordinator — National Model Forest Program Secretary of Environment and Sustainable Development

Biodiversity and protected environments

In 2009 Argentina formally obtained from the Global Environmental Facility (GEF) funds to implement the Biodiversity Conservation Project in Productive Forestry Landscapes.

Its main objective is to incorporate biodiversity management in plantation of regional and global ecosystems of great importance for Argentina. The management and execution of the project is implemented through the Forest Production Direction belonging to the Ministry of Agriculture, Livestock and Fisheries.

There are many ways to highlight the importance of biodiversity conservation. While it is the product of a natural historical process of great antiquity, biodiversity helps ensure the well-being and balance in the biosphere, contributing to the welfare and development of culture. It likewise represents a source of potential wealth for future generations.

Although the Protected Natural Areas (PNAs) are the basic tool for conservation of biodiversity, as is known, they are increasingly inadequate due to the advancement of the agricultural and forestry frontiers that make them isolated. Therefore, the PNAs should be supplemented or integrated with productive use areas under sustainable management of natural resources. In fact, conservation in productive areas is the higher relative measure application in the world during the last decade.

As part of the management of the GEF, the Forestry Development Project undertook a study to identify critical areas for biodiversity conservation in Mesopotamia and Delta (Univ. Maimonides, 2005). Analysing the current expected occurrence of 414 threatened species including vertebrates (mammals, birds, amphibians, reptiles) and plants (ferns, grasses, epiphytes, lianas and creepers, palm trees and woody plants), it identified 23 critical areas validated in workshops with participation of specialists.

The study estimated that between 4 and 9 per cent of those areas, according to the ecoregion or province, are forested, while between 29 and 48 per cent of the area under afforestation corresponds to priority areas, reinforcing the importance and need to implement conservation actions in plantations.

Technical assistance programme

The GEF project is divided into different lines of action to support the adoption of forestry practices for the conservation of biodiversity. The GEF project meets action strategies to promote conservation biodiversity on the small, medium, and large scale.

A technical assistance programme is planned for forest producers with a wide range of categories in terms of size and production systems. This programme is in development stage and mainly in financed actions, technical assistance such as: training of decision makers and managers; transfer of knowledge and information; specific technical advice; and conducting workshops and meetings.

Possible topics may include: maintenance, support and management of agrochemicals and pesticides and support for identification and establishment of protected areas.

The steps for defining the programme are:

- Regional workshops to identify and discuss the issues relevant to the plan
- Review of existing information in each region with reference to environmental care and production systems, determining their characterization as well as initiatives and actions in progress
- Design a strategy and terms of reference on the basic guidelines of the programme and define possible methodologies for its implementation
- Convene stakeholders in the implementation of the programme to develop proposals for this purpose.

Threatened species

Formerly widespread throughout all the subtropical area of the continent, the marsh deer (*Blastocerus dichotomus*) is now reduced to small isolated populations in areas of estuaries and lagoons of the basins of the Parana and Paraguay Rivers. Natural predators of the marsh deer, the jaguar and puma, have disappeared almost entirely from their habitat. The greatest threat to conservation, illegal hunting which sought the antlers as a trophy, is today relatively controlled. Traditional habitat destruction is the greatest risk to the marsh deer.

mental organizations with direct responsibility for planted forests, through the enforcement of activities investigation, extension training needs, dissemination and support for the efficiency of managed forests.

The Biodiversity Conservation in Productive Forestry Landscapes programme financed by the Global Environment Facility includes the incorporation of biodiversity management in forest plantation ecosystems of regional and global importance in Argentina.

Technical cooperation

Argentina participates actively in international organizations, agreements, forestry implications forums, regional organizations and processes and is developing technical cooperation at the bilateral level. The main multilateral level spaces include the United Nations Forum on Forests, the FAO Committee on Forestry, the Forestry Commission for Latin America and the Caribbean, International Poplar Commission, the Montreal Process and Memoranda of Understanding, as well as bilateral technical cooperation with China, the Russian Federation and other countries.

The opening of Argentina's economy presents a new challenge, of developing the potential of forests to sustain crop production on an international scale, capable of satisfying a significant part of the growing global demand.

Promoting legal timber trade for sustainable forest management

Marieke Wit and René Boot, Tropenbos International;
Ton van der Zon, Ministry of Foreign Affairs, Embassy of Ghana; Marnix Becking, Ministry of Foreign Affairs and Rob Busink, Ministry of Economic Affairs, Agriculture and Innovation, the Netherlands

For the past 20 years, the Dutch Government Position Paper on Tropical Forests (RTR) has guided the international and bilateral forest-related policies of the Netherlands. The Policy, signed in 1992 by five ministries, committed the Dutch Government to a minimum annual financial contribution of €68 million towards the sustainable management of the world's forests, with at least one third of this amount earmarked for tropical rainforests. The main objective of the RTR was 'to encourage the preservation of the tropical rainforests through balanced and sustainable land and forest use, with a view to halting the current rapid process of deforestation and other environmental damage and degradation'. The focus has shifted over the years from nature conservation towards sustainable use and the economic importance of forest resources, as well as increased integration of forest programmes in poverty reduction strategies, the promotion of sustainably produced wood and discouragement of trade in illegally harvested wood.[1]

Over the last decade, there has been a growing awareness among consumers and private enterprises in the Netherlands regarding the impact of consumption on biodiversity in developing countries. In the broader framework of international forest and biodiversity policies, several ministries work together to make commodity chains more sustainable, with a focus on greening the trade chains of those products that currently contribute to deforestation (such as timber, palm oil and soy) and on increasing productivity and efficiency of agriculture to reduce the pressure on existing forest areas. High priority is given to the EU's Forest Law Enforcement, Governance and Trade (FLEGT) process in combating import of illegally harvested timber.

Since 2010, the development cooperation policy of the Netherlands has undergone a substantial reorientation with an emphasis on the role of economic investment and entrepreneurship as the engine for development. Development aid will focus on four themes, which reflect Dutch specific expertise: 1. Water, 2. Food Security, 3. Security & the legal order, and 4. Sexual & Reproductive Health and Rights. The number of partner countries has been reduced to 15, mainly countries in Africa.[2] The formal sectoral policy on tropical forests has been transformed into a more trans-sectoral approach to forest ecosystems. Sustainable supply chains are still high on the agenda and are supported through the

Image: Tropenbos International

Chainsaw milled lumber is openly traded in Ghana's lumber markets, such as the Sokoban market in Kumasi

Image: Tropenbos International

Chainsaw milling provides a lot of employment to many people in Ghana, for example as carrier of lumber out of the forest

Image: Tropenbos International

Freehand chainsaw milling, which is not using more efficient equipment such as frames for processing logs into lumber, is unhealthy and dangerous for operators

Image: Tropenbos International

A chainsaw operator crosscutting a log he just felled before processing the log into lumber using the same chainsaw

Sustainable Trade Initiative (IDH). More specifically, the timber chain is supported in the context of FLEGT, which aims at facilitating trade in legal timber and improving forest governance through initiatives such as Voluntary Partnership Agreements (VPAs) between the EU and timber exporting countries.

The Netherlands is supporting forest governance in Ghana through sector budget support since 2008, together with the EU, World Bank, DFID and France. An EU-funded chainsaw milling project which is being carried out by Tropenbos International (TBI)[3] in collaboration with the Forestry Research Institute of Ghana and the Forestry Commission focused on the trade-offs between legalizing the timber chain for EU export and promotion of local entrepreneurship for the domestic market, to ensure local economic development in Ghana.

Changing forest landscapes in Ghana

Since the colonial era, the exploitation of timber for commercial purposes has been an important part of the Ghanaian economy. But it is only since the start of the Economic Recovery Program (ERP) under the guidance of the World Bank and the IMF in 1981 that deforestation has increased rapidly. The purpose of the ERP was to reduce Ghana's debts and to improve its trading position in the global economy. In practice, it led to an annual rate of deforestation in Ghana of more than two per cent, one of the highest in Africa, reducing Ghana's rainforests by 90 per cent in less than 50 years. The impact of deforestation is widespread, affecting the livelihoods of local people and disrupting important environmental functions of the original forest ecosystem.

Timber is Ghana's third most important export commodity after cocoa and minerals, but estimates suggest that 60-70 per cent of logging has been illegal in recent years. The major buyers of Ghanaian timber are countries in Europe and the FLEGT is enabling the EU to address the problems posed by illegal logging. In November 2009, Ghana was the first country to sign and ratify a VPA with the EU on legal timber exports, including the domestic market.

Since 2008 the Netherlands, together with the EU, the World Bank, the UK Department for International Development and France, has provided sector budget support through Natural Resources and Environmental Governance (NREG) to strengthen forest sector governance in Ghana. The lack of governance has been identified as a major factor in enabling illegal chainsaw milling, charcoal production and bush meat trade. The current level of exploitation is more than four times the actual increment, leading to a high rate of deforestation and forest degradation. The VPA, financed through the NREG budget support programme, with its focus on legal timber trade, will help Ghana to improve its forest governance and achieve sustainable forest management.

The challenge of including the local market

Although VPAs are primarily concerned with international trade, Ghana decided to include in its VPA the production of timber for the domestic market, 84 per cent of which is supplied by illegal on-site chainsaw-milled lumber. Although chainsaw milling (CSM) has been banned since 1998, illegal CSM is flourishing with an estimated annual harvest of 2.5 million m^3. There is a large official timber sector, but it is predominantly export-oriented and unable to fulfil the demands of the less lucrative domestic markets.

To reach consensus on the inclusion of the domestic market in the VPA and the role of CSM, TBI has facilitated a process of multi-stakeholder dialogue (MSD) in Ghana since 2007, involving both legal and illegal actors. This process is aligned with the VPA implementation processes and has the active participation of FC and FORIG.

Studies of the CSM sector carried out by the group have established that it enjoys significant public support in Ghana. Compared with legal lumber from the formal industry, chainsawn lumber is cheaper to produce and is more diverse in terms of species and dimensions. The product chain includes the rural poor as well as the urban elite. The practice provides a direct income to almost 100,000 people, who are mainly living in rural areas where employment is scarce. It supports the livelihoods of at least

700,000 people, which is almost as many as in the formal industry. The studies revealed that the State forgoes stumpage revenue equivalent to more than US$18 million due to illegal harvesting by chainsaw millers.

CSM became widespread in the early 1980s, when large-scale sawmill operations decreased along with a nationwide economic decline. The practice has continued despite various attempts by the Government of Ghana to regulate it. Implementation of the CSM ban has been challenging for several reasons:

- Strong market demand for cheap lumber and inability of formal sawmills to feed this market
- High rate of rural unemployment and lack of alternatives to the quick gains operators achieve
- Corruption in the forest sector and law enforcement agencies
- Lack of political will to enforce the ban and implement alternatives
- Political interference in forest sector operations
- Support for CSM by local communities, particularly farmers.

Based on lessons learned from the CSM ban and experiences elsewhere in Africa, policy recommendations have been formulated that advocate reconciling the demand for adequate legal timber for the domestic market with the sustainable production capacity of the country's forest resources. The MSD facilitated by TBI has considered the following three possible policy directions:

Option 1: Only sawmills supply the domestic market with legal timber. This implies the maintenance and full enforcement of the CSM ban, and the development of a range of options to encourage sawmills to supply domestic markets.

Option 2: Sawmills and artisanal millers[4] supply the domestic market with legal timber, with allocation of harvesting rights to artisanal millers and the logging industry.

Option 3: Artisanal millers alone supply the domestic market with legal timber, with allocation of harvesting rights to artisanal millers.

Participants in the MSD process agreed that the integration of CSM into the formal system in the form of regulated artisanal milling should be explored and they endorsed policy option 2.

Dilemmas

There are a number of dilemmas that need to be addressed when integrating the informal chainsaw millers into the formal sector. Regularization or eradication of CSM could adversely affect the rural economy and enterprises that depend on it for lumber. It could also reduce employment and income earning opportunities for rural people who are directly involved in chainsaw operations. Because under a regulated framework only 20-30 per cent of the chainsaw millers are expected to stay in business, attention will need to be paid to the development of alternative livelihoods.

CSM is characterized by low capital requirements and high labour input, making it a very attractive practice in rural areas where employment is scarce. Combined with its high mobility, the monitoring and enforcement of the practice becomes a challenge. Community management of forest resources is a possible solution, but the current regime of access and benefit sharing needs major reform before this can be realized. Tree tenure arrangements in Ghana are complex and tenure reforms that recognize some ownership or management rights on the part of communities, especially outside forest reserves, are an important consideration for addressing illegal CSM effectively. Climate financing could also be used to offer incentives for communities to become involved in sustainable forest management and timber production.

If the current level of exploitation continues, Ghana will lose much of its remaining forest and the services they provide within 15-20 years. The annual harvest is estimated to be approximately four times the recommended allowable cut — a figure that is itself probably outdated. Export policies should be fully aligned with domestic market policies and the remaining forest cover and its status must be assessed to establish the annual sustainable harvest level. Ultimately, supplies may have to come from plantations or imports.

Corruption is one of the key factors fostering illegal CSM. The challenge is to develop a system that would keep actors in the chain away from illegal practices. In addition, the policy requirement that sawmills must allocate 20 per cent of their production for the local market is inadequate as it is not enough to satisfy local demand in Ghana. Despite these factors, the proposal to regularize artisanal millers and allocate official harvesting rights to them provokes some resistance in the formal sector.

Finding solutions

Ignoring the large and expanding timber market in Ghana will lead to an increase in illegal activities, conflicts, unsafe practices, loss of revenue to the State, corruption and a loss of forest resources. Non-regulation will lead to forest degradation, loss of environmental services and rural and urban poverty, as well as jeopardizing the legal international timber trade. The VPA has acknowledged this and has put the spotlight on the domestic market, highlighting the need to resolve the CSM issue in Ghana. Through NREG, the Netherlands has supported the implementation of the VPA, since it views legal timber trade as an important first step towards reaching sustainability.

The Ghana case shows that support from NREG and TBI in the VPA process is highly relevant in the new Dutch policy context. Supporting multi-stakeholder policy dialogues in Ghana is an effective way to help balance future competition over limited resources for export with domestic market demand. Further investments in the governance of the sector and in certification of sustainable forest management are needed, through increased sector budget support, climate financing and other forms of payment for environmental services.

The rapid growth of Ghana's population (predicted to double by 2030 to almost 50 million) and the accompanying depletion of forest reserves leave the country at risk of food insecurity, water shortage and unemployment in the forestry sector in the future. The VPA, combining environmental, trade and poverty reduction aspects, should be implemented cautiously as it could have a significant impact on local livelihoods and entrepreneurship. Tough choices will have to be made, such as the adjustment of the land tenure system and the distribution of forest resources among the various actors. International Year of Forests, 2011 will raise awareness regarding the need to conserve and develop forests for the benefit of the current and future generations in Ghana.

Forests and forestry in Denmark — thousands of years of interaction between man and nature

Christian Lundmark Jensen, Coordinator on International Forest Policy, Nature Planning and Biodiversity, Danish Ministry of the Environment Nature Agency

"Life can only be understood backwards; but it must be lived forwards," said the famous Danish philosopher Søren Kierkegaard back in 1843. Another old adage says: "He who does not know the past, does not understand the present and can not see into the future". Both sentiments should fit well to the story about forests and man in Denmark.

Natural expansion of the forest

Although the oldest traces of trees date back to the age of Jura some 150 to 180 million years ago, numerous ice ages subsequently coming and going have frequently cleared the Danish landscape of practically all types of vegetation.

Since the last ice age, which ended around 13,000 years ago, forest trees have immigrated successively. The pattern has been traditional, with various primarily light-demanding species coming in first (such as birch, aspen and pine) followed by more shade-tolerant types, at first dominated by hazel. Subsequently species like oak, elm, alder and lime arrived — and at a later stage, some 3,000-4,000 years ago, also beech.

Image: ©Bert Wiklund

Danish forests are highly appreciated for outdoor life and recreation. Here, a family is having a picnic lunch after a bicycle ride in the public forest Poulstrup

It is assumed that at the peak of its succession, forest covered the vast majority of the country, perhaps up to 80 per cent or more.

Harmony, degradation and deforestation

Human beings took part in the development of forests and landscapes from the beginning. They quickly settled at the coasts and sustained their livelihoods through fishing, hunting and the collection of mushrooms, berries and nuts. The utilization rate was not high, however, and certainly no threat to the forest.

The influence of man picked up speed with the introduction of agriculture, approximately 6,000 years ago. Hunter-gatherers were gradually replaced by farmers, who introduced animal husbandry and used axe and fire to clear land for crops.

Gradually the increasing population and economic development caused further pressure on the forests. This was brutally interrupted around the year 1300, when the Black Death (plague) raged throughout Europe, and killed almost a third of Denmark's population. However, after the Black Death, the picture changed again and the forest came under renewed pressure. It was now used for an increasing number of different purposes, providing nuts, berries, apples and game, hay and grazing for horses and cattle, and beech mast for the fattening of pigs. The timber was used for house building, stables and ships, tools, clogs and pools. In addition, and not least, wood was used for energy — for heating, salt sizzling, baking of tiles and melting of iron.

All of it contributed to overexploitation, degradation and deforestation. A significant contributing factor was the special arrangements for ownership and use rights. The system gave ownership and use rights for squires and lords of manor to the mature stands of high-boled trees, whilst the use rights for the underbrush were given to tenants. Although intending the opposite (protection of high-boled stands), the system instead encouraged usage patterns among the tenants that rarely allowed any young trees to fully develop into maturity. Extensive grazing and coppice methods prevented the forest from regenerating itself.

Image: ©Nis Lundmark Jensen

Biodiversity conservation is a key priority in the Danish NFP. Eurasian Pygmy Owl (*Glaucidium passerinum*) seen resting after a successful mouse hunt in "Rude Forest"

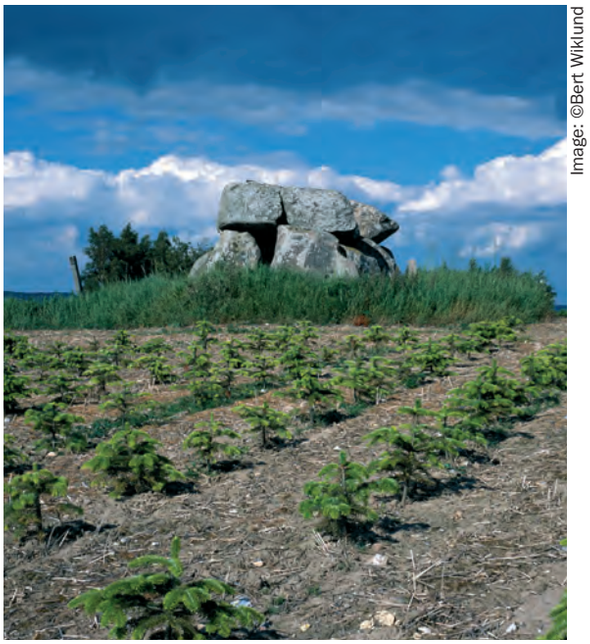


Image: ©Bert Wiklund

A plantation of exotic conifers cultivated for the production of Christmas trees — a popular and economically high-yielding production both within and outside forest areas in Denmark

Around the year 1600, the forest cover was reduced to 20-25 per cent. It dropped further down to 8-10 per cent in 1750 and reached a low of only 2-4 per cent around 1800.

Apart from running short of timber and non-timber forest, parts of the country now also suffered severely under storms and sand drift. Crops and fertile agricultural lands could be buried in thick layers of sand overnight, thereby destroying decades of hard work by farmers.

Evidently, the situation had become out of control and there was a growing understanding of the need for radical change.

200 years of recovery

Four major changes have paved the way for a slow, but steady recovery of the Danish forests:

Firstly, a new regulatory mechanism for forest management and use was adopted in 1805. The key elements included a new division of ownership and use rights. They were now given to one party only, not split between different groups. The squires and lords of manor got the rights to the best forests, whilst rights to own and use the poorer, low quality forests were given to the former tenants. In addition, grazing in forests was abandoned and – not least – the principle of permanent protection of classified forest reserves was established. It applied to the majority of forest land at the time and prevented conversion of forests to other land uses. To this very day, this key principle has remained the backbone of Danish forest legislation. The Forest Act of 1805 also established that forests had to be properly managed, with a view first and foremost to securing the long-term production of timber.

Secondly, forest management systems were introduced and promoted, with assistance of the then highly acknowledged German forestry expert, Johan Georg von Langen. He introduced systematic replanting after clear cuts and the introduction of a number of high-yielding exotic species.

Thirdly, afforestation was promoted. It began at slow rates, led by state planting activities, and was rapidly increased by the late 1860s. Various factors triggered this. One of these was the bitter loss of one third of the country's land area to Preussen and Austria in the war in 1864. Using the slogan "What is outwardly lost must be inwardly won", the Danish patriot and enthusiastic agitator Enrico Mylius Dalgas managed to turn afforestation into a national movement with broad public support. The positive will was underpinned by public grants and a general belief in the positive contribution of timber production to the economic development, benefiting both the landowners and society as a whole.

A large share of the afforestation was allocated alongside the coastline in order to mitigate sand drift, in particular in the western parts of Jutland. In the 1930s, during the recession, afforestation was also welcomed as a good means of job creation. It was promoted and remained high until the 1960s, when high employment rates and a booming agriculture industry slowed down afforestation activities again.

Fourthly, but not least, the replacement of timber with coal as the main energy source did unquestionably help reduce the pressure on the forests during the industrial revolution in the late 18th and early 19th century. According to some historians this might have been the most significant factor of them all.

A new era in 1989 — long-term goal to double forest cover

In 1989 new visions, new measures and new regulatory mechanisms were introduced, both for forest management and for afforestation.

Image: ©Bert Wiklund

In early May, when the beech bursts into leaf, the character of the forest changes dramatically. Here, a boy is collecting fresh beech leaves for his mother on Mothers' Day

Image: ©Bert Wiklund

Former coppice forest attacked by Honey mushroom (*Armillaria mellea*), by some seen as a pest in the forest, but by some mushroom collectors seen as a delicate contribution to the mushroom basket

A new Forest Act saw the light of day, introducing the promotion of 'good and multifunctional forestry' as the primary objective. Other new regulatory mechanisms paved the way for a reinforcement of both private and public afforestation, including the provision of new and additional financial resources as well as new instruments for spatial planning.

The key principle governing afforestation in the new era of 1989 was the division of the country into three key categories of land:

Category 1 constituted areas, where afforestation should be given the highest priority. State afforestation was primarily allocated into this category and private landowners could receive grants for afforestation 50 per cent higher than the rates available in areas of category 2.

Category 2 constituted areas where private afforestation would be encouraged with a standard rate public grant. However, in case of shortage of grants (if demand exceeded available funds), priority would be given to areas in category 1.

Category 3 constituted areas where afforestation would not be allowed at all (unless in rare and exceptional cases and only after concrete exemption). This could be areas with particular scenic beauty or high conservation value nature sites.

It was established that the spatial planning for afforestation should be based on a list of specified criteria aiming to ensure that the new forest would be truly multifunctional. Thus, category 1 areas should be allocated in particular where afforestation would promote one or more of the following functions: 1) Recreational opportunities for citizens, in particular in larger cities; 2) Groundwater protection, in particular sensitive resources suitable for drinking water; 3) Ecological connectivity, aiming to enrich biological diversity and reduce impacts of fragmentation.

The designation of the areas followed the normal Danish procedures for spatial planning, implying broad public consultation before final designation.

At the same time, in 1989, the Government formulated a long-term goal for afforestation in Denmark, namely 'to double the forest cover in the course of a tree generation' (from 11-12 per cent in 1989). Later, in the National Forest Programme of 2001, it was formulated as a goal to 'obtain approximately 20-25 per cent coverage of forest landscapes during a period of 80-100 years'.

In line with the objectives of multifunctional forestry, incentives were provided for a high share of domestic broadleaved trees in the new grant schemes for afforestation. This was in order to enhance the recreational value and improve both biological diversity and groundwater protection, still maintaining a long-term potential for high-value timber production. As a result, the vast majority of new forests became dominated by domestic broadleaves, a radical shift compared to the former afforestation, which had been dominated by various fast-growing exotic conifers.

Strategy for Sustainable Forest Management

In 1994, following the 'Forest Principles' adopted at UNCED in Rio 1992, and further building on the outcomes of the pan-European ministerial collaboration on forests (nowadays 'Forest Europe') as well as other international commitments, the Danish government developed a national Strategy for Sustainable Forest Management.

The backbone of the strategy was the identification of 18 sub-themes (or criteria) relevant for promoting SFM as outlined in relevant international commitments and recommendations. It was underpinned by a number of proposals for action working in support thereof in a Danish context.

Image: ©Bert Wiklund

Nowadays many Danish landscapes are characterized by a mixture of dune plantations and heather, like here in the Danish National Park at Fanø, an island west of Jutland

Denmark: facts and figures

- Population: 5.5 million
- Land area: 4,239,000 hectares
- Forest area: 587,000 hectares (14 per cent)
- Net annual change rate (2005-2010): +1.25 per cent
- Growing stock: 113 million m^3
- Net annual increment: 5.8 million m^3
- Annual fellings: 2.4 million m^3
- Privately owned forests: 69 per cent
- Contribution of forestry to GVA: 0.1 per cent
- Contribution of manufacturing of wood and articles in wood (in per cent of total GVA): 0.4 per cent

Source: State of Europe's Forests 2011

New National Forest Programme

In 2002 the Government developed and adopted a new national forest programme.

The main objective was to promote the principles for sustainable forest management, with due consideration for economic, ecological and social values and needs. The programme included a package of voluntary operational level guidelines for sustainable forest management in Denmark. It was developed through a transparent and consensus-based process of broad involvement of stakeholders.

Key objectives included (but were not limited to) the promotion of:

- Conversion to close-to-nature forest management principles
- Development of viable economic framework conditions for forestry
- Opportunities for recreation and nature experience in the forests
- Afforestation aiming for 20-25 per cent coverage of forest landscapes in the course of 80-100 years
- Effective information sharing and improved access to knowledge
- International cooperation in support of SFM.

Key instruments to promote and ensure the implementation of the programme included:

- Adaptation of new legislation, including a new national Forest Act in 2004 (establishing promotion of SFM as the key objective)
- Dialogue and stakeholder involvement
- Research and development
- Awareness raising, dissemination of information and training
- Economic incentives, including grants schemes
- Further engagement in international cooperation related to forests
- Special obligations and action plans supporting SFM in state forests (including an action plan on 'close-to-nature forestry' as well as certification of all Danish State Forests, against both FSC and PEFC standards).

State of play and future challenges

Although still applicable and relevant for many of today's activities, the Danish National Forest Programme might not sufficiently cover all relevant challenges for sustainable forest management in 2011. New and emerging focus areas that have gained in importance include:

- Utilization of the forests for different recreational purposes and for nature experiences (many and sometimes conflicting types)
- Enhanced focus on the role of forests in a green economy
- New demands for forest products, not least wood for renewable energy, which provides both opportunities and challenges (where lessons from the past will be kept in mind)
- Protection of nature sites with high conservation value ('Natura 2000' areas), where new legislation and new measures are currently being implemented
- Increased focus on demand-side measures as a means to promote legal and sustainable forest management, including implementation of new EU regulation on forest law enforcement, governance and trade as well as the promotion of voluntary guidelines for public procurement of legal and sustainable timber
- New developments in the international cooperation related to forests, including on REDD+ and LULUCF and not least the very recent Oslo ministerial mandate for negotiating a legally binding agreement on forests in Europe.

In 2010, the former Danish Government established an advisory board with a broad composition of members, representing a number of different stakeholder groups. The board got the mandate to provide recommendations for a future forest policy in Denmark. It finalized its work in 2011 by delivering a report with more than 40 concrete recommendations.

Since the report was launched, a new government has taken office in Denmark following a general election in September 2011. At the time of writing, no decision on the report and the recommendations from the board has been taken.

Norwegian forests: policy and resources

Pål Vidar Sollie, Director General, Department of Forest and Natural Resource Policy, Royal Norwegian Ministry of Agriculture and Food

Norway has considerable forest resources with 40 per cent of the land area being forest and other wooded land. The forest resources are of great historical importance and have played a major role in developing trade and industry.

Norwegian forestry and the wood industry continue to have great financial importance today, at a national, regional and local level. The primary value of Norwegian timber in 2008 was US$535 million. In the same year timber and wood products had a gross value of approximately US$8.6 billion, corresponding to five per cent of the total gross domestic product in Norway.

Biomass and timber from Norwegian forests will continue to play an important role in the years to come, as renewable resources that can help to meet the challenges of climate change. According to the National Forest Inventory, 8.3 million hectares of the forest area is productive forest. The most important types of wood, measured by volume and economic value, are spruce (*Picea abies*), Scots pine (*Pinus silvestris*) and birch (*Betula spp.*).

In 2009 the total growing stock in Norwegian forests was 823 million m^3, with a yearly increment of 25 million m^3. Over the last 90 years the total annual harvest has been between 8 and 11 million m^3. This is considerably lower than the yearly increment. With the existing level of timber harvest and forest management the growing stock and its increment in 2011 is more than twice the level documented by the first National Forest Inventory in 1932. The amount of dead wood, old forest and deciduous trees, which is important for biological diversity, has increased considerably during the same period.

Image: The Norwegian Forestry Society

Regeneration after felling is an important factor for sustainable forest management

Forestry in Norway is characterized by small-scale properties, combining forestry and agriculture. This structure is based on the Norwegian topography, varying production conditions and the ownership structure of Norwegian forests. In 2009 Norway had 120,000 forest owners with more than 2.5 hectares of forest. 97 per cent of these properties are privately owned, and constitute 80 per cent of the total productive forest area. The average size of privately owned farms with forest resources is 45 hectares.

Policy instruments for sustainable forest management

Norwegian forest policy is based on a wide range of measures. These include legislation, taxation, financial support schemes, research and advisory bodies. Norway's obligations under international agreements have also been incorporated in Norwegian law. For example, the criteria and indicators for sustainable forest management that have been developed in the framework of forest policy cooperation in Europe (FOREST EUROPE).

The main objectives of the Forestry Act are to promote sustainable forest management with a view to promote active, local and national economic development, and to secure biological diversity, consideration for the landscape, outdoor recreation and the cultural values associated with the forest. The Forestry Act applies to all categories of forest ownership.

The National Forest Inventory has been an important basis for the development of forest policy for every county in Norway since the beginning of the last century.

A regulation under the Forestry Act requires forest owners to reinvest a part of the revenue from forestry into a Government-administrated fund, the Forest Trust Fund. This fund was established to secure long-term investment in sustainable forest management such as silviculture, building and maintenance of infrastructure, forest management planning and environmental measures. The forest owner is stimulated to use the trust fund through tax relief.

Image: The Ministry of Agriculture and Food, Norway

Forests have many important functions related to local climatic conditions

Support schemes for forestry, on a regional and local level, include financial support to forest management such as silviculture, building of roads and environmental measures. Support is also granted in order to encourage the harvest of timber and forest residues for production of bioenergy. Some regions, mainly the western and the northern part of Norway, have little history of commercial forestry and are therefore prioritized when aid is allocated.

Economic support is also granted for developing forest management plans including environmental inventories. Such plans are important for ensuring that forest activities are carried out within the framework of sustainable forest management.

An asset for the society

Free public access to land, including forests, is an old and important principle in Norway. The general public may use the forests for recreational activities and sports at any time of year. Public access to nature is enforced through the Outdoor Recreation Act. Motorized recreational activity is prohibited off-road.

Traditional activities such as berrypicking and mushrooming are still important, while modern activities such as off-road biking are increasingly popular. In order to prevent forest fires, the public is allowed to collect dry wood and make campfires in the forest from 15 September to 15 April only. Both municipalities and non-governmental organizations help maintain a vast network of trails for hiking and cross-country skiing.

The principle of public access is underlined by the forest policy and the environmental standards used by forest owners. When practising forestry, forest owners are obliged to clear trails and ski tracks, and to repair damages caused by vehicles. The forestry sector contributes to outdoor activities by building and maintaining forest roads and by carrying out silvicultural measures to increase the accessibility of forests.

Norwegian forests are often mentioned as important for public health and as an educational arena for children and youth. Using the forests for recreation and sports can have a positive impact on both physical and mental health.

Hunting and fishing are also important forest activities in Norway. The right to hunt and fish is exclusively reserved for landowners, but the public is granted the right to fish in lakes and rivers by purchasing licences. Hunting licences are also sold, which gives the public

Image: Bård Løken, Samfoto, Norway

Through photosynthesis the forests are, for the time being, capturing and storing carbon equivalent to more than half of the total emissions of CO_2 in Norway

the possibility to hunt in privately owned forests, on common land and in municipal and state-owned forests.

Forests and climate change

Forests have many important functions related to climate. In addition to the impact on water balance and local climatic conditions, the world's forest ecosystems also represent considerable stores of carbon that can impact on global warming if the carbon is emitted into the atmosphere. On the other hand, growing stocks are important carbon sinks that can reduce the impact of anthropogenic emissions. Through photosynthesis the forests are, for the time being, capturing and storing carbon equivalent to more than half of the total emissions of CO_2 in Norway.

According to the Intergovernmental Panel on Climate Change (IPCC), sustainable forest management, with the aim of maintaining or increasing carbon storage in forest ecosystems while producing wood for timber, fibre and bioenergy, is an important contribution to climate change mitigation. As biological carbon is part of nature's own carbon cycle, the amount of carbon that is emitted when burning forest biomass is the same as when biomass decomposes naturally. As long as we maintain our forests, carbon will be sequestered through the photosynthesis.

As less than half of the increment in Norwegian forests is harvested today, it is possible to increase the use of wood for production of energy and as building materials in order to reduce the consumption of fossil fuels. This can contribute to further reduction of CO_2 emissions.

This understanding is the basis for the Governmental White Paper No. 39 (2008-2009) *Climate challenges — Agriculture part of the solution*, and *Climate Cure 2020* (2010), a study led by the Norwegian Climate and Pollution Agency (KLIF) to assess the available options to reduce greenhouse gas emissions.

Programmes for increased use of wood and bioenergy

An important goal for both Government and the wood processing industry is to increase the use of wood where it can replace materials which have a more negative environmental impact.

The Norwegian Wood-based Innovation Scheme is an important initiative that addresses different parts of the market: companies, decision makers, architects, entrepreneurs, traders, research and innovation. Economic support is given in three areas: industrial building and construction, wood products and traditional use of wood and innovation systems.

The Bioenergy Scheme established in 2003 aims to stimulate forest owners and farmers to use and deliver more bioenergy to the market in the form of fuel or heating. The Bioenergy Scheme's budget has been tripled since 2003, in order to increase awareness of climate change and forests as a source of

Image: The Ministry of Agriculture and Food, Norway

Traditional activities such as berrypicking and mushrooming are still important

carbon-neutral energy. The aim is to reduce the use of fossil fuels, to diversify energy supply and to provide a basis for economic development in rural areas. The most important measures under the programme are investment support, aid to pilot projects and capacity-building.

The Wood-based Innovation Scheme and the Bioenergy Scheme are administered by Innovation Norway, a public agency.

Sustainable forest management

Norwegian forest policy, as well as the environmental standards that forest owners are committed to follow, emphasizes environmental considerations such as maintaining and developing biological diversity, and the social and cultural functions of forests.

The share of virgin forests is small in Norway and therefore there are major concerns that Norwegian forestry is environmentally sustainable and takes sufficient consideration of biological diversity and threatened habitats. Biodiversity-rich habitats are registered and mapped in forest management plans.

The Nature Diversity Act contains provisions on forest conservation, prioritized species and selected habitats in forests that are important for specific groups of species. Voluntary protection is now the main strategy for forest conservation.

Protective forests are regulated in the Forestry Act. The main function of a protective forest is to protect climatically vulnerable forests and other areas against damage, and includes mainly the forest bordering mountain areas.

The Forestry Act, and the regulations given under it, also regulates forestry-related activity, making allowance for the role of forests for recreational use and by protecting landscapes and cultural values.

Forest certification

The Living Forest Standard is a national standard for sustainable forest management in Norway. The standard was jointly developed in 1998 and revised in 2006, by stakeholders in forest management and the forest industry, environmental and outdoor recreation organizations, trade unions and consumer interest groups. The standard promotes sustainable forest management by creating a balance between forest production, environmental protection and social interests. The Living Forest Standard is an important basis for forest certification in Norway. The standard is also used in combination with the ISO14001 environmental management system that is applied to practically all commercial forestry in Norway. By group certification through the forest owners associations, the challenge of certifying small forest properties has been overcome with bearable costs for individual forest owners.

Since June 2010 the Living Forest Standard has been suspended pending an unresolved disagreement in the Living Forest Council related to reforestation and afforestation regarding the use of new and introduced tree species. Despite this, the forestry sector continues to follow the rules and guidelines from the standard.

Forest management plans with environmental inventories

Forest management plans are important tools for the forest owner, in order to promote sustainable forest management. This includes both active commercial use of the forest resources as well as the forest owner's responsibility for the protection of biological diversity, landscapes, recreation and cultural values in the forest.

Forest management plans are offered to all forest owners in Norway every 10th to 15th year according to plans at county level. Today, forest management plans are developed through analysis and descriptions based on photography and laser measurements conducted by remote sensing. Field registrations are also important. The final product is customized to the individual forest owner and can give him or her recommendations for forestry measures. Providing an inventory of forest resources and environmental values on the property is a precondition for the allocation of grants.

Important areas for biological diversity are being inventoried on the basis of knowledge about species and their habitat requirements. The environmental inventories developed through the forest management planning process are made publicly available. The forest owner must ensure that all activities in the forest are carried out in compliance with laws and regulations. Under the Forestry Act, each forest owner must have an overall view of the environmental values and pay regard to them when carrying out activities in the forest.

Sweden — a forest kingdom

Marcus Öhman, Ministry for Rural Affairs, Sweden and Björn Merkell, Swedish Forest Agency

Compared to many other industrialized countries, Sweden is unique in terms of its large forest coverage. Situated in the most northern part of Europe, coniferous trees dominate the forests. These forests and the people of Sweden have been interconnected for thousands of years. Notably, living clonal trees have been found in Sweden that are more than 9,000 years old.

Forests, and all the goods and services they have provided through history, have played a major role in the development of the Swedish economy and culture. In the early days trees were very important for building material, firewood, charcoal production, fodder and fibre. During that time forestry was mainly carried out as part of small-scale farming activities.

In the 1800s there were clear signs of excessive deforestation. Although Sweden has had forest regulations dating back to the Middle Ages, there were few policy instruments at a national level to regulate how forests were utilized. Forests were turned into farmland and foresters had few rules to consider regulating the level of harvesting. The sawmill industry had been growing, which led to overexploitation, especially in the northern part of Sweden. In addition, there was a growing demand for charcoal by the mining industry. Further, there was little, or no, reforestation. Forests were allowed to deteriorate with little interference. Consequently, forest stocks had reached their lowest levels by around 1900.

To counteract the situation, measures were taken to replant trees and in 1903 Sweden's first Forestry Act was launched. Two years later forestry boards at a county level were introduced. This had a considerable positive effect on forest cover and timber volume. The level of felling became related to growth and with that Swedish forestry moved towards sustainable forest management. This showed that robust forestry policies were needed to maintain sustainability. It also showed the importance of using various instruments, including reforestation, legislation and management at a local level. Because of the managerial measures taken early in the 1900s and those that followed, the total standing volume of Swedish forests has increased by around 80 per cent from that time to now.

As the forests of Sweden were recovering in the early 20th century, their importance in terms of revenue at a national scale increased. Pulpwood became more

Image: Marcus Öhman

Image: Marcus Öhman

In Sweden, forests play a very important role for recreation including a range of activities such as running, walking, hunting and fishing

Image: Marcus Öhman

Two thirds of land area in Sweden is forest

important. However, the demand for timber products was largely determined by the world market causing large fluctuations. Timber prices increased in the beginning of the century as a consequence of the First World War. Fluctuations continued and, as a result of the worldwide recession in the 1930s, the Swedish forest industry was on its knees. Following the Second World War there was a great demand for timber products in Europe for reconstruction. In the years to come the forest industry developed further and today Sweden is one of the world's largest exporters of pulp, paper and sawn timber.

The Forestry Act has been changed several times since 1903. Important aspects of the present Forestry Act include: the forester is obliged to carry out reforestation after final felling; forest owners must conduct preventive control of insect pests; felling of young stands is prohibited; forests in highlands and valuable hardwood are under special management arrangements; and forest owners should take into account natural and cultural values when considering felling.

Big business and sustainable forest management

More than two thirds of Sweden's land area is covered by forest. In terms of total standing volume Norway Spruce (*Picea abies*) and Scots Pine (*Pinus sylvestris*) dominate, followed by Birch (*Betula spp.*). The forest is one of Sweden's most important resources and the industry employs approximately 100,000 people. Forestry and forest products together are the largest contributors to Sweden's net export; the total export value of forest products amounts to approximately US$20 billion annually.

Swedish wood materials provide the market with a range of products. In addition to manufacturing common wood-derived products such as furniture, buildings, packaging and personal care products there are also new developments, such as specialty cellulose used for textile materials. Wood is also a very important source of energy in Sweden. With approximately one third of all energy being provided by biomass, Sweden is one of the most progressive countries in the world in terms of fossil fuel independence. Notably, more than 80 per cent of the biofuels used in Sweden originate from wood biomass.

Given Swedish forests' economic importance, it is desirable to keep up a high production of forest resources. At the same time there are other values that are considered. Swedish forestry and Swedish forest policy was early to acknowledge the importance of sustainable resource utilization and to adopt ambitious targets for biodiversity conservation and a range of values besides timber. Therefore, forest management in Sweden today acknowledges two equal aims including both production objectives and environmental considerations.

The two equal objectives are in line with the objectives of the Swedish Government: that forest resources should be used without being overused. Sustainable resource utilization is a central goal for forest management in Sweden. Under the umbrella of sustainable development, the production of wood and paper should continue uninterrupted. Indeed, given the present situation, felling could increase as growth volumes are larger than harvesting.

These equal aims of forest management in Sweden are in line with the concept of sustainable forest management which considers economical, ecological and social aspects of forest management. In international forest politics, Sweden takes a strong position in terms of supporting this approach.

A unique feature of forest management in Sweden is the open dialogue between governmental organizations and forest owners. Notably, about three quarters of all forest land is privately owned while the rest is largely owned by the state. In Swedish forest policy

Image: Marcus Öhman

Image: Marcus Öhman

Swedish forest policy was early to acknowledge the importance of sustainable resource utilization and to adopt ambitious targets for biodiversity conservation

this ownership structure is translated into the principle of 'freedom with responsibility'. The sustainable management of Swedish forests is a shared responsibility between the public and private domain. Successful management is dependent on forest owners acting responsibly and considerately in terms of sustainable usage.

Forest management also takes into account public interests. In Sweden, forests play a very important role for recreation including a range of activities such as running, walking, cross country skiing, picking berries and mushrooms, hunting, fishing and hiking. Another unique feature in Swedish forest management is the opportunities given through the Right of Public Access. This gives people the right to move freely in all forests and other natural habitats. However, with that follows responsibility. People moving in the forest are expected to be respectful in relation to the landowners, the well-being of the forest, as well as other people present in the area of interest.

Moreover, the Swedish forestry model for maintaining and enhancing forest biodiversity has a holistic approach. Unlike many other countries, sustainable forest management is applied across all forest surfaces through a combination of general consideration of conservation interests in everyday forest management and formal forest protection of designated sites, in addition to voluntary set-asides.

Future perspectives

The forest will continue to be very important for the people of Sweden in the future, providing a large variety of products and services. Timber production is expected to remain at a high level; harvesting levels currently lie between 80 and 90 per cent of the annual increment. However, some changes are taking place when it comes to the end use of the harvested timber. Already today we can see the share of wood used for energy purposes increasing as compared to traditional uses for pulp, paper and sawn wood. In the near future we expect biorefinery products to increase in importance.

There are some discussions on the availability of raw material to satisfy the demands for the various end products. Therefore research is being conducted to assess ways of further increasing resource efficiency and further intensifying forestry practices.

Climate change is another factor with possibly large consequences for forestry. The research community and practitioners alike are continuously assessing the situation and trying to foresee possible risks such as the appearance of new forest pests and diseases as well as new tree species. Tests are also made to investigate new opportunities in terms of species that could be used in a different climatic situation.

In the light of increasing demands for raw materials and the effects of climate change, the balance between environmental and economical sustainability will become an even bigger challenge. As mentioned, Sweden has implemented sustainable forest management by assigning equal importance to environmental and production functions. Given that outside factors and demands can disrupt this balance it is essential that all those involved recognize sustainable forest management as an iterative process where one tries to find a new equilibrium, reflecting the overarching objectives, as soon as one of the factors changes.

Together with environmental and economic values, social values form the third pillar of sustainable forest management. Sweden has one of the highest per capita areas of forest in Europe and thus availability of forest for recreation is not perceived as a limiting factor. However, there are other dimensions to social sustainability, such as rural livelihoods – of people living in or close to the forest. Swedish Government policy has recently priori-

Facts about Sweden

Population: 9.4 million
Land area: 41 million hectares
Forest area: 28.6 million hectares (70 per cent)
Annual increment: 96 million cubic metres
Annual fellings: 81 million cubic metres
Public forests: 27 per cent
Private forests: 73 per cent
Production of pulp: 11.9 million tons, 28 per cent exported
Production of paper: 11.4 million tons, 92 per cent exported
Production of sawn wood: 17.0 million cubic metres, 67 per cent exported
Export value of forest products: US$20 billion in 2010

Image: Marcus Öhman

tized rural livelihoods in its vision for 'The Forest Kingdom' policy programme (see below). Such livelihoods can become more diversified and for example, build on wilderness tourism or adventure-oriented recreation. Furthermore, research into the relationship between forests and public health has received more attention recently.

One of the biggest challenges for forests and forestry in Sweden is of a policy nature. Firstly, we can see that in spite of the fact that more and more political attention is given to sustainable and renewable products, there is no level playing field for forest products compared to their non-renewable counterparts such as concrete, steel, plastic and oil. This is exemplified by the different sets of sustainability and legality criteria forest products have to fulfil.

Secondly, the international governance regime puts further challenges to the development of holistic national forest policies. For example, in an EU Member State such as Sweden, forests are increasingly regulated by a complex of direct and indirect legislation stemming from a wide range of related policy fields such as environment, climate change, energy and trade. Although forest policy is a matter of national competence for EU Member States, the national room for manoeuvre is becoming smaller.

The main reason why forest policy has remained a national competence has to do with the large differences across Europe when it comes to forest ecosystems, biogeography, forestry practices, forest industries and societal demands. A hollowing-out of national flexibility could have a negative effect in terms of pursuing sustainable forest management. Successful forest policy needs to acknowledge the scale factor considering local, regional and national perspectives and beyond. Noteworthy, in an international policy-development context, a transition to a greener economy and the rising different demands on various forest functions calls for substantive cross-sectoral cooperation and commitment to greater policy coherence at different governance levels.

Forest Kingdom

Sweden is a country largely defined by its forests. The Government sees great potential in forests and has thus created the vision of 'A Forest Kingdom – with values for the world'. The aim is to create conditions for new jobs related to Sweden's forests and, in so doing, help economic development in the countryside and in small towns and villages. The vision is based on the sustainable use of forests and the coequal objectives of environment and production, which form the foundation of Sweden's forest policy.

The Forest Kingdom vision is built upon around a number of specially selected branches, which form the basis of the work. These are: 1. Sustainable use of forests; 2. Processing and innovation; 3. Experiences and recreation; and 4. Sweden in the world. These four branches are presented in the Forest Kingdom Action Plan, which is the result of contributions from a large number of people, stakeholders, interest organizations and companies involved with forests all over Sweden.

Fundamental for the Forest Kingdom vision is the sustainable use of forests. Conditions for increased production should be facilitated but it should be in balance with nature's capacity to provide goods and services. The above-mentioned coequal forest policy objectives of the environment and production are a central theme. Important areas to develop include mitigation of climate change, renewable materials, ecosystem services, game management and more. Gender equality in the sector is also addressed.

Processing and innovation focuses on new perspectives on how to use the forest. The forest biomass can be used more efficiently, acknowledging the whole life cycle. Sweden has a strong position in a range of forest-derived products such as renewable energy, textiles, packaging materials and composite materials. However, there are considerable opportunities for further developments in these areas as well as green energy and new technology. The usage of wood for construction is increasing, which is in line with the will to use climate-sensible building materials.

One part of the Forest Kingdom vision is to broaden the scope of forest experiences and activities. Forest plays an important role for Swedes in the large variety of outdoor activities they carry out. Most Swedes spend time in forests occasionally, or on a regular basis. Sweden is also a popular tourist destination, with many visitors from abroad looking for the unique experiences that Swedish forests can provide.

Forest is important for Sweden and its inhabitants but Sweden is also part of a global context. The Swedish forestry model, 'freedom with responsibility', has attracted attention in various international forums. Swedish forestry expertise can be of benefit to the rest of the world, for example by active participation in international forest policy forums and by exporting technical know-how as well as products.

Forest ecosystems in the Republic of Croatia's ecological network

Srećko Juričić, Ministry of Regional Development, Forestry and Water Management, Republic of Croatia

Of all terrestrial ecosystems, forests are the richest reservoirs of biodiversity, and as a valuable national resource and potential, Croatian forests meet economic, environmental and social functions, and contribute to the beauty of the landscape. Enjoying special protection and significance within the Constitution of the Republic of Croatia, forests regulate local, regional and global climate changes, protect the soil from erosion, regulate drainage basins and hydrological systems and have a significant influence on the quality of air and water.

Forests and forest-covered areas make for 48.5 per cent of the land area of the Republic of Croatia, that is, 2.7 million hectares, and are characterized by rich biodiversity which is a result of a long tradition of organized sustainable forestry. 78 per cent are owned by the Republic of Croatia, while 22 per cent are privately owned. Pursuant to the Forest Act, forests in the Republic of Croatia fall into three different categories according to their purpose. Ninety per cent of the total forest area falls into the category of economic or multi-purpose forests, six per cent in the category of protected forests and four per cent are special purpose forests which includes national parks and strict and special reservoirs with fundamental forest phenomena. The forestry and wood industry in the Republic of Croatia accounts for around three per cent of the gross domestic product, employs approximately four per cent of the workforce and contributes around ten per cent in exports.

Sustainable management

Forest quality and diversity in the Republic of Croatia are a result of a long tradition of sustainable forest ecosystem management. Inventorization on a large area of Croatian forestry was conducted as early as the mid-18th century. The first technical textbook on forest management, entitled 'Forest Order of Maria Theresa' was issued in 1769. The document had the power of law, and for the first time it introduced sustainable management, prescribed the felling

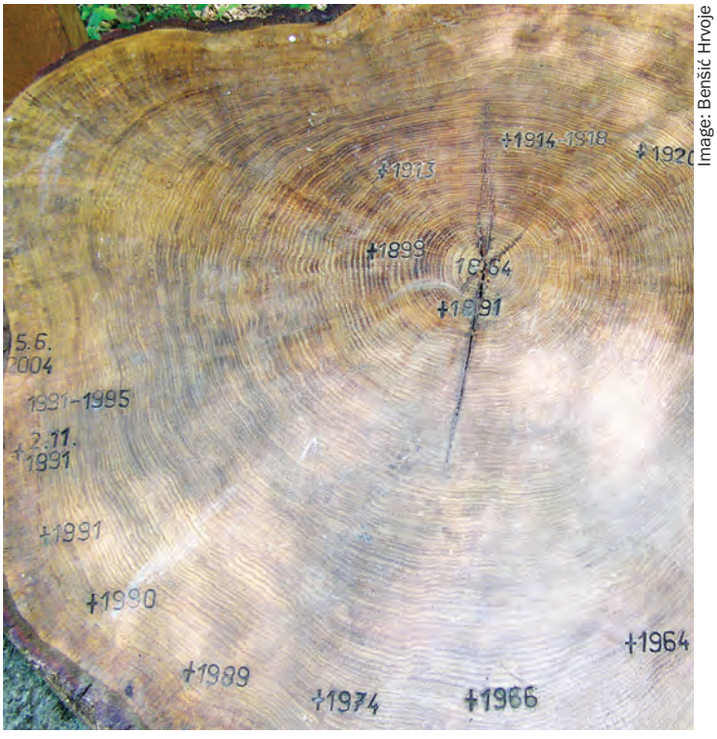


Image: Benšić Hrvoje

Image: Domagoj Topić

Photography from the 'Forest through the Eyes of a Forester' exhibition. (L) 'Beginning of the end'; (R) 'Forest'

season, asked for felling records, gave practical instructions on seed sowing and acorn planting, prohibited harmful interventions, and introduced fees for acorns and new provisions aimed at forest protection and preservation. It also established the first forest offices in the area.

Since extensive expertise is a precondition for the implementation of high-quality sustainable management, the fact that forestry is one of the oldest professions in the Republic of Croatia is no surprise. Education of forest personnel was initiated as early as 1860 with the establishment of the School for Forestry and Economy, the first of its kind in this part of Europe, while the higher education of forest personnel started in 1898 with the establishment of the Academy of Forestry in Zagreb.

Today, the laws of the Republic of Croatia regulate the planting, protection, utilization and disposal of forests as a natural resource, with the purpose of maintaining biological diversity and ensuring management based on principles of economic sustainability, social responsibility and environmental acceptability. The laws prescribe drafting of forest-management plans that specify conditions for harmonious use of forests and forest-covered areas, interventions in the area, required scope of planting and protection of forests, possible utilization degree as well as terms and conditions for fauna management. Laws of the Republic of Croatia prescribe that the management plans for all natural resources, forest-management plans among them, have to include all defined measures and conditions for nature conservation and that they have to be drafted in cooperation with local communities.

Conservation of forest genetic resources and seed storage for the purpose of cultivation of planting material necessary for the restoration of biological forests are of paramount importance for the development of forestry and sustainable forest regeneration. Consequently, the Republic of Croatia has established a seed saving bank, seed bank and genetic bank of forest tree species, to secure additional preconditions for biological forest regeneration in case of crises, such as situations in which natural restoration of forest communities is not possible.

The fact that the overall area of forests in the Republic of Croatia compared to 1996 increased by 203,077 hectares while the wood stock increased by 73.7 million cubic metres in the same period, speaks in favour of the regeneration plan. Furthermore, the Republic of Croatia can be proud of the fact that all three existing species of the European large carnivores, bear, wolf and lynx, inhabit its forests, and for these species, as well as for other natural resources, management programmes have been drafted in cooperation with the local community.

In order to ensure conditions to finance sustainable management of forests, the Republic of Croatia developed a 'green tax' twenty years ago. The system is based on the payment of compensation for general benefits of forests which are manifested through the benefits provided by the forest ecosystems. General benefits of forests are prescribed by law, and are as follows: soil protection from erosion; balancing the water relations in the landscape and flood prevention; water purification and supply of drinking water; reduction of the greenhouse effect through carbon sequestration; favourable impact on agricultural activity; purification of polluted air; as well as a number of other benefits that forests provide us with. The taxation mechanism functions in such a way that each legal entity engaged in economic activity is required to pay a fee amounting

Image: Željko Gubijan

Image: Dubravko Stipanček

Photography from the 'Forest through the Eyes of a Forester' exhibition. (L) 'Where are you, Earthlings?'; (R) 'Puzzle'

Image: Željko Gubijan

Image: Željko Gubijan

Photography from the 'Forest through the Eyes of a Forester' exhibition. (L) 'King of the European sky'; (R) 'Bear cub on guard'

to 0.0525 per cent of its total revenues. Finances collected in such a way can only be used for strictly prescribed purposes listed below:

- Works of biological regeneration of forests
- Works of forest conservation
- Works of forest management in karst areas
- Works on sanctioning and restoring of forest stands jeopardized by drying and other natural disasters, construction of forest roads, mine clearance of forest-covered areas as well as other works crucial for conservation and improvement of general benefits of woods
- Seeding and tree-nursery activities in forestry, preservation of gene pool and setting up of clonal seed orchards
- Scientific works in the area of forestry
- Costs of drafting, updating and revision of management programmes of forest owners.

The Government of the Republic of Croatia receives a detailed annual report on the allocation of funds for the previous year. This mechanism proved to be a suitable tool for the promotion of sustainable forest management, which is constantly being perfected and adjusted to the latest demands and pressures affecting the delicate forest ecosystems.

Partnership towards a joint goal

Climate change and other pressures on delicate forest ecosystems mean that the forestry profession, as well as other professions in the Republic of Croatia are devoting a lot of effort and resources into the prevention, protection and conservation of forests. Without sustainable management of all natural resources there is no future and development, therefore many sectors are cooperating to achieve common goals. With this, and the growing energy demands of the entire society in mind, cooperation between various sectors has been initiated in order to find ways to increase energy production from renewable energy sources. Consequently, the cooperation of the energy and forestry sector has resulted in the adoption of an energy strategy which plans a significant increase in energy production from biomass, of which forest biomass represents a significant part.

Forest fires pose the greatest danger to the forest ecosystems in the Republic of Croatia and other Mediterranean countries. This is why Croatia makes substantial investment towards ensuring adequate prevention of forest fires and to enable efficient defence from fires during major emergencies, in the form of people and equipment.

Obligations of users and forest owners in terms of preventive measures and defence against forest fires, as well as obligation to restore fire-damaged areas, are prescribed by law. As an additional contribution to defence against fire in the last years, the Government of the Republic of Croatia has carried out a number of projects in cooperation with regional and local communities, with the aim of improving and modernizing defence and prevention systems, and projects for the restoration of forest-covered surfaces destroyed in fires. The projects have been financed jointly by the State, regional and local communities. This has resulted in further enhancement of fire protection and created a basis for economic recovery of fire-affected areas. Furthermore, every year, especially before the forest fire season, special efforts are being devoted in cooperation with the media to raise public awareness about the need for proper fire management in open areas. The

Image: Tomislav Lukšić

Culture of *Pinus halepensis*

Image: Ministry of Regional Development, Forestry and Water Management

School children's drawings on the theme of forest fires

problem of forest fires is being introduced to the young population through educational institutions and specially tailored programmes and activities, with the purpose of raising awareness and norms of behaviour from the earliest age to avoid and minimize future damage by forest fire.

Following international commitments, along with its own initiatives and interests, the Republic of Croatia has developed a national ecological network which represents a system of interconnected and contiguous environmentally important areas that significantly contribute to the preservation of natural balance and biodiversity through their balanced biogeographical distribution. In such an ecological network, forest ecosystems with extremely rich biodiversity are fundamentally important elements.

A branch of the Croatian Forest Society — a non-governmental institution founded by foresters in order to protect the interests of the profession, achieve optimal economic development, and preserve the environment and general quality of life — organized exhibitions of photos entitled 'Forest through the Eyes of a Forester'. The initiative sprang out of the love of humans toward forests and the wish to raise awareness among the general public about the value and benefits of forests. The exhibition emphasized the importance of forests, water, air and environment as seen through the camera lens of foresters and amateur photographers. Starting off as a modest and amateur exhibition, it has achieved the status of an internationally acclaimed exhibition at which authors from a dozen different countries exhibit their work. 'Forest through the Eyes of a Forester' reached its peak and acclamation with a display at the UN headquarters in New York at the official opening ceremony of the International Year of Forests, 2011, in the ninth UNFF session.

To facilitate the efforts of the international community, and also to convey its own experiences and understanding of the importance of forests for humans, the Republic of Croatia launched the initiative

Image: Gordana Bajurin, Kinookus Food Film Festival

Kinopokus workshop

to declare the International Year of Forests in the fifth UNFF session in 2005, which the Resolution 61/193 of the UN General Assembly enacted on 20 December 2006. With the whole world celebrating 2011 as the International Year of Forests, the Republic of Croatia is especially proud that forests are getting the attention they deserve on a global level, knowing that the way forests are treated in any part of our planet affects the quality of life for each human on Earth.

Lithuania's sustainable forests

Gediminas Jasinevičius, Department of Forests, Ministry of Environment, Lithuania

Lithuania is a small country with a total area of 65,200 km^2, situated in the northern part of Central Europe along the south-eastern shore of the Baltic Sea. One third of Lithuanian land is covered by coniferous, broadleaf and mixed forests. The dominant tree species are pine, spruce and birch. Forests represent one of the major Lithuanian natural resources, serving for the welfare of the State and citizens. Forestry and forest industries have an important role in the national economy, accounting for about 3.6 per cent of gross domestic product.

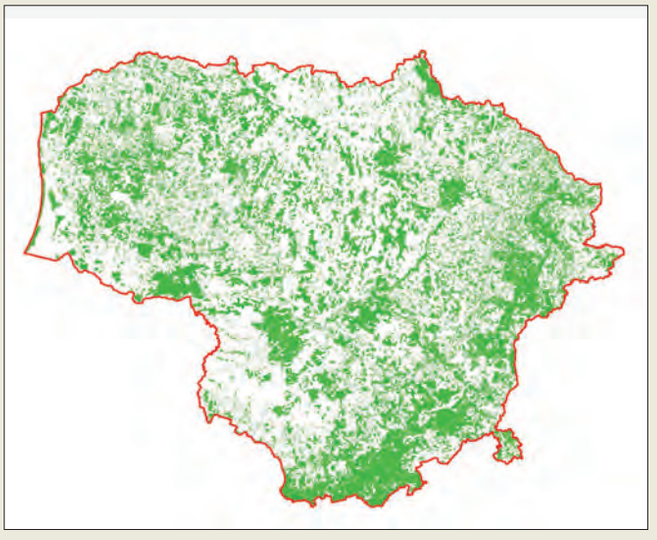
Lithuanian forest policy

In 1991, after Lithuania regained its independence from the Soviet Union, it became a Member State of the United Nations and also of the pan-European policymaking process, the Ministerial Conference on the Protection of Forests in Europe (MCPFE). The First Lithuanian Law on Forests and the National Forest Programme were adopted in 1994. These legal acts are based on the principles of sustainable forest management. The main goals of both previous and current laws governing forests as well as of the National Forest Programme are to achieve sustainable forest sector development, satisfy the forest-related needs of various groups of society and ensure the preservation of forests for future generations. This requires an acknowledgment of forest growth duration, taking into account different forms of ownership and the relationship between them, by promoting conditions for the proper management of forests leading to economic benefits for the country. Long-term forest policy has been formed in Lithuania in compliance with the policies of other branches of the economy of the country, based on national traditions and the requirements of European Union legal norms, international conventions, resolutions, agreements, programmes and national legal acts.

Sustainable forest management in Lithuania is widely accepted as the overriding objective for forest policy and practice. Forests are used very responsibly and annual or periodic timber harvest rate does not exceed timber growth. The current annual timber harvest rate is around 6 million m^3, less than half of annual timber growth.

Forest area expansion is one of the main objectives of Lithuanian forest policy. Due to the implementation of sustainable forest management and of various national afforestation programmes over the last 20 years, forest coverage in Lithuania has increased by 3.4 per cent to reach 33.2 per cent while at the same time growing stock volume has risen significantly.

Forests of Lithuania



One third (more than 2 million ha) of Lithuanian land is covered by coniferous, broadleaf and mixed forests

Source: State Forest Service

Collaboration in the forest policymaking process

Cooperation with European institutions, international organizations, stakeholders and the public is an integral part of the forest policymaking process. Policy takes into account the opinions of all interested groups in society, balancing the interests of forest owners, forest governors and users, wood processors, environmental organizations and other social groups involved with forests and the forestry-related economy. All major forestry policy statements comply with the requirements of separate stakeholders and are submitted for public consideration.

The Forest Owners Association of Lithuania (FOAL), the national public organization that represents and unites private forest owners, is helping to develop management structures for private forestry. Established in 1993, it now has more than 5,000 active members. FOAL also works with non-members through 38 regional units. Founded to represent the interests of forest owners and to develop an institutional framework for family forestry, FOAL has the status of an independent public NGO. It is also recognized internationally

Image: Young Forest Friends

Young Forest Friends feeding wild animals

Image: Directorate General of State Forests

Recreation path adapted for physically disabled needs

and is taking steps to enhance education and extension services for private forest owners in Lithuania.

FOAL has supported the development of a network of forest owners' cooperatives and collaborating companies. The first owners' cooperative was founded in 1998 and within a short time others were created as the industrial demand for roundwood and owners' demand for forestry services rapidly increased. The network operates on two levels. In the field, cooperatives advise local forest owners and consolidate production volumes. Marketing take place through roundwood trading companies that specialize in supplying the largest buyers. FOAL has become the biggest roundwood supplier in Lithuania because its large-scale bargaining power enables it to achieve higher wood prices. These benefits are then passed back to the forest owner. FOAL is very active in the national and international forest policymaking process and it has been recognized for its valuable contribution to the development and improvement of national forestry.

Forests for people

In Lithuania there are four main public groups to which sustainably managed forests bring direct or indirect benefits:

- The general public using services provided by the forests
- Private forest owners
- People working in the forestry sector
- Youth in education (Young Forest Friends)

Benefits for the general public of forest services

Forests are among the most important indigenous natural resources in Lithuania. The State charges for usage of its forests — all State forest governors pay 10 per cent tax to the State budget from the sale of raw material timber and non-cut forests. These taxes are used for general public needs.

Planning and inventory data are crucial for sustainable forest management. In Lithuania, all private and State forests are periodically inventoried using State resources. The inventory and registration data are provided to forest owners and governors free of charge. Forest management plans are compulsory for all forest holdings bigger than 3 hectares, and forest inventories must be completed by qualified persons. Forest management planning is a great advantage for forest owners and governors and is also a good sign of trust for the general public that forests in Lithuania are managed sustainably and will be saved for future generations.

In Lithuania, people have the right to visit forests freely, except for those forests designated as strict nature reserves and special purpose areas (for example, border or military zones). Visitors can gather fruit, herbs and medical materials, other than endangered species, and can gather nuts, berries, and mushrooms, and keep bees in State forests free of charge.

Even in modern times, a number of private houses are heated by firewood. Forests provide the opportunity for people to obtain fuel for heating. Many houses are heated by using residual forest cuttings and this fuel is regarded as an environmentally friendly alternative to fossil fuel.

In recent years there has been strong public demand for opportunities to spend leisure time in forests. People are increasingly interested in the landscape's attractiveness and suitability for recreation activities and visitors

Image: Directorate General of State Forests

Forests are a part of life from an early age for Lithuanian people

Image: Directorate General of State Forests

Children monitor, investigate and analyse forest phenomena

use forests for camping, sightseeing and relaxation. Seeking to balance economic, ecological and social forest functions, foresters have built more than 2,000 recreational objects in Lithuanian forests, more than 200 of them adapted for the needs of physically disabled visitors. This type of adaptation is a new phenomenon in Lithuanian forests. Its main objectives are to contribute to the integration into society of disabled people by allowing them to experience equal access conditions with other members of society.

Benefits for private forest owners

Since 1991, the structure of forest ownership has changed considerably. Land reform and restitution in the forest sector has seen a shift from nearly 100 per cent of State owned forests to 38 per cent private, 50 per cent State and 12 per cent forests reserved for restitution. In Lithuania, private forest holdings are mostly small — the forest estate average is 3.3 hectares — but the number of private forest owners is considerable (almost 250,000).

Private forest owners and their families can get direct benefits from forests, by disposing of property, using wood, picking wild mushrooms and berries or using forests for recreation. Forest owners can harvest a limited amount of wood annually for their own purposes (not exceeding an annual increment) without permission.

Benefits for people working in the forestry sector

Around 50,000 people work in the Lithuanian forest sector and wood industry (about 6 per cent of total employment in the country). During the last few decades in the State forest sector, the number of employees has gradually reduced, mostly because of forest works undertaken by private contractors, but there are still around 4,000 employees working in the State forest sector. The welfare of these people depends directly on forest production, as they receive payment and social guarantees, and salaries in State forest enterprises are higher than average for Lithuania.

Youth education (Young Forest Friends)

Young Forest Friends is an independent organization that brings together children who are interested in nature conservation, forestry, flora and fauna. The main objectives of this organization are to:

- Develop the ability to recognize, protect and take care of the forest's flora and fauna
- Train children to monitor, investigate and analyse phenomena in the forest
- Promote the forestry profession, fostering ethnic traditions and customs
- Develop ecological habits within Lithuanian society
- Cooperate with similar organizations.

In the State forest enterprises, there are 356 clubs of Young Forest Friends and currently the organization unites more than five thousand youngsters. Together, they are learning about forest growth principles and sustainable forest management and forming strong relationships with local foresters.

Forests are a part of life from an early age for Lithuanian people. Most of the population cannot imagine life without the benefits provided by forests. We believe that sustainable forest management will save and even increase the benefits of the forests for future generations.

Sustainable forest management in Slovakia

Boris Greguška, Ministry of Agriculture and Rural Development of the Slovak Republic, Section of Forestry and Wood Processing, Ľudmila Marušáková and Milan Sarvaš, National Forest Centre, Zvolen, Slovakia

Slovakia (the Slovak Republic) is a country with a relatively high share of forest land. The total forest coverage is more than 40 per cent and as a result of diverse natural conditions and terrain, a broad variety of forest types is represented.

Forests have long been a part of life for many people living in Slovakia's rural and mountainous areas. As a result of societal and political developments, the relationship between people and forests has been changing in recent centuries, affecting their use, management and protection. A long tradition of active and systematic forest management in Slovakia can be documented by several examples, notably in the field of education and research. The foundation of the Mining Academy in Banská Štiavnica by the Austrian Empress Maria Theresa in 1762 was significant as forestry subjects were taught, probably for the first time at university level anywhere in the world. The foundation of the Forest Research Institute in 1898 represented another important historical milestone in this regard.

National forest policy

The National Forest Programme (NFP), adopted by the Slovak Government on 27 June 2007, and its Action Plan, adopted on 11 June 2008, are fundamental strategic documents that constitute national forest policy in Slovakia. The main objectives of the NFP are to implement sustainable forest management (SFM) and to enhance multifunctionality of forests. Based on current forest policy documents, processes and commitments that have been adopted at national and international levels, it provides updated forest policy priorities and constitutes a framework to build relationships and assess the impacts of other sectors on forests and forestry.

Sustainable forest management, as defined by the pan-European forest policy process (the Ministerial Conference on the Protection of Forests in Europe/ Forest Europe) is a fundamental principle of the

Image: B. Greguška

Protective forest functions are vital in the mountainous regions of Slovakia

Image: B. Gregušková

Natural forests and close-to-nature forestry are at the forefront of subjects covered by subregional cooperation in the Carpathians

programme. As a policy concept, this consists of three main pillars: economic, environmental and social.

Carpathian Convention — subregional cooperation on forests

Slovakia is a party to the Framework Convention on Protection and Sustainable Development of the Carpathians (Carpathian Convention), a subregional convention pursuing a comprehensive policy and cooperating in the protection and sustainable development of the Carpathians. The convention currently includes seven countries: Czech Republic, Hungary, Poland, Romania, Serbia, Slovakia and Ukraine. The third meeting of the Conference of the Parties (COP 3) to the Carpathian Convention was held from 25-27 May 2011 in Bratislava in the Slovak Republic. The COP adopted the Protocol on Sustainable Forest Management, which was subsequently signed by six of the seven parties.

The main objective of the protocol is to promote the sustainable management and protection of Carpathian forests. Its adoption creates conditions for effectual follow-up that can result in improving cooperation between countries of the Carpathian region in such areas as ensuring productive and non-productive forest functions, improving the health and vitality of forests, identifying and protecting natural forests, promoting the restoration of close-to-nature forests and encouraging research and exchange of information on Carpathian forests.

There are several points relating to the Protocol on Sustainable Forest Management that should be highlighted in the context of current policy developments and discussions related to forests and the forestry sector at all levels:

- The protocol is the first intergovernmental legally binding instrument on sustainable forest management in Europe (in spite of the fact that it only applies at a subregional level)
- It fully recognizes and accepts the concept of sustainable forest management as defined by the Forest Europe process at a pan-European level
- The adoption of the protocol and its follow-up have some linkages with the current activities that are taking place at the European Union (such as the EU Forestry Strategy revision and the European Commission green paper on forest protection and information) and pan-European (possible legally binding agreement) levels
- The protocol's adoption is a significant subregional contribution to the activities of International Year of Forests, 2011.

Environmental education as a vital part of national policy

Supporting environmental education and raising public awareness in order to achieve a positive change in the perception of forestry by the general public is a priority action of the Slovak National Forest Programme. As a part of the NFP implementation, professional foresters in Slovakia used the unique opportunity given by Forests 2011 to present a plethora of contributions that forests and forestry provide to society. Various national forestry entities joined together and, based on a common strategy, organized specifically targeted events.

A 'National Forest Days' event was held throughout the whole country for the fifth successive year in April 2011. A large number of events took place,

Image: Ľ. Marušáková

Forest pedagogics on the ground

focused on all societal groups, including children, youth, adults and seniors. A variety of tools were used, such as educational, cultural and sporting activities, to explain all aspects of forestry and work in forests as well as their societal importance. An example of specifically focused activities was the special effort made to break a national record by collecting as many handprints as possible to express public support for the messages of Forests 2011.

An exhibition on the importance of contributions provided by forests and forestry to society, held in the Slovak Parliament, can be considered as a principal action of Forests 2011 in Slovakia. It was accompanied by relevant communication activities, such as press conferences and dissemination of information.

Forest-related environmental education (forest pedagogics) forms an integral part of the activities of Forests 2011 in Slovakia. Using various methods of learning about forest ecosystems, it is aimed at educating people about the benefits of sustainable forest management. Activities are carried out by certified forest pedagogues and are mainly targeted at children and youth. Forest pedagogics not only provides knowledge but also supports the holistic development of the human personality. It uses methods of learning that demonstrate how the partnership between people and nature can function to benefit both. Educators use very diverse types of activities, such as organizing excursions in forests, seminars, workshops, exhibitions, educational and art competitions, summer outdoor camps, planting trees, building educational paths and printing information brochures and leaflets. To increase environmental awareness and improve understanding and perception of forestry by the broad public is a key objective of forest pedagogics in Slovakia.

Public awareness and education in the Slovak National Forest Programme

The NFP Action Plan includes measures for the development and application of a system of advisory services in forestry, as well as of a comprehensive system of lifelong learning for forest owners, managers and workers in forestry, with the aim of contributing to the development of a knowledge-based economy. It promotes the certification of forests and of a wood-based chain of custody for society.

Elaborating and implementing a comprehensive strategy for public relations activities is an important goal, in order to improve coordination and cooperation amongst forest and 'non-forest' organizations. This requires improvements to the institutional framework, including funding, to enable public relations activities for the forestry and related sectors. Activities have been implemented at a national level since 2007-2010, including:

- A proposed national strategy for public relations and communication in forestry
- Establishment of an expert working group on communication in forestry
- Development and operation of new internet sites on forests and forestry
- Media communication on forest events, forestry and forests through press releases, press conferences, media trips, articles in papers and magazines and interviews with forestry experts on national and regional television
- National events during European Forest Week 2008
- Annual 'National Forest Days'.

Forest Stewardship Council certification: forests for people, in practice

Alistair Monument, Forest Stewardship Council

Dhana Lama represents just one of some 22 community forest user groups which together manage 14,145 hectares of Forest Stewardship Council (FSC) certified forests in the Himalayan foothills of Nepal. Here, a unique alliance of representatives from industry, government, NGOs, communities and forest certifiers was brought together by the Asia Network for Sustainable Agriculture and Bioresources. Together they created the Private-Public Alliance on the Certification and Sustainable Marketing of Non-timber Forest Products. Promoting sustainable resource management, at the same time as increasing incomes from non-timber forest products and expanding responsible buying practices are major objectives of the alliance. FSC certification, under a group certification scheme, provides the vehicle to achieve these objectives.

"Forests are an integral part of local people's livelihoods as they have harvested fuelwood, fodder, medicinal plants, fruits and more since time immemorial," explains Dhana Lama, executive committee member of the Bhitteri Pakha community forest user group in Nepal. "Introduction of certification made people aware of sustainable forest management. Now they understand that forests and their biodiversity are very important and they should use them in a sustainable manner."It's a strategy that is paying off. With the help of the Federation of Community Forestry Users Nepal (FECOFUN), communities have been able to improve their forest management, strengthen their conservation efforts and reinforce their democratic institutions. "All certified community forests are better in terms of participation, benefit sharing, decision-making and fund utilization," says Apsara Chapagain, chair of FECOFUN. The organization works as a resource manager for the group certification scheme, helping community forest user groups to implement forest management guidelines and providing capacity-building and monitoring activities on the ground.

Image: ANSAB, Nepal

General assembly of users of the certified community forest, Dolakha, Nepal

For many people working in small-scale forestry, this is the model of FSC certification that is most successful. Established in 1993, FSC certification provides an internationally recognized assurance of responsible forest management. The logo appears on billions of wood, paper and other forests products around the world, making it a globally recognized label for consumers seeking forest products that benefit people, safeguard the environment and support sustainable businesses.

How does FSC certification work?

FSC has a direct, permanent and positive impact on the world's forests and the people living in and around them. It is recognized worldwide for applying the highest social and environmental standards in forestry. The FSC's ten principles describe how forests should be managed to meet the social, economic, ecological, cultural and spiritual needs of current and future generations. These principles are subject to periodic review and revision, under rules designed to ensure a balance between social, economic and environmental interests as well as a north-south equilibrium.

FSC doesn't issue certificates itself. This is done by independent certification bodies, which check that forest owners and managers meet the FSC's standards for forest management. Separate chain of custody certificates allow FSC-certified wood products to be credibly

Image: ANSAB, Nepal

Handmade paper sheets in a community enterprise, Dolakha, Nepal

tracked from the forest, through production processes to retailers and consumers. Once they achieve certification, each certificate holder is checked at least once a year to make sure they continue to comply with the FSC requirements.

To ensure the certification bodies are competent, they are assessed against an extensive set of rules and procedures by Accreditation Services International, who manage the FSC accreditation programme. Only accredited certification bodies are authorized to certify against FSC standards.

In its 18-year history, FSC has achieved global importance. By 2011, over 145 million hectares of forests had been certified to FSC standards in over 80 countries around the world: this is equivalent to roughly 7 per cent of the world's production forests. Importantly, 22,000 companies working in the wood product supply chain in 105 countries have also achieved FSC chain of custody certification, entitling them to use the FSC trademarks and to sell FSC-certified materials.

This unprecedented growth in certified forest area and supply chain participation is a direct response to market demand for FSC certified products. FSC certification provides economic benefits for forest owners and managers, local communities and companies in the supply chain. Demand is largely driven by the responsible procurement practices implemented by many leading companies around the world including Kimberly-Clark, Tetra Pak, Penguin and HSBC, along with retailers such as Ikea, Home Depot, Marks & Spencer and Kingfisher. Many governments around the world support FSC certification. Uniquely, FSC is also the only internationally recognized standard-setting organization for responsible forest management supported by leading global environmental organizations like WWF and Greenpeace.

This wide range of stakeholders working with FSC demonstrates the strong political and economic forces that endorse and promote the FSC system globally.

FSC principles for forest stewardship

1. Compliance with laws and FSC principles
2. Tenure and use rights and responsibilities
3. Indigenous peoples' rights
4. Community relations and workers' rights
5. Multiple benefits from the forest
6. Assessment of environmental impact
7. Management planning
8. Monitoring and assessment of management impacts
9. Maintenance of high conservation value forests
10. Responsible management of plantations

Image: ANSAB, Nepal

Local people measuring their forest in preparation for developing their forest operational plan

Forests for people – the FSC perspective

FSC supports responsible forest management at all scales and on all continents. This means taking into account a vast array of ownership situations, ranging from small private woodlots to large private and public forests and extensive areas of forest managed by communities at a low intensity for non-timber forest products.

Setting standards for such a wide range of situations that are relevant in tropical and temperate environments is a huge challenge that FSC has successfully addressed. Through the development of national standards, using FSC procedures that ensure balanced representation of different stakeholder groups and based on the FSC principles and criteria, standards are adapted to local conditions and made appropriate to different situations.

Since its inception, FSC has placed a significant focus on ensuring that small-scale and community producers have access to, and benefit from, certification. The FSC principles emphasize the recognition of and respect for indigenous peoples' rights, the endorsement of the rights of forest workers, and the importance of effective and meaningful stakeholder consultation. The concept of forests for people is at the heart of FSC certification.

While FSC has always sought to put people at the centre of its certification, a balance is also needed between reducing costs and bureaucracy to make FSC certification accessible to small-scale producers and communities and maintaining high standards of forest management, monitoring and evaluation. In this delicate process, a number of milestones are evident in FSC's continuing dedication to putting in place fair, inclusive and people-centred policies.

Group certification procedures, introduced in 1998, allow small-scale forest producers and processors to work together for FSC certification. The group structure reduces certification costs for individual members; a group or resource manager like FECOFUN is responsible for ensuring that group members understand the FSC requirements and put them into practice.

In 1999, the concept of High Conservation Value Forests was introduced to define areas of outstanding biological, ecological, social and cultural importance. By using such a holistic approach, which incorporates both the ecological and the social, the HCVF concept recognizes the needs and rights of many otherwise marginalized peoples, for whom forests provide not only food and timber products, but also spiritual and cultural sustenance.

The standard for small and low-intensity managed forests (SLIMFs), introduced in 2004, was a further groundbreaking policy for FSC. Developed through participatory mechanisms, the SLIMF approach streamlined the procedures for certifying small community forests, making FSC certification more accessible to small-scale producers and communities. National SLIMF standards have been developed in Brazil, Cameroon, Mexico and Sweden and are under development in a number of other countries, setting out clear and appropriate requirements for such forests. Furthermore, all FSC national standards for forest management now need to include indicators that are specific to small, low-intensity and community forests, to make them more easily applied to these types of forests.

Working in partnership has impacts on the ground

Group certification schemes, as well as the SLIMF standards for small, low-intensity and community managed forests, offer important opportunities for small-scale

Image: ANSAB, Nepal

Women cleaning Lokta bark in preparation for making paper

producers to benefit from FSC certification. And learning to work in partnership to achieve certification is often one of the biggest benefits of the certification process.

In Indonesia, the 550-member cooperative, Koperasi Hutan Jaya Lestari (KHJL), has worked with partners in the private sector and NGOs, to achieve a group certificate for their members' teak forests. The Forest Trust (TFT) is a membership organization, comprising retail companies in Europe and the USA which are committed to buying tropical hardwoods from FSC-certified forests, or those actively working towards FSC certification. Jaringan Untuk Hutan (JAUH) is a network of environmental and social non-governmental organizations (NGOs) in Sulawesi Province of Indonesia, with expertise in community organization, government advocacy and media campaigns. Together, TFT and JAUH have supported the cooperative in its efforts to sell teak grown on its members' farms on the international market.

Achieving this has needed work on many different fronts. Legal restrictions related to harvesting and transport permits meant that one or two wood buyers in the province had gained a monopoly position on teak prices. Individual farmers were obliged to sell their teak locally for very low prices.

FSC certification has allowed the members of the cooperative to sell their wood directly to TFT member factories in Java for a higher price than that offered locally. Furthermore, through consultation with the factories, a short-term loan was arranged to support the cooperative process and pay for the initial permits needed for buying and selling wood.

Working together has been essential for these farmers. Group certification made FSC certification cheaper and allowed them to obtain the necessary permits and link directly to the international market. Working in partnership with a regional NGO and a network of buyers who give preference to FSC-certified wood was also vital, as these partners brought in key expertise and resources. Group membership offers opportunities for capacity-building, information sharing and access to resources that are not open to individual farmers.

But it hasn't all been plain sailing. Previous attempts to set up cooperatives had failed because farmers had no experience in managing them. This time JAUH and TFT worked with the Indonesian Cooperative Department to give farmers training on cooperative structures and management, business practices and forest management.

The cooperative has been extremely successful, growing from the initial membership of 196 individuals to the current level of 550 members. Perhaps more importantly, with FSC certification came recognition by the District and Provincial authorities of the farmers' ability to supply the international market, and their need to be recognized in regional forestry legislation.

A growing market improves people's lives

Market demand for FSC-certified products is growing around the world, driven by responsible manufacturers, retailers and consumers. And growing demand for FSC products is leading to improvements in people's lives in places like Nepal and Indonesia. Dhana Lama in Nepal sums it up: "Products of our community forests have been successfully marketed, good changes in environment and economy have been observed and social changes have been felt."

Community forestry in Honduras as a bulwark against deforestation

Benjamin Hodgdon, Projects Manager, Rainforest Alliance TREES program

From the air, the forest canopy of the Río Plátano Biosphere Reserve in eastern Honduras' Moskitia region appears unbroken. Designated a World Heritage Site in 1982, the 830,000-hectare expanse is the anchor of the country's largest primary tropical rainforest, one of the largest intact forests remaining in Central America, and home to globally important species such as jaguar, ocelot, Baird's tapir, scarlet and green macaw and the great curassow. The reserve is also an internationally significant experiment in multi-use, community-based forest management. The core zone protected area covers just a quarter of the reserve, while the remaining area — divided into buffer and cultural zones — allows local communities to use their forest resources sustainably.

Over the last fifteen years, an increasing number of local groups in the reserve, both indigenous groups and mestizos, have formed cooperatives to manage state-licensed concessions for a range of timber and non-timber forest products (NTFP). Most have also founded enterprises around these forest-management activities, creating jobs and adding value to primary products for market sale. The successes of these enterprises have given rise to the expansion of the model to areas outside the reserve, in other parts of the country where production forestry activities offer the best — and often the only — chance for sustainable economic development.

Image: Charlie Watson

A community member from an UNICAF cooperative and a Rainforest Alliance staff member assess sawn wood quality as part of a training exercise

But the threats to this community-based approach to forest protection are serious and mounting. Earlier this year, the Food and Agriculture Organization's State of the World's Forests report found that Honduras had the highest deforestation rate in all of Latin America and the Caribbean from 2000-2010, ranking it as one of the highest in the world. Conversion of forest for cattle ranching continues to be the principle driver of permanent deforestation in the Moskitia, as it has been for decades.

However, this type of conversion is now increasingly driven by narcotics trafficking rings seeking to launder and invest drug money through illegal land deals and cattle ranching businesses established on cleared forest lands. The presence of these criminal groups in a part of the country where State authority is already limited has brought a new and menacing edge of intimidation and violence to the deforestation front. At the same time, an emergent culture of lawlessness and organized crime is fueling petty corruption, hindering efforts to control the widespread illegal harvest and trade of the region's high-value timber species, including most notably mahogany.

The UNICAF community forest cooperatives

In the face of this daunting array of threats, the achievements of the community forestry operations organized under the Union of Agroforestry Cooperatives of the Río Plátano Biosphere Reserve (UNICAF, by its Spanish acronym) are remarkable. The eleven cooperatives manage concessions covering more than 100,000 hectares in both the buffer and cultural zones of the reserve according to sustainable forest management plans approved by the Honduran Forest Service (ICF).

With assistance from the Rainforest Alliance — and together with long-standing support from the German international aid agency Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and the local organization Fundación Madera Verde — the cooperatives have steadily improved forest operations while

Image: Charlie Watson

A portion of profits from community-owned forest enterprise is reinvested into social programmes, many of which directly benefit indigenous youth

Image: Charlie Watson

Improvements in forest operations have reduced waste and increased productivity, while creating new employment opportunities

building up processing capacity for value-added production. As of October 2011, seven of the cooperatives covering more than 53,000 hectares had achieved Forest Stewardship Council (FSC) certification, which ensures the sustainability of forestry practices while granting access to preferred international markets demanding certified wood.

Formed initially as a body that would hold the FSC 'group certificate' for certified members, in recent years UNICAF has taken on a number of additional functions to better serve the needs of local forest communities. Since 2005, the union has evolved into a second-tier enterprise that aggregates the relatively small volume harvests of its members, achieving economies of scale and adding value to primary wood products to cut out intermediaries and access better markets. Increased efficiencies in forest harvesting and improved quality in wood processing, moreover, have resulted in a more than 100 per cent increase in annual income for the cooperatives, although harvest volumes remain well below allowable cuts prescribed by management plans.

UNICAF also represents its members' political and economic interests and has achieved increased visibility through organizing. Already, the union has lobbied the central Government to streamline processes for forest harvest permit provision and extend the length of concession contracts to better match community and forest management objectives. At the same time, recognizing that a lack of funds is a major hurdle to achieving sustainable forestry and enterprise competitiveness, UNICAF applied for and last year was awarded a US$500,000 loan that will provide access to working capital and allow major upgrades to infrastructure and equipment.

Real improvements through good forestry practice and business development

UNICAF's approach to sustainable forest management has made demonstrable, positive impacts on local people's lives. Scores of new jobs in forest harvesting, processing, transport and enterprise administration have been created, increasing household incomes and enabling other entrepreneurial activities. Technical training in forestry, value-added transformation to produce finished wood products, and business and marketing skills have increased community capacities, demonstrating the commitment to locally-driven enterprise and economic development.

Critically, the forest itself is also being conserved: a preliminary analysis by the Rainforest Alliance indicates that the cooperatives are outperforming the adjacent core zone protected area in maintaining forest cover. A more comprehensive study is underway.

Grasping a chainsaw, Omar Antonio Rivera, of the UNICAF-member cooperative El Guayabo, echoes the feelings of many: "Over the years we've seen wildlife move farther and farther away. We've seen fewer fish in the streams because of all the hunting and fishing." But, says Rivera, improvements in forest management are having an impact. "The idea is that we will see recovery because of our good forestry work."

Sustainable forest management clearly benefits local community members, who rely on the forest not just for timber but for a range of products for domestic use and market sale. At the global scale, moreover, intact tropical forests like those in the Río Plátano are taking on increased importance in the struggle to reduce greenhouse gas emissions. The rapidly growing market for carbon credits for reducing emissions from deforestation and degradation (REDD) is an opportunity for UNICAF and the cooperatives to tap into a potentially major new revenue stream. With support from USAID,

Image: Charlie Watson

According to a preliminary analysis by the Rainforest Alliance, community forestry in the Río Plátano is outperforming the adjacent core protected area in maintaining forest cover

Image: Rainforest Alliance

A local worker displays sustainably harvested fruit from ojon palms; the oil extract *batana* has a significant international market as a beauty product

the Rainforest Alliance is leading work in the Río Plátano aimed at using sustainable, community-based forestry and enterprise as the platform for the development of high-value REDD projects.

Strengthening social structures

Adequate finance alone, however, will not ensure the future of community forestry in this highly complex region. Ultimately, the key to long-term success is the strength of the social institutions that underpin both the cooperatives and UNICAF itself. Although greater transparency and increased participation in decision-making have been achieved in recent years, communication within and between cooperatives still needs to be improved and problems stemming from corruption, favouritism and collusion must be urgently addressed. The increasing presence of organized crime rings and the associated pressure to log and convert forests illegally only heighten the risks posed by the lack of social capital.

Earlier this year, narco-driven conflicts in one of the UNICAF communities led to community conflicts, the closure of the local ICF office and the temporary suspension of forestry activities. The only way to prevent such incidents from becoming more common in the future is to strengthen local commitment to community forestry through greater participation and better benefit sharing. Improving transparency and building social capital is the most promising bulwark against illegality and deforestation and is therefore the central priority for UNICAF in the near term. With threats mounting and so much at stake — but with a record of success to build on — the forestry cooperatives in the Río Plátano are leading in the global struggle to maintain forests as the basis for sustainable development.

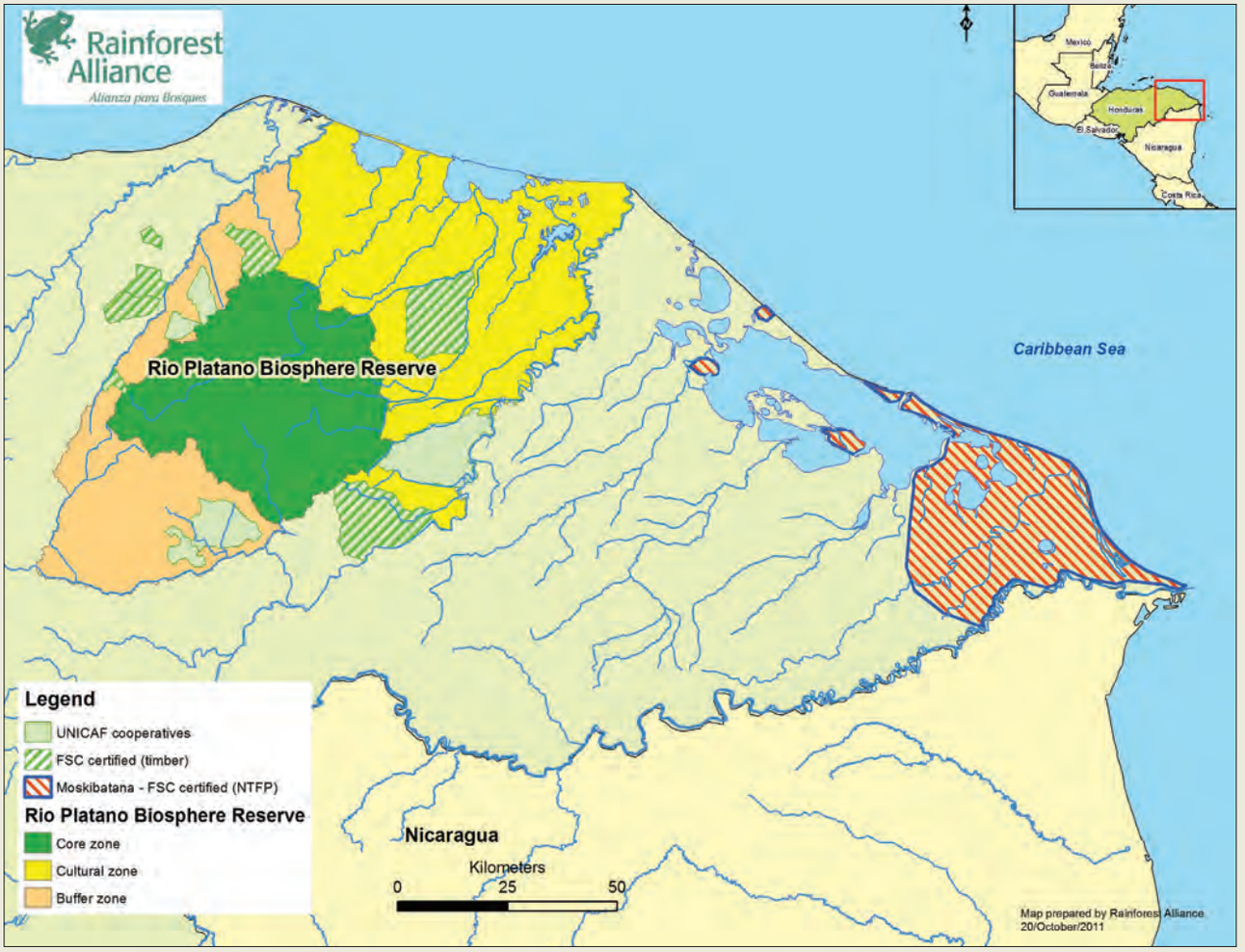
Indigenous non-timber products

A hundred kilometres from the Río Plátano, in the coastal marshes, flooded savannas and closed forests around the Catarasca Lagoon at the eastern tip of Honduras, indigenous Miskito people are organizing a collective venture around the harvest and sale of a ubiquitous non-timber forest product. Used since ancestral times to treat skin conditions and for hair care, the oil extracted from the fruits of the ojon palm (*Elaeis oleifer*a), known locally as batana, has strong international market demand and is purchased by the Ojon Corporation, a subsidiary of Estée Lauder.

Although the harvesting and extraction of ojon has gone on for hundreds of years, until recently, local communities had little capacity to monitor the impacts of harvesting or verify the quality of processing activities. However, in close partnership with the local organization Mopawi, which has assisted producers for twenty years, the Rainforest Alliance has been working with communities in this highly remote region to document harvesting practices, improve value-added techniques and form a collective enterprise called Moskibatana to capture maximum benefit from the sale of ojon and ensure equitable benefit sharing among producers. In September 2010, over 55,000 hectares under management by producers from 40 communities were awarded FSC certification, the first certificate issued for NTFP production in Honduras.

Since its formation as a legal enterprise — a major step in its own right — Moskibatana has focused on building local capacities to monitor ojon harvesting, administer sales and grow its business. Following a series of grass-roots workshops, the producers created their first business and marketing plans and identified the training needs for community members – developments that have engendered a greater sense of local owner-

Community forest operations in the Moskitia region, Honduras



Source: Charlie Watson

ship. "We set up our new enterprise with the goal of taking greater control over our business and expanding our markets," says Serrano Vásquez, Moskibatana's field coordinator. "With continued support, we know this can be achieved."

But as with the UNICAF cooperatives, threats are increasing, even in this region far from the agricultural frontier. In spite of their decades-old campaign for permanent common property title over customary lands — consistent with ILO Convention No. 169 on Indigenous and Tribal Peoples — communities in this part of the Moskitia still lack clear tenure, endangering the survival of traditional practices that conserve forest resources. Although a new national forest law grants indigenous groups rights to forests on lands they traditionally inhabit, the extent of these rights has yet to be made clear. In the meantime, as in the Río Plátano, illegal land deals for forest conversion are becoming increasingly commonplace.

Documentation of management practices and organization of a collective legal entity is aiding community efforts to assert their rights to customary lands and to begin building sustainable enterprises. But ultimately, achieving successful community forestry requires building local capacities in forest management, institutional governance and business development — the same skills that will enable indigenous communities to exercise their rights, chart a locally-driven course for sustainable development, and confront the threats to their livelihoods and resources.

Expanding local forest enterprises to halt the process of deforestation

UNICAF and Moskibatana have shown that organizing community forest enterprises and complying with sustainability standards can lead to increased incomes, forest conservation and improved forest rights. Although the deforestation threat is powerful and mounting, community leaders are attempting to counter it through increased transparency and more equitable benefit sharing, making sustainable forestry a viable alternative to forest conversion. Together with increased Government efforts to crack down on illegal activity, expansion of the community forest enterprise model offers the best hope to halt deforestation, empower locally-owned enterprise and secure the survival of the Moskitia region's natural forests.

Empowering local communities in forest ecotourism

H.O. Mohd Shahwahid, Professor and Deputy Dean, Industry and Society Networking, Faculty of Economics and Management and Research Associate, Institute of Tropical Forest and Forest Product, Universiti Putra Malaysia, Selangor, Malaysia[1]

The Lower Kinabatangan River Ecosystem has seven forest types and is rich in wildlife. The forest composition include montane, limestone, hill and lowland dipterocarp, alluvial, seasonal flooded forest, peat swamp forest (the largest of its kind in Sabah) and mangrove forest. The wildlife comprises 208 bird species, 10 primate species including proboscis monkey, silver leaf and red leaf langur, two ape species (orangutan and gibbons), several mammal species, including pygmy elephant and sambar deer and many reptiles, including freshwater crocodiles. Sabah is the only state in Malaysia where elephants can be found and a further attraction to visitors is the formation of ox-bow lakes.

The village of Batu Puteh along the Kinabatangan River (at 560 km the longest river in Malaysia) is located 150 km from the sea, yet sea water can at certain times reach this far inland. Batu Puteh has a dynamic ecotourism programme that has helped to raise awareness and establish sound practices of forest ecology, conservation and restoration to conserve the wildlife habitats of the Lower Kinabatangan Floodplain.

Image: KOPEL

The forests of Lower Kinabatangan are rich in wildlife including pygmy elephant

The programme incorporates village homestays, forest camps, wildlife watching, student educational and volunteer programmes and opportunities to engage in tree planting and forest restoration as core components of community-based tourism activities.

The ecotourism flagship at Batu Puteh is the Tungog Rainforest Eco-camp at Pin Supu Forest Reserve. This forms part of the wider sustainable tourism project initiated by the World Wide Fund for Nature Malaysia (WWFM). Nestled next to a pristine ox-bow lake located some 10 minutes from the Batu Puteh jetty, the eco-camp provides visitors with accommodation within the natural forest environment, with a particular focus on nature education, ecotourism and research. Participation in this programme allows visitors a rainforest experience and an opportunity to gain knowledge about forest restoration.

The eco-camp is designed and constructed jointly by local youths and supported by international volunteers, utilizing the latest eco-friendly design principles and technology to minimize energy and water usage. During construction, there was no felling of trees for the construction of the camp and the buildings were situated between the existing vegetation on site. Construction materials were derived from natural products and sourced from nearby villages.

With more than three language groups and over twenty dialects, members of the local indigenous Orang Sungai community have a unique and diverse story to tell of their lives alongside the Kinabatangan River. Located within the Batu Puteh enclave is the historic archeological site of Batu Tuluq, a limestone hill whose many cavities are filled with the remains of villagers from up to 900 years ago. The village is also known for several traditional dances including the rimbai, titikas, menggalai and bambunatip. Traditionally the titikas dance is used as a welcoming gesture to head hunters on their return while the rungsai involves interactive singing among opposite gender youths to call the spirits and to engage in attracting potential partners.

A model ecologically sustainable community tourism (MESCOT) initiative

Best practice community-based forest ecotourism (CBFET) takes into account environmental, economic,

Image: Mohd Shahwahid

The eco-camp at Batu Puteh provides visitors with accommodation within the natural forest environment

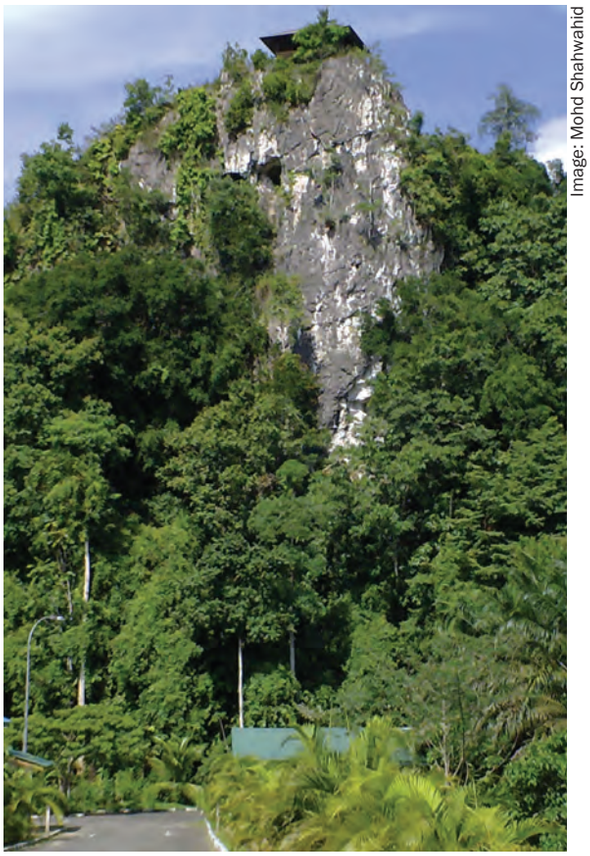


Image: Mohd Shahwahid

Located within the Batu Puteh enclave is the historic archaeological site of Batu Tuluq

social and cultural sustainability and gives local people the opportunity to participate.[2] These components have to be organized on the basis of transparent cooperative governance by enacting a knowledge network drawing on the experience and wisdom of a wide range of key individuals, including village leaders, external non-governmental organizations (NGOs), consultants, advisors and volunteers.[3] Conflict resolution procedures are put in place and the legitimacy and acceptance of the governance structure ensures that community members are committed to well-defined roles and responsibilities.[4]

Ecotourism at Batu Puteh is managed by KOPEL (an acronym for Koperasi Pelancongan or 'Ecotourism Cooperative'). Active since July 2003, KOPEL serves the community in the villages of Batu Puteh, Mengaris, Perpaduan and Singgah Mata.

The community of Batu Puteh is like many poor, isolated, indigenous rural communities in Sabah,whose traditional reliance on the rainforest for food, medicines, daily commodities and trade with the outside world has been displaced by the loss of forests and cultural heritage and a cash-driven lifestyle. KOPEL was set up to reverse the losses, to capitalize on ancient indigenous and traditional knowledge and culture and to create economic value and appreciation of the rainforests.

The local community members of KOPEL initially looked to CBFET to generate a reliable source of income and take them out of poverty. By 2010, ecotourism had become as important an economic activity to the villagers as oil palm growing. Local communities benefit from KOPEL, firstly in terms of ecotourism services that provide sustainable incomes and secondly as a result of work allocated to members of cooperatives for forest rehabilitation and ox-bow lake restoration projects that KOPEL has been able to obtain from relevant Government agencies.

The ultimate aim is to create a sense of hope for a sustainable future for the people of the LowerKinabatangan. KOPEL was formed to coordinate and amalgamate a number of separate village ecotourism associations such as MESCOT, Miso Walai Homestay, Mayo do Talud Boat Service, Wayon Tokou Nature Guide Service, MESCOT Culture Group, Tulun Tokou Handicrafts Association and Tungog Rainforest Eco Camp. These activities are all serviced by local villagers. The Floodplain Forest Habitat Rehabilitation and Wetland Lake Rehabilitation programmes provide additional job opportunities for KOPEL members. As a result, from an initial 110 members in 2003 and an administrative team of seven, KOPEL had expanded to 400 memberships by 2011.

CBFET at Batu Puteh is rising in popularity and provides tourist income and green jobs to local households. Over the 10-year period since implementation, rates have risen at an average rate of 175 per cent per annum, growing from 176 visitors in 2000 to more than 3,000 in 2010. There are two main categories of visitors, the first of which is group-inclusive tourists (GIT), who commonly make advance bookings to visit and participate in homestay and conservation activities. This is the main target and is preferred by the KOPEL administration, because the

Image: Mohd Shahwahid

KOPEL was set up to reverse the losses of forests and cultural heritage and to create economic value and appreciation of the rainforests

Image: Mohd Shahwahid

Ox-bow lake rehabilitation: locals used boats with scoops to raise the weeds out of the lake

members can control and manage the visits by providing prior information and guidelines regarding local values and norms and provide ecotourism programmes that incorporate Miso Walai homestay and conservation activities. The second category is known as free independent tourists (FIT), who may arrive spontaneously at the village and are more difficult for the KOPEL administration to manage. The average annual rate of growth of GIT (199.9 per cent) has surpassed that of FIT (94.1 per cent), indicating this package's popularity. During the last decade GIT accounted for 86.6 per cent of visitors, with the rest being FIT. Overall visitor figures rose annually except in 2002, most likely due to the SARS bird flu scare in South East Asia.

The success of CBFET at Batu Puteh can be attributed to institutional arrangements that include:

- Friendly and cooperative work cultures and norms among the households in the community and presence of conflict resolution mechanisms
- Willingness of relevant Government agencies to decentralize natural resource management to local communities
- Willingness of corporate entities to financially support CBFET through their corporate social responsibility programmes and of domestic and NGOs to lend a hand in facilitating forest resource conservation activities
- Strategic partnerships among the community with relevant Government agencies and NGOs with regard to organizing CBFET, community user rights of forests for ecotourism purposes and the use of volunteers to strengthen forest conservation and ox-bow lake restoration programmes.

The establishment of KOPEL and MESCOT was motivated by economic and environmental considerations. Local youths were looking for new job opportunities that would not require migrating to urban areas but, due to a lack of exposure and experience, they needed external guidance to move forward. In 1997 the WWFM and the Sabah Ministry of Tourism, Culture and Environment offered to assist by assigning a facilitator for local people in the conservation and homestay programmes. The group assessed the rural opportunities, shared ideas and prioritized ecotourism as the economic activity of choice.

A proposal paper for a CBFET at Batu Puteh was prepared to seek funding from WWF Norway to finance the initial activities.The society that was initially formed was converted to a cooperative to amalgamate the available ecotourism options.

Having gained experience and established a working relationship with the Sabah Forestry Department, KOPEL and the local youths then formed a strategic partnership with the department for forest fire prevention and forest rehabilitation programmes.

Involvement in ox-bow lake rehabilitation occurred as a result of an infestation of Selviena mollusta, a fast-breeding weed species found in still lakes. Infestation can cause the water level in lakes to drop, affecting fishery resources. Locals developed the idea to use boats with scoops to raise the weeds out of the lake.

Image: KOPEL

Transporting seedlings for planting by boat

Image: KOPEL

Ecotourism: Boat trip along the Kinabatangan river

KOPEL set up a volunteer initiative and worked with various organizations such as Global Vision International (GVI) to arrange volunteer groups to support the community and conservation work at Batu Puteh. These partner organizations helped with many practical arrangements such as flights, visas, medical needs and other practical requirements such as pre-arrival briefings and training.

When the idea of introducing homestay programmes was first mooted, its success depended on acceptance by community leaders and elders and the cultural ambience of ordinary households towards foreign tourists living among them. Community leaders were brought into the discussions by the youth group at an early stage so that they could be informed and offer advice. To ensure acceptance of tourists in the homestay programmes, local communities would have to feel that they were not asked to go beyond their limits in accommodating visitors. Initial wariness was overcome by prior distribution to visitors of information about local household culture and norms.

To secure the ecotourism jobs and income that arise from initiatives such as the homestay programmes, KOPEL has to ensure regular visitor rates year round by raising promotions and maintaining a strong relationship with tour agents and NGOs managing volunteering tourists.

Sustaining sources of finance and community jobs

KOPEL and MESCOT have links to many organizations that they can rely upon to provide sustained financial support. MESCOT is funded by national and international organizations, including Government departments, NGOs and private firms.

An example of a financial support package is Shell Malaysia's provision of a seed grant of RM220,000 as part of a Memorandum of Understanding signed in February 2002 with WWF Malaysia and Raleigh International to develop Tungog eco-camp and its associated structures. Sabah Forestry Department provided the permit for KOPEL to use the Pin Supu Forest Reserve, while WWF Malaysia and Raleigh International provided administrative and management expertise to the project. Shell's participation in this programme was aimed at building local capacity that will benefit the community and enhance the conservation of biodiversity and wildlife of the Kinabatangan floodplain.

International student volunteers from the UK, Australia, Japan and Brunei participated through programmes such as Outlook Expedition, Raleigh Expedition, Global Volunteering Institution and International Brunei School, while other interested tourists contributed large sums of money to participate in indigenous tree planting activities.

During the period 2008-2010, KOPEL received commissions for a 300 hectare enrichment planting job and a 700 hectare silvicultural treatment works, with a budget of RM1.3 million. 10 per cent of this money went to the management fund of KOPEL to sustain future projects. The experience gained has allowed KOPEL to provide consultancy services in preparing the CBFET model in other villages.

United States support for forests and people around the world

Thomas L. Tidwell, Chief of the US Forest Service, US Department of Agriculture

In the early 20th century, visionary conservationists from around the world recognized the need for global partnerships to address common forestry concerns. In 1926, a World Forestry Congress in Rome initiated a series of global conferences that continue to this day, with strong United States support. The impacts of ecosystem and biodiversity loss or mismanaged resources in one country often reverberate throughout the world, manifesting themselves in many ways — global conflict, environmental refugees, market distortions, increasing global poverty and loss of species. Rapid globalization in the 20th century, trade, population growth and climate change have increased the need for cross-boundary cooperation in anticipating emerging conservation challenges.

Through global partnerships, the United States has long worked for sustainable global forest management and biodiversity conservation, supporting efforts in more than 90 countries. The lead Federal agency for forestry in the United States is the US Department of Agriculture (USDA) Forest Service. Much of its work in other countries is funded through the US Agency for International Development (USAID) and the US Department of State. USDA Forest Service researchers and land managers draw on more than a century of experience in dealing with US forests, which constitute the world's fourth largest forest estate, with forest types ranging from boreal to tropical. They work with global partners on issues such as forest health, invasive species, rangeland management, forest economics, policy analysis, and disaster response and mitigation. The following case studies showcase some of their work.

Image: Stephanie Otis, USDA Forest Service

Forest management planning workshop, Guinea

West Africa: Cross-border collaboration

For thousands of years, tightly knit communities have lived in and around the biodiversity-rich Upper Guinea Forest, which spans the West African coast from Guinea to Togo. These communities have developed elaborate mechanisms to conserve their forest resources. However, due to pressures from rising populations and growing economic demands, the Upper Guinea Forest has been degraded and is under threat from overexploitation. With funding from USAID, the USDA Forest Service is working through the Sustainable and Thriving Environments for West African Regional Development programme (STEWARD) to conserve biodiversity and improve rural livelihoods of communities living in critical transboundary landscapes in Guinea, Sierra Leone, Liberia and Ivory Coast.

At the national policy level, the USDA Forest Service collaborated with the Natural Resource Technical Team of the Mano River Union, a subregional governmental body, to assess existing natural resource management policies/regulations across the region and make recommendations for improving legal frameworks to harmonize transboundary natural resource management, biodiversity conservation and climate change response. In addition, thanks to community education and empowerment, eight nationally recognized community forests have been developed in Guinea and Sierra Leone. Through sustainable forest management, communities can improve their livelihoods and conserve biodiversity in the forest. The USDA Forest Service is also working in partnership with the Forest Research Institute of Ghana to develop a methodology for community-based carbon monitoring for use throughout West Africa, leaving local communities better positioned to receive payments for carbon sequestration.

Viet Nam: Protecting Ho Chi Minh City's water supply

With USAID funding, the USDA Forest Service is working with Winrock International and the Government of Viet Nam's Forest Protection Department on an innovative partnership in Lam Dong Province. The joint project will protect the watershed and water supply of Ho Chi Minh City, home to more than four million people, by improving the management of protected areas and developing methods for local people to profit from protecting the forests surrounding the parks. For example, the hydropower company is paying local people not to clear the forest and to pursue sustainable enterprises such as bamboo handicrafts and ecotourism.

Vietnamese land managers had the opportunity to examine the innovative watershed management approaches taken by the US cities of Seattle and Albany through a study tour hosted by the USDA Forest Service. They learned about ways in which public and private groups can work together to affordably maintain clean water supplies for thousands of citizens by protecting forested watersheds. Hydrology experts assisted in examining road development in Ho Chi Minh City's watershed and in recommending relocation or modification of roads to reduce erosion and improve water quality downstream. Assistance was also provided in analysing the locations of water quality gauging stations used to compare sediment loads between areas of the watershed where tree cover was being maintained and areas where agriculture was the dominant land use. USDA Forest Service landscape architects helped to identify ways of making ecotourism in Bidoup Nui Ba National Park more environmentally friendly and beneficial to the local community. The lessons learned from the Lam Dong project have helped inform cutting-edge national legislation, making Viet Nam the first Southeast Asian nation to develop a system for national payments for ecosystem services.

Russia: Building stewardship at Lake Baikal

Image: Thomas Weatherley, Great Baikal Trail

Campsite at tree line, Barguzinskii Zaliv, near Maksimikho, on the eastern shore of Lake Baikal

A mile deep and tens of millions of years old, the Siberian World Heritage Site of Lake Baikal holds 20 per cent of the world's unfrozen fresh water. Local inhabitants are passionate about protecting the 'Sacred Sea' and the lands surrounding it. The non-governmental organizations Great Baikal Trail (GBT) and Tahoe Baikal Institute (TBI) protect Baikal by helping people make a connection with this land and provide opportunities for them to care for it.

Activities undertaken by GBT and TBI include building ecotourism trails and campgrounds, teaching environmental education to local children and training young leaders. They create forums that bring natural resource agencies together with non-governmental stakeholders.

With USAID funding, the USDA Forest Service has worked to build the capacity of these organizations. Specialists have travelled to Baikal to teach seminars on trail building and environmental education. Interns from GBT were brought to the United States to study trail building, safety techniques, wilderness first aid and non-profit and volunteer management. Financial assistance was provided for environmental education events, roundtables and training for governmental and non-governmental stakeholders.

USDA Forest Service specialists also worked with Baikalsky Reserve and Pribaikalsky National Park, protected areas near Lake Baikal, in developing major ecotourism development plans. A recreation manager and a landscape architect provided consultations and training on designing ecotourism and interpretation infrastructure and programmes.

Lebanon: Restoring the forests — a symbol of national unity

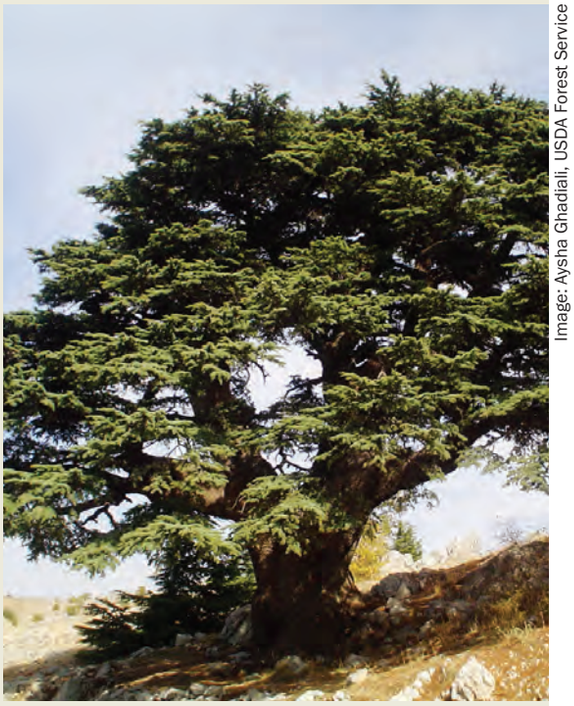


Image: Aysha Ghadiali, USDA Forest Service

Cedar Tree at Chouf Cedar Reserve in Lebanon

For many centuries, Lebanon has benefited from its rich forests, both economically and culturally. The Lebanon cedar is an important symbol of Lebanese unity and national pride, and Lebanon is one of the most heavily forested countries in the Middle East. However, for various economic, political and natural reasons, forest cover has decreased by more than 35 per cent since 1960. This decline, coupled with climate change, threatens national identity, water security, ecosystem services and rural and urban livelihoods. In 2001, the Government of Lebanon released the National Reforestation Plan to increase total forest cover by 20 per cent. With funding from USAID, the USDA Forest Service is supporting this effort through the Lebanon Reforestation Initiative (LRI), designed to provide short-term employment in economically depressed and environmentally degraded regions of Lebanon through the strategic planting of several hundred thousand trees.

Since late 2010, the USDA Forest Service has partnered with Lebanese governmental and non-governmental sectors to provide technical expert assistance in planning, site and tree selection, nursery and seedling development and maintenance. Reforestation projects are inherently long term, requiring preparation, planning and commitment. The initiative takes a decentralized approach, engaging rural communities at the municipal level. In addition to planting trees, the LRI will establish reforestation contracts to generate short-term employment in selected villages; restore sites with important ecological, cultural and watershed values; and enhance national extension services.

All future reforestation efforts will benefit from sound government extension services, viable commercial nurseries producing high-quality seedlings and a fund to provide resources for long-term investments in the forestry sector. With sound technical and scientific assistance and participation from the rural, urban and diaspora communities, this work will set the stage for Lebanon's forests to thrive in the years to come.

North America: Saving one of nature's winged wonders

Image: Michael Rizo, USDA Forest Service

Children participating in an El Valor environmental education programme

Every year, millions of black-and-orange Monarch butterflies migrate thousands of miles from Canada and the United States to spend the winter in Michoacán, Mexico and southern California, returning north in the spring. Monarchs have an important ecosystem function as pollinators, as well as indicators of healthy lands.

Use of pesticides, habitat conversion and changes in land management practices mean that Monarch habitat across North America is rapidly disappearing, posing serious threats to the population's long-term viability. In 2010, the World Wildlife Fund included the species on its list of those thought to be highly threatened and in need of closer monitoring and protection.

As the Monarch migrates through urban areas in the United States, outreach to inner city youth is an essential component of USDA Forest Service educational and conservation efforts. The agency is teaming up with museums, community-based organizations and schools in several cities to use the Monarch as its primary teaching tool. These programmes provide youth with conservation and leadership training, employment opportunities and increased environmental awareness. Students and families are actively encouraged to create habitat on public lands, in schoolyards and even around their own homes.

The USDA Forest Service has a partnership with El Valor, a local organization in Chicago, home to the second largest Mexican-American population in the United States, many of whom immigrated from Michoacán, the Monarch's overwintering grounds in Mexico. The Monarch is a strong cultural symbol for them, and the partnership has involved the engagement of over 2,000 children and parents in conservation efforts. The partnership focuses on the entire family, especially on children with disabilities.

Successful conservation of Monarch habitat requires coordination of various partners and efforts in the public and private sectors, both in the United States and abroad. In Mexico, the USDA Forest Service is working with communities in Michoacán who depend on the resources and ecotourism generated by their local forests and by the Monarch for their livelihoods. The agency provides technical assistance and capacity-building in forest inventory, ecological mapping, ecotourism, recreation site management, conservation and outreach. Since 1993, the USDA Forest Service's partnership with the Mexican Government and with non-governmental partners in the communities adjacent to the Butterfly Biosphere Reserve has increased management capacity for conserving Monarch habitat in Mexico.

Honduras: Community forest management

Image: Fundación MaderaVerde/GreenWood Inc., Sico-Paulaya, Honduras 2010

Traditional method for transporting sawn wood

Through a commitment to the sustainable development of its natural resources, the community of Copén, Honduras, has become a pioneer in forest management. Of the 35 families in the community, 26 are members of the Cooperativa Brisas de Copén forest enterprise, working together to sustainably harvest bigleaf mahogany and create value-added products with minimal impact on the forest ecosystem.

Since 1999, Copén has been working with the non-profit GreenWood and its Honduran counterpart, Fundación MaderaVerde, to improve production techniques, test new technologies, develop products and find market opportunities. This has led to multiple contracts and a lasting relationship with the Taylor Guitar Company — Copén has become one of Taylor's primary sources for mahogany guitar necks. Net profits from these contracts are invested in a variety of collectively managed community funds, supporting an insurance policy for the workers, a small loan fund and a social fund that has helped to finance community improvements such as solar energy cells for homes, school repairs and road work.

With USAID funding and USDA Forest Service technical assistance, along with other donor funding, Copén, GreenWood/MaderaVerde and Helveta have been piloting a project using personal data recorders and a bar code system to provide stump-to-market tracking of every piece of wood processed for Taylor guitars. With the pending launch of the complete system, consumers will be able to track their guitars back to the forest that provided the wood and the community that processed it.

Copén's success in sustainably managing its timber resources has helped stem land use change in the sensitive buffer zone of the Río Plátano Biosphere Reserve. The Food and Agriculture Organization of the United Nations named Copén as one of 18 Model Forests in Latin America and it has become a benchmark for sustainable community forestry and enterprise throughout the region.

Learning from community-based forest management in Nepal

Resham B. Dangi, Deputy Director General, Department of Forests, Nepal

Nepal occupies less than 0.1 per cent of Earth's land mass in the central Himalayan region, covering a surface area of 147,180 km^2 with an altitude range of 60 to 8,848 metres above sea level. Nine important eco-regions are situated in Nepal out of sixty across the entire Himalayan region, comprised of thirty-five forest types and 118 ecosystems.[1] Mountain ranges divide the country into five major physiographic regions, from the tropical lowland plateau to the snow-covered Himalayas, representing all major climatic conditions. High mountain forests are home to many endemic plants and tropical lowland forests host rare species such as tiger, one-horned rhinoceros and wild elephant.

Almost 80 per cent of the population of Nepal lives in the rural areas, where land is a critical resource to maintain livelihoods, and the agriculture and forestry sector accounts for more than one third of total GDP. A quarter of the population lives below the absolute poverty line and two thirds earn less than US$2 a day. Hills and high mountains cover almost 86 per cent of the total land mass and the remaining 14 per cent is comprised of flat Terai landscape.[2] Since one fifth of the land mass is under a farming system with low-input cultivation, the poverty level in remote areas is estimated to be higher than the national average.

The last National Forest Inventory, undertaken in 1999 with technical and financial support from the Government of Finland, estimated the area under forest land use as about 5.8 million hectares (ha), of which around 4.2 million ha is forest and the remaining 1.6 million ha is scrub land. Only 51 per cent of the forest area is assumed to have attained mean stem volume of 178 m^3/ ha.[3] Between 1978 and 1994, shrubland increased by 5.6 per cent per year and forest area decreased by 1.7 per cent per year,[4] indicating that degradation is a widespread problem in Nepal.

Since 2010, DFRS has again had support from the Government of Finland in implementing a National Forest Resource Assessment project. This assessment will provide an updated picture of forest cover and biomass change since 1994, along with additional statistics regarding biodiversity, trees outside forests, carbon stocks and non-timber forest products. The report will assist in developing a national strategy for sustainable forest management, a monitoring, supporting and verification (MRV) system for Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (REDD+) and a new forestry sector master plan.

Forestry institutions

Nepal was historically divided into many small states, with the southern lowland plateau under thick forests. Those forests which were strategically important were regulated by royal decree, while attempts were made to increase the tax base by converting less important forests to farm lands.

Image: Nepal Swiss Community Forestry Project/ Intercooperation/SDC/Fritz Berger

Danda pakhar, Sindhupalchok forest restoration after the community took management responsibility. Left 1975, right 2005

Image: ICIMOD

Local participation in carbon inventory for REDD+

After unification of the states in 1769, forest guards were appointed to protect key forests, large segments of which were later gifted as private property to family members of the rulers. In the early 20th century, a Working Plan Office was established for the sustainable supply of railway sleepers to India, leading to further significant impact on forests.

Following the democratic revolution in the 1950s, the Government of Nepal (GoN) nationalized all of these gifted forests with the Private Forest Nationalization Act 1957. The result was mixed due to a weak and ineffective communication system. GoN further attempted to halt deforestation by empowering the forestry organization through sanctioning new Forest Acts and regulations, but this did little to halt deforestation.

During the global oil crisis in the 1970s, Nepal required a sustained supply of wood-fuel energy from the mid-hill region, leading to over-exploitation of forests, soil erosion and ecosystem deterioration. The Staff Appraisal Report of the World Bank in 1978 forecast that if the rate of forest degradation continued, all accessible forests in the Hills and Tarai would disappear within 15 and 25 years respectively.[5] This issue was addressed by the GoN through a subsidiary forest resource management policy that eventually became the benchmark for establishing a community-based forest management (CBFM) regime in Nepal.

Evolution of the CBFM regime

As recommended by the National Forest Plan 1976, the prevailing Forest Acts and Regulations were amended to authorize local communities to take over forest management responsibilities from the State agency. This was later supported by the Decentralization Act of 1982. When the political system changed in 1990, these forests were then handed over to local forest users as Community Forests (CF). After approval of the Master Plan for the Forestry Sector in 1989, there was both external and internal support for the development of a sustainable approach to forest management. To date almost one third of forests are under the CBFM regime, of which CF alone occupies almost 90 per cent.

Adoption of context-specific modality

Initiatives such as pro-poor responsive forestry intervention under different modalities — including Leasehold Forestry and Livestock Programme, LF within CF, agroforestry within state plantations and public land forestry — are being implemented to contribute to poverty reduction as per national and Millennium Development Goals targets.

Success with CF in the hills encouraged an attempt to replicate this in Terai region, but it did not work as well due to contention between existing residents and new migrants for access and use rights. Later this issue became the subject of policy discourse and the forest administration endorsed a collaborative forest management policy to involve distant users in forest management initiatives. This initiative was financially supported by the Government of the Netherlands and United Nations Development Programme (UNDP).

The Annapurna and Kangchenjunga conservation areas have been successfully managed by local communities. Similarly, there has been good conservation of forests in the buffer zone around the parks and reserves. In this endeavour GoN gratefully acknowledges the financial and technical assistance received from the Government of Finland, US, UK and UNDP.

Major achievements

So far, more than 1.6 million ha of forest land has been entrusted to 2.1 million user households associated with 17,800 forest user groups, which represents almost 48 per cent of the national population and one third of the state forest land. The degraded forests in the hills have been successfully restored due to effective monitoring, enforcement and protection activities against forest encroachment, forest fire, free grazing and illicit felling. The growing stock, forest coverage and biodiversity have substantially improved in CF compared to adjoining open access forests.

Findings from various studies indicate that CF favours biodiversity conservation.[6] The improved forest management activities — cleaning, thinning and harvesting of dead and dying trees — facilitates natural regeneration

and helps to suppress invasive species. Technical and financial assistance has been received from the Governments of Australia, Denmark, Switzerland, Netherlands, Finland, USA and UK, as well as from multilateral agencies like UNDP, FAO and The World Bank in implementing the CF programme.

Improvements in carbon sequestration potentiality

Improved forest management initiatives have also contributed to enhancing the carbon sink and sequestration potential of forests. REDD+ pilot projects, supported by Norwegian Assistance for Development (NORAD), indicate that the annual average forest carbon increment in CF from the project area was estimated at 2.6 tC.[7] This demonstrates the potential of community forests to support climate change mitigation by reducing carbon emissions and enhancing carbon removal capacity. Local involvement in carbon stock estimation shows the scope of capacity-building for knowledge sharing and technology adoption from the REDD+ mechanism. GoN received support from the Governments of UK, Switzerland and Norway and the World Bank/Forest Carbon Partnership Facility in the national REDD+ readiness process.

Restoration of functional corridors in critical landscapes

Conservation initiatives of local CF networks have been instrumental in protecting focal species like tiger, one-horned rhinoceros, wild elephant, red panda and snow leopard at landscape level. The establishment of functional corridors and bottlenecks to facilitate free movement of wildlife between Protected Areas are unique examples of success in biodiversity conservation of a transboundary nature. One such corridor was successfully restored within five years and the forest has been functioning as an important corridor for wildlife in Terai Arc Landscape (TAL) with technical and financial support from UNDP and WWF Nepal

Improvement in environmental restoration and food security

Since the contribution of CF to household income has not been properly valued and quantified at national level, to what extent the regrowth of biomass has contributed to uplifting the livelihoods of the rural ultra-poor is not clearly understood. However, pro-poor leasehold forests implemented by the Government with financial and technical support from International Fund for Agricultural Development and the Food and Agriculture Organization (FAO) demonstrates that after implementation of this programme, vegetative cover had increased up to 90 per cent after seven years.

An effectiveness study commissioned by the Department of Forests/FAO in 2009 shows that livestock units have increased due to improved forage production that has directly contributed to food security. It has also been observed that about 11 per cent of target households now have year-round food security and average household income has increased by 70 per cent.

Issues and challenges ahead

Product-focused CBFM now has new windows of opportunity from the emerging market of environmental services, including biodiversity, carbon sequestration and hydrological services. In the absence of clear tenure rights on these services, local communities are finding it difficult to participate in the Payments for Environmental Services (PES) market. If tenure rights are well defined, then there is potential for sustainable financing of CBFM from PES so that local people can be made more responsible for forest conservation in future. There is still a need for a robust technical MRV system and a lucrative carbon market may lead to recentralization of forest governance.[8]

Due to limited access to information and technology, there is a potential risk of elite domination in the entire PES value chain to capture prospective benefits. Therefore, it is important to secure the rights of poor, marginalized and women's groups in the decision-making process. In many places communities have been protecting their forests at the cost of adjoining state forests; in sub-national REDD+ projects it is difficult to take account of such leakages in net emission reduction.

Key challenges for CBFM in capturing the benefits of environmental services include:

- Developing an appropriate structure to satisfy local as well as market expectation
- Developing local capacity to amalgamate the local fragmented production supply chain to global market networks
- Satisfying market expectations for a robust MRV system and other national and international criteria
- Providing technical support to local communities from the existing institutional capacity of the State agency
- Developing a PES mechanism responsive to poor and marginalized people.

Potential futures

A one-size-fits-all approach does not work and different modalities of CBFM are attainable, provided that local communities have clear tenure rights on the forest products. Prevailing policies and institutions need to be reformed to cater to emerging public demand for PES. To capture this opportunity, small fragmented production units need to bundle all environmental services to reduce transaction costs and increase bargaining power in price negotiations.

There is agreement that large sections of the population have benefited from CF, either in terms of consumer goods or ecosystem services. However, benefit-sharing mechanisms must be further improved to assure equity and social justice for poor and marginalized households through appropriate institutional arrangements and capacity-building schemes.

Institutional reform may be necessary to improve transparency and accountability in the value chain process for CF-produced goods and services. The current practice of mandatory representation of poor and marginalized groups on executive committees and allocation of CF funds for pro-poor activities are good initiatives from Government which need strong monitoring and regulation to achieve the desired change.

It is also crystal clear from three decades of experience with the CF development process in Nepal and elsewhere that if stewardship is given to local communities, forests can be better managed for sustainable biomass production, biodiversity conservation, livelihood improvement and sustainable supply of ecosystem services.

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Voices of the forest: building partnerships for community forestry in Cambodia

Prabha Chandran, RECOFTC — The Center for People and Forests

"We've depended on the forest for many generations. If we don't have legal rights, the forest will be lost. Before we signed the [community forest] agreement, we were always afraid that someone would take the trees and destroy the forest. It took us almost three years, but the agreement we have now means nobody can change the area and outsiders cannot invest and take away our forest. We can keep using it as we have traditionally." (Mr Sorn Yam, Chairperson, Community Forest Management Committee, Kbal O KraNhak, Kampong Thom, Cambodia)

It's a fight that's been fought by local communities living in and around forests across the world and it's becoming more urgent as rapid urbanization, compounded by food and fuel shortages, puts daily pressure on forests. Yet, as the villagers of Kbal O KraNhak discovered, it was possible to reclaim forests and assert traditional rights — but only after a logging concession had virtually destroyed their habitat. From 1996 their forest lands were controlled by a logging company, whose licence was revoked in 2001 following widespread illegal activities. By then, the forest had been largely destroyed and along with it, the livelihoods of those in Kampong Thom — especially their traditional trade of resin collection.

Image: Alison Rohrs, RECOFTC

Sorn Yam, Chairperson of the Community Forest Management Committee, worked for three years through six stages of approval to get legal recognition "otherwise the forest will be lost"

An environmental, social and economic disaster

On a national scale, more than half of Cambodia's forest land, nearly 7 million out of 10.8 million hectares, was licensed to 33 companies via logging concessions in the 1990s. The government believed these concessions would generate much-needed revenues of US$100 million annually. Instead, by 1997, it was estimated that four million cubic metres of illegal timber was pilfered each year — ten times what could be taken sustainably — causing a loss of US$60 million to the national treasury.[1] One of the poorest countries in the region, Cambodia was recovering from almost three decades of civil war and social upheaval. Poor governance, weak institutions and law enforcement following the Khmer Rouge's exploitive policies had decimated the country's primary rainforest cover from 70 per cent in 1969 to 31 per cent, in less than 40 years[2]. The conclusion from a number of reviews[3] was that Government control of logging operations was ineffectual and might jeopardize long-term economic growth and poverty reduction.

In response, the Government of Cambodia declared a logging moratorium in 2002. However, economic growth continues to draw heavily on the country's natural resources with investment in large-scale agriculture and rubber plantations posing a growing threat. The loss of forest cover has also exacerbated the poverty of millions of rural families like Mr Sorn Yams', who depend on local forests for food, medicine, shelter and fuelwood.

Research shows that nearly half of Cambodia's rural households — more than five million people — rely on forests for 20-50 per cent of their livelihood. For another one million people, forests provide over half of their livelihood.[4] Faced with a critical situation at

Image and interview: Alison Rohrs, RECOFTC

"Once we make the Community Forest Management Plan, we can get more benefits from the forests. We will start doing silviculture. We'll clear out some of the small plants and trees to get the bigger trees to grow. We'll also benefit from the small trees. We're already able to gather more products for traditional medicine and we have a plan to protect the forest. We can use trees for building houses, too. I've used skills I learned in the RECOFTC courses doing forest inventory, recording tree and plant species and developing records of the forest."

Ms Sao Saveun,
Community Forest Management Committee

the turn of the century, the country reviewed its development policies and drafted a National Poverty Reduction Strategy Paper. Vital for continued international support, this strategy depended on the contribution of all sectors towards the national goal of poverty reduction, including forests. In 2003, the country committed to achieving 60 per cent forest cover by 2015 in order to meet its own Millennium Development Goal targets.

Building partnerships for success

"When I arrived in Cambodia as Chief Technical Advisor to the Capacity-building for Sustainable Forest and Land Management Project at the beginning of April 2007, I was sceptical that community forestry would advance very far or fast in Cambodia," says James Bampton, Program Coordinator, RECOFTC – The Center for People and Forests. "When I left in July 2009, I held a very different view: 124 potential community forestry areas had been approved by the Ministry of Agriculture, Forestry and Fisheries in six of Cambodia's 24 provinces, covering a little over 126,900 hectares." Today, in partnership with the Forestry Administration, international development agencies, communities and NGOs, RECOFTC has helped put some 237,781 hectares of forest into the hands of more than 60,000 families from 450 villages. The organization has directly supported more than half the country's community forestry sites and those with legal agreements. In Kampong Thom alone, RECOFTC has enabled 120 villages to go through the legalization process between 2008 and 2010. So how did this impressive change come about?

Faced with the huge task of stewarding some 300 community forestry sites under the project through the complex legal recognition process with very few resources and poor Government capacity at all levels, it quickly became obvious that only a strong partnership of all major stakeholders — grass-roots NGOs, community leaders, administration officials and international organizations – could promote the sustainable development of community forestry in Cambodia. It was a mission that was to consume the project staff from then on. All staff had 'partnership' included in their formal job titles. Nationally, and in each of its five target cantonments, the project recruited and deployed Community Forestry Partnership Coordinators. Their task was to initiate, coordinate and manage partnerships as one staff member in each cantonment would never be able to do everything that was necessary.

A beginning had been made in the 1990s with the coming together of various NGO groups who had started working with communities in mostly degraded areas: The Menonite Central Committee established the first community forest in Takeo province, planting *Acacia manguim* on barren land. In Pursat and Kampong Chhnang provinces communities were organised by the South Asia Development Program, and Concern Worldwide supported a range of community-based programmes where villagers developed management plans detailing silvicultural activities. In Kampong Thom, too, the villagers of Tboung Teuk banded together to begin planting trees and protecting the forest once the company was evicted.

Creating a legal framework for community forestry

From these humble beginnings, a national working group of committed individuals from civil society, the Forestry Administration and donors got together to learn from pilot experiences on the ground, and internationally, to formulate a policy and legal framework for a national community forestry programme. The partnership was formed gradually through interactions enabled by a variety of more or less informal and interlinked networks. Various provincial level community forestry and natural resource management networks, as well as broader environmental, religious and indigenous people's networks added to the mix. From all of these emerged a group who realized that partnership rather than conflict would more effectively lead to change. Most of them came together through the Community Forestry Working Group that was formed under the Sustainable Management of Resources in the Lower Mekong Basin Project in 1998 to assist the

Image: Alison Rohrs, RECOFTC

Phok Chantra, a Forestry administration official, trained with RECOFTC so the community could learn how to record and manage forest resources

Image: Alison Rohrs, RECOFTC

Chea Tun, mother of seven, no longer worries about feeding her family and is active in patrolling the forest to report illegal logging

Government of Cambodia in developing the legal framework necessary for community forestry.

The categorical failure of the concession system and the powerful alliance between international agencies and local civil society led to the passage of the Forestry Law in 2002: 'The Minister of Agriculture Forests and Fisheries has the authority to allocate an area of Permanent Forest Reserve to a community or group of people living inside or near a forest area in the form of a community forest.'[5]

Together with its partners, RECOFTC set about implementing the Capacity-building for Sustainable Forest and Land Management Project in 2006. First, a programme was designed for each target cantonment through a 63-day Training of Trainers course. These trainers then ran a series of courses in their cantonments for community forestry development facilitators so each knew the next steps in the formalization process. Of particular importance was the training of local forest administration staff alongside NGO staff so that, through training together, they had a similar understanding of development needs, built relationships and were able to plan a coordinated course of action together. The lack of understanding about community forestry among government officials and their crucial role in endorsing documents without which community forests could not be formalized, required a particular focus on training local government. Equally critical was the training of forest community leaders, through elected management committees.

The second component of the strategy was the development of 'Cantonment Community Forest Development Plans'. These were facilitated by the projects' Partnership Coordinators through an assessment of the requirements to complete the formalization process, including funding needs as well as an analysis of what each development partner had planned. The third component targeted coordination at the national level among development partners (both donors and international NGOs) and the Forestry Administration. A National Community Forestry Program Coordination Committee was established in 2007 in response to the need to chart the direction for the Program, which required a clear understanding of the current situation on the ground, the strengths and weaknesses of current systems, and the opportunities that exist to further community forestry in Cambodia.

Legal recognition for community forests

With the main building blocks in place, the partners turned their attention to identifying potential community forest sites and the work of building capacity for legal recognition of these sites through six stages of local, provincial and national requirements. In Kbal O KraNhak, for instance, RECOFTC's work began in 2008. Working closely with the local community and the Forestry Administration through all the steps of the process, it helped the community gain an official community forest agreement on 11 November 2009 — a day the villagers will never forget.

"RECOFTC had prepared a detailed plan for each step of the legalization process," recalls Phok Chantra, the local Forestry Administration official. "Each step had specific activities. I explained the process to the community. We followed this plan through the whole process. After the agreement was reached, I felt proud because I had helped the community. It's proof I didn't lie to them!" Chantra subsequently took three more RECOFTC training courses "and then I delivered those courses to the community: record keeping and financial management, resource assessment for Community Forest Management Plans, and a forest inventory. Now,

the local people also report illegal activities to me which is very helpful since I have a large area to patrol."

Over the course of four years, the Capacity-building for Sustainable Forest and Land Management Project delivered a massive grass-roots training programme through 70 field-level training sessions on community forestry. Beginning with 33 nationals who became community forestry trainers, a further 1,416 individuals were trained to understand the process and benefits of the community forests programme, the most important being secure rights over forest lands.

Once the long procedure for legal recognition was over, the next step was learning to manage the forest lands. Through other livelihood support programmes, local administration officials and communities were also taught to develop sustainable forest management plans.

Rebuilding livelihoods

For Ms Chea Tun, a mother of seven, life in Kbal O KraNhak has changed from an uncertain struggle for survival to an assured harvest of rice and soya beans in addition to the cassava that she grows upland. "I know the agreement was signed, and I feel more secure that I can use forest materials, like firewood, mushrooms, vines to make fences, and resin," she says. "Some members of the community collect resin. If I want a bit, they give it to me for free. We mix it with bark and use it as fuel to light the stove."

Having realized the economic value of their forest land once more, the community is determined to protect it. "We used to talk about how to stop locals and outsiders from cutting down trees," says Chea Thun, "but there was nothing we could do to stop them. We have more power now that we signed the community forest agreement. This year, an outsider was cutting down trees illegally. We tracked him down and confiscated his materials. Then we reported it to the Forestry Administration."

In Kampong Thom, as in other areas, the programme is also encouraging women to take an active part in the drawing up of Forest Management Plans. The Manage our Forests project is active in Kampong Thom and Kratié provinces and is helping 21 villages create and implement management plans for 20 community forests. Community forestry training is a key function of these projects. During 2009-2010, the three projects hosted 54 field training events and involved 1,339 participants from the Forestry Administration, Government agencies, NGOs and local community forestry groups. Ms. Sao Saveun, for instance, took over her husband's elected seat on the committee and is actively involved in management, inventory, and patrolling of forest areas.

Mua Amkon, a community forest member from Boengkok village in Kampong Chhnang sums up their common narrative: "When I was young, this whole village was forest land. Only a few families lived here. We used the forest for building a few small houses, for cow sheds and for collecting firewood. During the Pol Pot regime, the forest was cleared to make a coconut plantation. Starting from around 1980, more and more people moved in and needed farmland, so they cleared the forest, and it disappeared. I really regretted seeing the forest disappear. We used to have a lot of trees, and then, almost nothing was left. But now, we can protect the forest. We are lucky to have the opportunity."

In 2010 Beongkok village joined the ranks of legally recognized community forests in Cambodia. In that same year, the National Forest Policy (NFP) for 2010-2030 was approved, paving the way for legal and policy reforms in the forestry sector. In recognition of forests' essential contribution to national development, the NFP emphasizes the importance of good governance and promotes community forestry specifically under Programme 4 of its six-point programme. Indeed the strategic direction for Objective 8 states community forests have 'demonstrated considerable potential to protect forests and support rural livelihoods. Recently community forestry has expanded from low value forest to also include more valuable forest'.

RECFOTC continues to engage not only in formalisation of community forests but also in community forest networking, management plans and enhancement of rural livelihoods. Through a 'programmatic and partnership' approach, it hopes to contribute significantly to the achievement of the goals and targets of the Community Forestry Program of National Forest Program (2010-2029) endorsed by the Royal Government of Cambodia in October 2010. Together with the Spanish Agency for International Cooperation and Development and the European Union, RECOFTC has also expanded its coverage to some 200 community forests in ten of 24 provinces in the country. And yes, that's more good news for the villagers of Kampong Thom.

Image and interview: Alison Rohrs, RECOFTC

Mr Teav Pot collects resin from a *dipterocarp tree*. He can sell the resin for 30 cents a kilo or trade it for rice. Resin is a primary non-timber forest product for the community, used for sealing furniture, making soap, and fuelling lamps and stoves. Although the process looks harmful to the tree, resin can be collected sustainably. A small cut is normally made in the tree, and heat from a small fire causes the resin to flow. Studies in southern Mondulkiri province reported that 86 per cent of families owned resin trees, with an average of 77 trees per family. The income from the sale of resin averaged US$3.6 per tree per year (with a mean annual income per family ranging from US$299-377 across four villages). The total annual income from resin sales across the four villages was US$61,000.[6] Of the 11,000-18,000 tons of resin collected in Cambodia each year, approximately 3,000-4,000 tons is sold domestically and the remainder is exported to Viet Nam, Thailand and Lao PDR.

German Development Cooperation in the forest sector — capacity development for benefiting people

Heiko Warnken, Head of Department Environment, Federal Ministry for Economic Cooperation and Development, Germany

The world's forests provide a livelihood for more than one billion people. They use the forest as a source of income, construction materials, fuelwood, food and medicine. Forests contain and preserve 75 per cent of global biodiversity, and it is well known that they store carbon and produce oxygen, thus regulating our global climate. This significant role of the worlds' forests in sustainable development and green economies has been the focus of the German Development Cooperation in the forest sector for more than 30 years. Forests, biodiversity and climate change play a major role in German official development assistance (ODA), building on strong political support.

At present Germany is investing about €1.5 billion in ongoing bilateral tropical forest programmes worldwide. The bulk of funding by the German Federal Ministry for Economic Cooperation and Development (BMZ) is dedicated to bilateral cooperation in Germany's partner countries and regions. Most of BMZ's programmes are implemented by GIZ (technical cooperation) and KfW Development Bank (financial cooperation), working closely with local partners. Today, BMZ cooperates with 44 partner countries in the context of forest conservation on topics ranging from Reducing Emissions from Deforestation and Forest Degradation (REDD+) and sustainable forest management, forest governance and policy reform, especially the Forest Law Enforcement, Governance and Trade (FLEGT) Action Plan of the European Union, to protected forest area management, community forestry, small and medium-sized enterprises and forest certification.

Image: G. Ulunturcok

Forests are among Cameroon's most important natural resources

Germany also has increased its multilateral activities. As the most important global initiative on REDD+, the Forest Carbon Partnership Facility was originally spearheaded by Chancellor Angela Merkel at the 2007 G8 summit and Germany so far has committed €54 million to it, mainly through BMZ. This underlines Germany's firm belief that, as a results-based instrument, REDD+ provides huge potential for development, climate change mitigation and protection of biodiversity. The World Bank-affiliated facility today has 37 partner countries and 16 donors and has quickly developed into the largest multilateral pilot initiative for REDD+. This lends vital impetus to forest protection, both on the ground and in the international climate negotiations.

The Millennium Development Goals as well as the Paris Declaration on Aid Effectiveness and the Accra Agenda for Action provide the overall framework for German Development Cooperation's work. Environment and forest-related cooperation is guided by the Rio Conventions and the international forest regime. BMZ follows an integrated cross-sectoral approach supporting capacity development at all levels – local, national and regional — to enable its partners to manage their forests for the welfare of their own and future generations. Implementation of the programmes is managed by decentralized structures, the application and combination of instruments such as technical and financial cooperation, public private partnerships and budget support. Provision of German ODA is subject to close consultation and negotiation with partner governments as well as civil society. One outstanding example,

Image: Viora Weber

The forests in the Congo River Basin form a crucial CO_2 sink

Image: Viora Weber

Legislation aimed at improving participatory use of forests is not yet fully implemented

showing most of these features, is the Forest and Environment Sector Programme (ProPSFE) in Cameroon.

Meeting the sector challenge: making policies work in the forestry sector

The vast tropical forests of Cameroon (estimated at over 17 million hectares) represent one of the country's most important economic resources. Export revenues from tropical timber and wood products account for 8 per cent of GDP. Moreover, the commercial use of forest products is an important source of revenue for the rural population and the national economy. Because of its extraordinary significance with regard to biodiversity and its importance as a CO_2 sink, the Congo River Basin forest is of global importance and is earmarked for protection and sustainable use.

The National Forest Law of 1994 provides the necessary policy framework for the sustainable use of forest resources. However, a report commissioned by the World Bank in 2003 on the implementation of forestry policies notes a "growing discrepancy between the announced political will and the real ability of the authorities to implement this policy". The report cites insufficient involvement of regional and district level ministerial delegations in budget preparation, weak budget execution by the ministries involved, and a low level of implementation of forestry and environment regulations in general. Assessments show that local communities have benefited very little from forest resources: their lack of organizational capacities have denied them access to viable information about their rights and restricted them from articulating their concerns.

Finally, despite legislation geared at sustainable and participatory use of forest resources, the increasing pressures from agricultural expansion, illegal logging and poaching has led to an alarming depletion of the ecological, social and economic value of Cameroon's forests. Moreover, due to high levels of corruption, the potential positive impacts of forest industries on development and poverty alleviation of rural communities have not yet been achieved.

Turning the national forest law into action

The German government has supported the relevant Cameroonian ministries since 2001 in their efforts to develop and implement ProPSFE. It was finally launched in 2006 with the vision of promoting the sustainable use of forest resources and the equitable distribution of associated benefits.

Shaping the legislative framework:

German Development Cooperation's consistent support for the Ministry of Forest and Wildlife (MINFOF) since 2005 has facilitated the negotiation of a Voluntary Partnership Agreement on Forest Law Enforcement, Governance and Trade (VPA-FLEGT) between Cameroon and the European Union. The agreement was signed on 6 May 2010 and in June 2011 the National Assembly of Cameroon officially authorized the President to ratify it. The agreement requires that timber traceability and legality verification systems are to be developed and enforced in order to foster sustainable timber exploitation in Cameroon. Three committees will be established during the next months: the National Monitoring Committee, which provides a platform for stakeholder consultation; the Joint Monitoring Committee; and the Joint Implementation Council. The latter two committees are bilateral mechanisms involving the EU, MINFOF and representatives of stakeholders of the forest sector in Cameroon. They will supervise the implementation of the VPA at technical and decision level, respectively.

Image: Peter Schauerte

Timber traceability will aid sustainable exploitation of forests in Cameroon

Image: G. Ulunturcook

Local communities should benefit more from forest resources

Mediation and cooperation at field level:
Institutional support to four Technical Operational Units (TOUs) in the Southwest and East Regions of Cameroon has facilitated their establishment as effective mediation and cooperation platforms between various local interest groups concerning the sustainable management of forest resources. Issues including poaching, the utilization of forest tax revenues, and the creation of national parks and council forests are discussed at these platforms. To secure their sustainability, MINFOF has now earmarked financial resources for TOU operations in its annual budget.

ProPSFE has significantly contributed to the participatory development of Cameroon's National Forests and Environment Programme through its support for exchange forums and platforms as well as by sensitizing stakeholders at national and local levels. The nine Community Committees for the Management of Fauna Resources in the Southeast Region of Cameroon are further examples of successful steering structures supported by ProPSFE. The total value of their revenues in 2006 and 2007 exceeded €120,000, of which 51 per cent was used to finance community projects.

The ProPSFE committees of the Southwest and East Regions developed functional annual work plans for the first time in 2007 and 2008 respectively. Based on these plans, regional MINFOF delegations could successfully lobby for funds to undertake important activities such as forest monitoring and anti-poaching initiatives. In collaboration with the GIZ Health Programme and the Association of Forest Industries in Cameroon, ProPSFE has established a public private partnership for the prevention and mitigation of HIV/AIDS in forestry companies. Trained peer educators have raised awareness among over 4,700 workers in six logging companies. For several companies the adoption of HIV/AIDS workplace policies and prevention measures has contributed to their compliance with Forest Stewardship Council certification criteria.

Monitoring, learning and innovation:
Through assistance in the establishment of a PSFE impact monitoring system, cooperation between MINFOF and the Ministry of Environment and Nature Protection (MINEP) has greatly improved, and transparency regarding industrial timber exploitation has increased. The information provided by these ministries can now be accessed at http://data.cameroun-foret.com. The site has an average of 400 visitors per week (traffic counter reading of May 2010) from all over the world.

ProPSFE support provided to four councils in Cameroon for the establishment of council forests has served as a model for similar activities in other parts of the country. In 2010, a total of 47 councils were involved in the process of establishing forests that could eventually supply additional sources of revenues for local development initiatives. Additionally, GIZ has demonstrated an improved technique for producing charcoal and clay bricks from wood residues. Currently, a group of 70 people produces about five tons of coal per month using this technology. Further agreements have been signed with two forest companies, two councils and one community association linked peripherally to logging concessions to develop similarly sustainable livelihoods and income generating activities.

Our approach and contribution: multi-level implementation

The support of the German Development Cooperation for the implementation of the National Forest and Environmental Programme follows a multilevel approach: experts from GIZ and KfW work in close collaboration at different levels with national partners.

ProPSFE strengthens institutional capacities at the national level through advisers placed at the central ministries, and at the regional level through two offices associated with the regional delegations of

Image: Viora Weber

Capacity-building for marginal populations helps communities access information

Image: Viora Weber

Attainment of Forest Stewardship Council criteria is on the agenda

these ministries. In addition, two technical advisers serving as integrated experts in the Association of Forest Councils facilitate the link with the council level. This vertical approach enables the programme to feed back experiences from the local level to the national level.

ProPSFE's outreach is further strengthened through close working relationships with other BMZ-funded programmes, including a decentralization programme in Cameroon, a programme to support the Commission for Central African Forests, and a Congo Basin Forest Partnership facilitated by Germany from 2008 to 2010. Moreover, coordination between all programmes in the 'green sector' in Cameroon is managed through the consultation framework of MINFOF/MINEP partners. Finally, ProPSFE collaborates intensively with the private sector through public private partnerships on forest management certification for timber companies.

Future challenges with regard to capacity development

Despite important progress made in shaping enabling framework conditions for sustainable forest management and in developing capacities for the implementation of PSFE in Cameroon, certain challenges remain:

- Incentives to use acquired skills and capacities are sometimes missing in national structures. In ministries, job performance is not necessarily rewarded and individuals are not always promoted on merit. Discussions are currently underway with other development partners in relation to sustainable mechanisms for the payment of premiums based on the use and application of additional skills acquired and outcomes delivered
- Within certain partner institutions there exists substantial resistance to change. The introduction of democratic elements and the strengthening of capacities among marginalized populations (including local communities) contribute to a reallocation of resources and power. To reduce the perception of certain groups of the loss of influence that innovation appears to represent, the programme aims at overall and inclusive growth. Alliances at a higher management and political level seem to facilitate the adoption of innovations and will be further strengthened
- Capacity development is still sometimes seen as an opportunity for individuals to gain individual benefits, such as paid travel duties, instead of to gain more knowledge and skills for the institutions that employ them. Given the power and decision-making structures within the partner ministries, it is sometimes difficult to target capacity development measures at staff who will later multiply their newly-gained knowledge within the institution. Therefore, ProPSFE is exercising more influence on the list of participants for co-funded training programmes
- Monitoring of PSFE implementation still lacks the necessary rigour and political attention. Agreements and decisions reached within the PSFE dialogue platforms, and decisions taken within the framework of consultation, are not always enforced. Hence, a stronger focus on monitoring the implementation of decisions is necessary for the future.

Germany's support for the world's forests will continue to grow in the years ahead. Chancellor Angela Merkel's pledge to increase German support for the conservation of forests and other ecosystems by half a billion euros by 2012 has resulted in a strong increase in commitments for mainly forest related development cooperation in recent years. From 2013 onwards it is planned to invest an annual half a billion euros in forests and other ecosystems, including through REDD+.

Tropical forests for local people

Steven Johnson, Communications Unit, International Tropical Timber Organization

The International Tropical Timber Organization (ITTO) has funded over 1,000 projects and activities contributing to its mandate to promote sustainable forest management (SFM) in the tropics over the Organization's 25-year history. These projects span a range of themes and topics relevant to SFM. One of the most important areas of ITTO's work, and one of the most relevant to the International Year of Forests, 2011 theme of Forests for People, is its efforts to involve local communities in SFM.

Forests are particularly important resources for the rural poor in tropical countries, with over 800 million people living in forests and woodlands in the tropics.[1] Forest communities include indigenous peoples and other local groups which have been living in forest areas for significant periods, as well as more recent settlers or immigrants. Many of the very poor are hunting or gathering tribes, landless people living around forests and landless forest workers.

In addition to improving livelihoods by providing a subsistence safety net, including food, shelter and fuelwood, the tropical forests also provide communities and smallholders with a source of cash income, a capital asset, a source of employment and an alternative health-care system based on forest plants. More needs to be done to improve the livelihood of forest-dependent people when they are interested in moving from subsistence livelihoods towards market-based activities. In many tropical zones, most local community cash income from forests comes from collection and commercialization of non-timber forest products such as bamboo, rattan, bushmeat, wild medicinal and aromatic plants and forest fruits. The employment impact of these activities in the tropical rural areas is measured in millions in both the informal and formal sectors, but reliable estimates are lacking. However, due to poverty and difficult access, many forest communities are living in conditions in which even the most minimum standards for education, health, sanitation, potable water, infrastructure and employment cannot be met.

Indigenous groups and communities own or are entitled to the use of about 25 per cent of the forests in developing countries.[2] According to a recent assessment,[3] the forest area owned by communities and indigenous people in the ITTO developing member countries[4] in 2008 was about 332 million hectares. This was about 51 million hectares (18 per cent) more than six years earlier, demonstrating a strong trend to transfer formal ownership to forest communities. However, there are various countries where community forestry is not yet practised at all, or is still in the initial stages.

Community forests have existed for centuries and represent one of the main forms of forest ownership. For instance, in Guatemala, Mexico and Papua New Guinea, community ownership of forest land has been the dominant tenure form for decades. More recently, the Governments of Bolivia, Brazil, Cameroon, China, Colombia, Ecuador, Ghana, Guyana, Honduras, India, Peru, Thailand and Venezuela have revised their policies and legislation for this purpose, some of them with ITTO assistance. In addition to transferring or recognizing ownership rights, various other arrangements are being applied in the devolution of management or use rights to local communities and their members.

The process is not, however, as simple as granting communities title over forest areas, since this is usually not sufficient to ensure SFM and the development of community forest enterprises (CFEs). In general, forest communities are poorly equipped to manage their forests sustainably and to generate value through timber production and various other benefits. One reason for this is that the forest areas transferred to communities have often been degraded lands with limited development potential and a lack of investment in rehabilitation, which seriously limits their role as a livelihood source for local people who are in need of immediate tangible benefits.

In spite of the difficulties, community forest management and enterprises represent a huge opportunity for contributing to national development goals through poverty reduction, sustainable socio-economic development and environmental conservation in rural areas. It has become clear that, given the right conditions and incentives, communities can govern and manage forests sustainably for a variety of objectives, and restore degraded landscapes and ecosystems.[5] However, improvement is generally needed in managing natural, human, financial, physical and social assets by communities.

In order to address continued high poverty levels in tropical countries due partly to the inadequate capacity of indigenous peoples and forest communities to manage their forests and develop community forest enterprises on a sustainable basis, in 2009 ITTO established a Community Forest Management and Enterprises (CFME) Thematic Programme.[6] Some of the prominent causes of poverty and unsustainable management of community forest resources are:

- Lack of clear land tenure and resource rights and inappropriate legal and policy frameworks
- Poor organization of forest communities and limited capacity among CFEs due lack of technical, business and managerial skills
- Weak competitiveness in CFEs.

Land tenure is often insecure and resource rights have not been clarified which is a major constraint for engaging communities in such long-term endeavours as SFM. Insecurity discourages sustainable practices in forest

Image: Ruben Guevara, ITTO

Community forest nurseries have an important role to play in education

Image: Ruben Guevara, ITTO

Ashaninka family in community forestry plantation, Peru

utilization and community investment. This is partly explained by inappropriate legal and policy frameworks which have often been designed for large-scale private operators and tend to be biased against small-scale operators like CFEs.

In various ITTO producing member countries there is a lack of clear government policies on community forest management, which is reflected in the absence of targeted public support to this activity. National policies tend to overlook the economic potential of community forestry and the important social, cultural and other benefits of CFEs. Even where policies exist, forest authorities do not tend to have confidence in the capacity of indigenous peoples and communities to sustainably manage their forest resources.

Consultations with ITTO producing member country focal points have revealed that, in countries with no or weak community forests, government institutions do not fully understand community priorities. In most countries, even where legal reforms have been carried out, the regulatory frameworks reflect outmoded tenure arrangements and can make it impossible for small-scale actors and communities to benefit from the reforms. Discriminatory rules and regulations can represent fundamental challenges for forest communities and the rural poor.[7] Regulations often prevent legal access to forests and markets, unduly raise the transaction costs for community enterprises and promote unfair sharing of benefits and corruption. In addition, arbitrary changes of rules and obligations can have dire consequences for local people.[8]

Regarding social assets, weak internal organization is often found in forest communities, particularly those which have a heterogeneous ethnic population structure. This is often associated with differing priorities and conflicting interests among community members, sometimes resulting in inequitable sharing of benefits. Basic organizational capacity and effective participation of all members of the community, including women and marginalized groups, are preconditions for success in such targeted joint efforts as sustainable forest management.

Being small and isolated, forest communities do not represent the necessary critical mass as a stakeholder group to promote common interests in policy development, forest product markets and the development of appropriate support services. The underlying reason is inadequate cooperation among forest communities and their enterprises. Forest users' organizations, networks and alliances are essential to advance community forestry and CFEs. There has been extensive reliance on external intermediaries such as non-governmental organizations and government agencies, with a focus on short-term project approaches to providing support. Building up community capacity is, however, a long-term endeavour. Capacity-building is also needed in forest agencies to create new attitudes and skills to enhance their facilitation role.

In spite of its importance, traditional knowledge is not usually enough when forests are managed for market-based production purposes. Indigenous peoples and forest communities typically lack essential managerial and technical skills, knowledge and experience in running CFEs and accessing markets. This is a key constraint which also makes communities vulnerable to external pressures and illicit activities. Building up community capacity to plan, utilize, monitor and control their forest resources is therefore critical to reduce illegal logging and associated trade. However, in most ITTO-producing member countries a shortage of targeted capacity-building and training facilities, weak local intermediaries and inadequate support to community-based organizations are retarding progress. Valuable lessons learned have been accumulated in many countries but this knowledge has not been sufficiently used to replicate and upscale successful experiences. Traditional knowledge should not be lost as it can provide invaluable support to sustainable forest management if systematized, improved and disseminated together with modern tools to increase competitiveness and market-based approaches.

Image: Ruben Guevara, ITTO

A community forest nursery in Peru

Image: Gary B. Wetterberg

Dayak villagers with harvested forest incense, providing a source of income to the East Kalimantan economy, Indonesia

Community-based enterprises are typically insufficiently competitive as there are major shortcomings in their human, financial and physical assets. Even in the leading countries only a few CFEs have developed into medium-sized industrial enterprises, and their capacity to get a fair price for their products and to invest in value-added activities is low. Apart from niche markets, buyers generally tend to prefer suppliers who can provide reliable deliveries in sufficient quantities. As CFEs typically lack commercial cooperation and other networks, they cannot enjoy the economic benefits of scale and specialization, keeping their profitability low. This is coupled with isolation from the market, limitations in market access due to increasing requirements for verifiable legal and sustainable product supply and general ignorance of market characteristics and pricing potential. Trade intermediaries tend to unduly exploit such situations to reap windfall profits, resulting in an inappropriate sharing of benefits for CFEs. Support programmes have often failed due to problems with providing the required economic feasibility assessments for community forest enterprises.[9]

Another set of constraints to the development of forest communities, smallholders and their enterprises can be their limited access to capital and appropriate technologies. Most rural funding schemes have been designed for agriculture and only a few countries have targeted financing schemes for community forestry. This is particularly problematic in fairly common situations in which the forest areas transferred to community management are degraded and require significant investment in restoration. Existing credit schemes are not tailored to the need of community forests for relatively long pay-back periods which are not compatible with the conditions of regular commercial credit. Financing institutions have little understanding of the business potential of community forest operations. Forest growing stock could be used as collateral for financing of CFEs but this is rarely possible due to lack of relevant regulation and engagement of the banking sector.

ITTO's contribution

Since 1992, ITTO has accumulated a significant body of knowledge and experience in the development of community forestry in its producing member countries. Prior to establishment of the CFME programme, a total of 85 projects were implemented with an investment of about US$40 million. These projects have had a significant impact on country and community capacity as revealed by thematic evaluations.[10] It has been clearly demonstrated that community forest management and enterprises can lead to sustained improvements in livelihoods but they have to be economically feasible, which is one of the key issues of the CFME Programme.

ITTO has implemented successful community forestry projects in Bolivia, Ghana, Panama, Peru, the Philippines and Togo, among others. In addition, many ITTO projects in the field of reforestation and forest management have included a focus on creating economic and other benefits for the local communities through their participation in project interventions. ITTO recently completed a series of forest tenure conferences in the three tropical regions, raising the profile of this important topic globally. And the CFME programme (which commenced operations in 2010) is already funding important country activities in Ghana, Indonesia, Papua New Guinea and Thailand.

A considerable body of this work has been undertaken in partnership with other multilateral and bilateral organizations such as the Food and Agriculture Organization's Forestry Department and the Center for People and Forests (RECOFTC) and in consultation with the Rights and Resources Initiative (RRI), the Global Alliance of Community Forestry (GACF) and the Forest Peoples Program (FPP) of the World Rainforest Movement. ITTO will continue to work with its global partners to ensure that communities and local people achieve their potential to contribute to the sustainable management of the forests they depend on.

‘Pleasant be Thy hills, O Earth — Thy snow clad mountains and Thy woods’: greening the mountains in the Indian Himalayan Region

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The title of this article is derived from the ancient ‘Hymn To Mother Earth’ of the Bhumi Suktam in Atharva Veda. This poem, which dates back at least four thousand years, presents holistic environmental values that are very apt for this International Year of Forests, 2011. Another verse reads as follows:

‘Whatever I dig from thee, Earth,
May that have quick growth again,
O purifier, may we not injure Thy vitals or Thy heart’

This verse sums up, in a most extraordinary manner, the need for sustainable development[1]. Forests represent one of the ‘vitals’ for the sustenance of life on Earth. The Krishana Yajurveda includes several references to the natural environment, including: ‘I bow to the Lord Rudra perceived in the trees with dark green leaves’; ‘I bow to Shiva the Lord of the forest’; and ‘I bow to the Lord of herbs and plants’.

These excerpts from the Vedas, the first and most important texts of our cultural heritage, clearly indicate that reverence for the natural environment is deeply embedded in our tradition. But in addition to the Vedic injunctions, a plethora of customs and traditions direct us towards conservation of natural resources. For example, there are sacred trees, such as the ‘Peeple’[2] and the ‘Vatavriksha’[3], which are not to be cut down under any circumstances. Historically, it has been forbidden to cut down the ‘Kalpavriksha’[4] tree, the giver of everything. Then there is the tradition of Devavanas (sacred groves) dedicated to various deities. All the trees of the grove were dedicated to the Mother goddess or to local deities so that people would not disturb or destroy them. This ancient tradition continues today and there are several sacred groves and forests in the Indian Himalayan region and elsewhere. There are also numerous examples of the ceremonial closing of parts of village forests for a few years to give them sufficient time to regenerate. Protection of the forests has

Revival of Badrivan, the ancient sacred forest at Badrinath

Badrinath, the major Hindu pilgrimage place in the Indian Himalayan region for thousands of years, lies in a remote valley at an altitude of 3,133 metres. Approximately 700,000 pilgrims a year flock to the shrine from all over India. Under the impact of so many visitors, the extensive forest that filled the valley had gradually disappeared by the early 1990s. Many attempts to restore it had failed due to inappropriate selection, preparation and planting of trees, along with a lack of community consultation. An innovative research and development programme was initiated in 1993, making use of scientific knowledge along with the community’s spiritual and cultural values.

At the suggestion of the chief priest, around 20,000 seedlings were provided for pilgrims and local stakeholders to plant, in keeping with Hindu beliefs and myths about the physical and spiritual importance of trees. Harsh winter conditions led to the loss of many of these seedlings, but a plant nursery was later established nearby to raise suitably hardy native trees.

Subsequent plantings led to reforestation at Badrinath, resulting in the survival of approximately 21,670 tree and shrub saplings up to November 2001, a vast improvement on the fewer than 100 trees found growing in the entire Badrinath valley before the project.

This programme presents an inspirational example of how myths and religious beliefs can be used in a practical way to motivate environmental conservation. The World Conservation Union (IUCN) has included the Badrivan approach in its guidelines for planning and managing protected mountain areas. The unique programme has also been cited internationally as a model for reforestation/afforestation of locations all over the world.

occurred in modern times with the Chipko movement for the preservation of India's forests, which in 1976 forced the Government to ban commercial felling of green trees above an altitude of 1,000 metres.

Vegetation forms a green 'security blanket', protecting the fertile yet fragile soil, maintaining balance in atmospheric conditions, safeguarding supplies of fresh water and moderating their flow to prevent flood and drought. The green cover, especially in our forests, is under attack by the greed of the rich and the need of the poor. This must be corrected[5]. As far back as 22 centuries ago, the Emperor Ashoka defined a king's duty as not merely protection of citizens and punishment of wrongdoers but also, preservation of animal life and forest trees. Along with the rest of mankind, we in India — in spite of Ashoka — have been guilty of wanton disregard for the sources of our sustenance[6].

In Indian culture, trees have come to symbolize eternity, constancy and unity of nature. Sages in India have long believed that gods descend from heaven to Earth through the trees to communicate with human beings. One of the old scriptures states: "The supreme one infuses energy into the peaks of trees. Therefrom rays radiate outwards from descending layered limbs. May they reside within us".[7] Meditation traditionally took place while sitting under a tree against its trunk as if to physically support a spiritual connection leading to personal transformation. When we hear the story of the forests we hear the voices of the future[8].

Forests are also traditional sources of food, fuel, fodder, fertilizer and fibre (the 5 essential 'Fs' for Chipko) and forestry practices should improve the lives of forest dwellers, whether human or other species. The reckless exploitation of nature and especially of forests must therefore end. There is an urgent need to evolve programmes through which forests can not only coexist but be enlarged side by side with active community participation. The case studies that follow are based on the ethos 'let us give back to Nature what we have taken from it — creativity and capacity for renewal'. They illustrate the merits of deploying an appropriate driving force, whether spiritual, religious, traditional or customary practice, to encourage the planting of trees, symbolizing our faith in the future. Let this act of faith (and investment) in the future grow, particularly during this International Year of Forests, 2011, inspiring change, enhancing value and securing our own future. The 'Katoupanishads' exhorts us 'to arise and awake and walk boldly across the razor sharp path ahead'.

Planting the forest of Rakshavan by the Indian army

The Indian army traditionally plants trees in high altitude areas, to provide cover during operations, as a natural source of oxygen and to relieve snow blindness in winter. The Badrinath reforestation programme inspired the army to launch a similar initiative in Badrinath. The Garhwal Scouts regiment carried out a project between 1998 and 2000 to establish Rakshavan (a defence forest) on degraded defence land at Dhantoli.

Army personnel promoted environmental awareness among the locals, pilgrims and villagers of eight adjacent villages of Badrinath and organized tree planting ceremonies.

A 10 hectare plantation site was developed at Dhantoli and almost 16,697 well-established and hardened saplings of various high-altitude trees and shrubs were planted at the Rakshavan site. Out of these, 15,299 saplings of 11 high-altitude trees and shrubs were found to have survived at the project site up to the date of completion of the project. In addition, the army established a nursery of high-altitude trees and shrubs within the plantation site. The army used seedlings raised and hardened at the nursery for subsequent plantations. Several similar projects have followed under the auspices of the Indian army in various locations.

Establishment of a sacred forest by local communities at Kolidhaik

Important lessons learned during the Badrivan restoration programme at Badrinath led to a follow-up action programme to create a forest for eco-restoration and biodiversity conservation. The Sacred Forest Programme (SFP) was executed at Kolidhaik village in the Kumaun region of Uttarakhand between 2004 and 2007 with the participation of local communities.

The programme addressed the need to reforest community lands in and around the village at an altitude of 1,740 metres. It was necessary to obtain the blessing of both the imam of the mosque and the priest of the temple in the village, both of whom agreed to become involved in the project to undertake ritual plantings of around 8,000 tree seedlings.

Villagers from both religious groups responded enthusiastically to the establishment of the sacred forest as an act of devotion. A total of 6,200 seedlings of about 20 promising tree species had survived up to May 2007. The forest was dedicated to Kail Bakriya (the local deity) and felling of trees was banned, with the exception of fodder collection for local families.

Afforestation of community degraded land for livelihood enhancement in Arah village

The western Himalayan ecoregion of India contributes significantly towards the regulation of hydrological processes in the surrounding area, which faces serious environmental threats due to depletion of natural resources. The mostly agrarian inhabitants have small and fragmented land holdings and poor access to infrastructure and technological know-how. Afforestation of degraded lands with community participation can help arrest the ongoing process of resource degradation. In 1992 in the remote village of Arah, a project was launched that combined a practical mix of both traditional and scientific knowledge, resulting in improved livelihood options and better management of natural resources.

Land in the village had been abandoned as it became economically unviable to cultivate and as a result, the area had become an open grazing area. The Van (forest) Panchayat approached the Institute requesting rehabilitation of community land. A detailed proposal was developed and activity-based land consolidation and subsequent community-based development took place for the first time in the region. The project focused on the introduction of various multipurpose plants, including nitrogen-fixing species, to ensure long-term benefits. Activities like protected cultivation, introduction of nutritious fodder grasses, water harvesting, small scale fish farming, introduction of high yielding crop varieties and nursery development were also initiated, aimed at providing short-term benefits to encourage the participation of villagers. Meetings and training camps were organized for all stakeholders on appropriate technologies and new approaches.

This was the first project in the village requiring active participation of the villagers, and the project team used participatory activities such as video shows and tutoring of schoolchildren to encourage involvement among the local stakeholders. The project overcame cultural barriers around planting bamboo, linked to its association in Hindu culture with death rituals.

Soil loss was reduced by over 60 per cent within 12 years of the post-initiation period, due to a complete check on open grazing. The amount of grass and green leaves harvested increased dramatically. As a result, most of the families could save money, leading to a gradual reduction in women's workload in particular.

Community conserved areas: A mechanism for biodiversity conservation

As a part of a project aimed at securing biodiversity conservation through community based natural resource management, a team from Itanagar engaged with local communities to conserve the rich biodiversity of the state of Arunachal Pradesh. Local biodiversity management committees and community conserved areas (CCAs) were set up in local villages. The CCAs promoted conservation of ecologically and socially valued wild and native flora in the state, which is home to 26 major and more than 110 minor tribal communities. They also operated as community based platforms, to prohibit hunting and illegal fishing, to obtain sustained supplies of goods and services from the conserved ecosystem and to sustain religious, social and cultural identity. Apatani plateau has been proposed as a Globally Important Agricultural Heritage Site because of its unique traditional practice of rice-cum-fish cultivation. The Village Biodiversity Register maintained by the villagers includes 40 identified species of plants and 10 species of animals

The creation of the CCAs has led to improved conservation of forests, along with enhanced flow of associated environmental services, reduced hunting, and better livelihoods for local communities through the sale of traditional medicines and wild edibles. The conservation conscious villagers patrol their CCAs to deter illegal poaching, hunting and felling of trees.

Indigenous peoples, fire and forest management in Australia

Cathy J. Robinson, Alan N. Andersen, Ashley Sparrow, Marcus B. Lane, Rosemary Hill and Michael Battaglia, Greenhouse Gas Abatement, Sustainable Agriculture Flagship, CSIRO, Australia

Forests and their plants and animals continue to be integral to Indigenous peoples' livelihoods and cultural identity in many parts of Australia. They provide cultural and ecological landscapes that nourish deep cultural and spiritual links with the land, in turn influencing the natural diversity that exists in many forest ecosystems.[1] Finding new and better ways to access resources to manage and connect to forests that lie within their traditional estates is a major priority and challenge for many Indigenous communities. Yolngu elder Joe Yunupingu explains the interconnection between Indigenous peoples and their country: "I care for fire. The fire burnt only traditional way. Because we look after animals, birds and land. The land is real important for us. Our lands... We look after the animals, eat them not to waste it... That's the law for the Yolngu people."[2]

Some of the opportunities and challenges faced by Indigenous peoples in their efforts to access forests reflect the uniqueness of forest ecosystems in Australia. The country's forest estate consists largely of *Eucalyptus*- and *Acacia*-dominated woodlands and open forests in sub-humid and semi-arid regions, including the seasonal tropics,[3] and these include some of the world's most fire-prone ecosystems. Fire plays a critical role in the geographical range and structure of vegetation types in all of Australia's forest ecosystems, and has been a management tool used among Indigenous peoples over millennia.[4] Regionally unique mosaics of unburned, early burned and later burned patches of landscape created by local Indigenous seasonal burning activi-

Image: Mat Gilfedder

Burned patch of *Melaleuca forest*

Image: Adam Liedloff

Tiwi land management rangers teaching Tiwi College students how to light experimental fires as part of the Tiwi Carbon Study

ties have supported the conservation of a range of flora and fauna.[5] Indigenous peoples also use fire for subsistence, social and cultural purposes such as burning to protect particular sacred sites, as part of traditional hunting techniques, to travel through terrain, and to 'imprint a human signature' on certain landscapes and places.[6]

Customary indigenous burning practices and cultural relationships to forest ecosystems have changed since European colonization and the introduction of new plants and animals. Indigenous peoples in central Arnhem Land, for example, report on adapting fire regimes to create patches of grasslands to attract feral Asian water buffalo as a highly valued food source.[7] Some Indigenous peoples have maintained cultural connections to forests as employees in the commercial forestry sector.[8] In many cases the relationships Indigenous peoples have with forests have been lost due to significant levels of dispossession of lands and the rapid loss of forest ecosystems through land clearing for agriculture.[9]

Successive Government policies dedicated to promoting European colonization and the interests of settler land uses prohibited indigenous fire burning practices in many parts of Australia, depopulated vast areas of land, and created new forest ecosystems.[10] This has had a significant impact on the ecological and cultural attributes of forest landscapes, including the expansion of rainforest patches in the wet eucalypt forests of Northern Queensland, the contraction of conifers in the southern state of Tasmania, and the expansion of flammable grasslands in the savanna woodlands of northern Australia.[11] Largely unmanaged wildfires in tropical savanna woodlands and open forests release into the atmosphere large quantities of the greenhouse gases methane and nitrous oxide, contributing on average 3 per cent of Australia's greenhouse gas emissions.[12]

Australia's forests are also unique because three quarters of forest reserves are on public lands. The political and legal construction of forests as 'publicly' owned goods has been a source of indigenous dispossession in Australia and internationally.[13] As such, forests have become an important focus of environmental disputes in Australia, and the question of forest use and management has become a major national political issue.[14] This ongoing and complex social and political relationship between Indigenous peoples, other resource users and the State continues and sets the important cross-cultural context in which new initiatives, such as community-based forestry and indigenous co-management agreements, have been created.[15]

Co-management agreements negotiated in Cape York, Kakadu National Park and elsewhere have also opened up important opportunities to address some of the problematic issues that plague indigenous relationships with the State over forest management and

Tiwi Carbon Study: managing fire for greenhouse gas abatement

The Tiwi Islands north of Darwin in the Northern Territory have exceptional natural and cultural values, sustaining many endemic plant and animal species and having a long history of indigenous ownership and management. About half of the 6,500 km^2 of savanna woodlands and open forests is burnt each year. The Tiwi people are working with CSIRO to examine the biophysical and economic potential of fire management for greenhouse gas abatement on their lands, as a basis for possible livelihood opportunities. The project features 18 long-term experimental plots (each 50-100 ha) arranged along an environmental gradient on Melville Island and subject to different fire management options. Tiwi land management rangers are working with CSIRO scientists to document the effects of fire on emissions of methane and nitrous oxide, above- and below-ground carbon storage and biodiversity. Combined with social research on the willingness and capacity of Tiwi people to change current fire management practices, the results are being used to develop an integrated Tiwi fire management plan that best meets the cultural, environmental and economic aspirations of Tiwi people.

Reforestation projects for Indigenous landholders

The Indigenous Land Corporation estate spans several forms of ownership or title on behalf of local people and includes approximately 55,000 hectares that has been cleared and is potentially available for reforestation projects to generate carbon offset income. Between 400,000 and 600,000 tons of CO_2e yr-1 can be sequestered in above- and below-ground biomass in mixed biodiversity plantings and/or monoculture hardwood plantations on these lands.[30] The estimated net annual returns for these reforestation projects is in the order of $A4 million – 7 million yr-1, assuming non-harvested carbon sinks and a carbon price of $A23.00 per ton CO_2e, and factoring in establishment and management costs of plantations.[31] If timber harvesting were included in the final Carbon Farming Initiative[32] or if non-timber products such as *eucalyptus* oil were to be harvested, financial returns and employment opportunities could be significantly higher.

conservation.[16] Conservation alliances have been forged based on recognizing the significance of forests and other environments to Indigenous peoples and the need to support Indigenous communities in their efforts to access forests and be involved in forest management decision-making.[17] The recent Cape York Tenure resolution process, for example, has led to 1.5 million hectares of high conservation land being returned to traditional owners. 850,000 hectares of this land is now a national park with the Indigenous peoples' consent and is supported through a formal co-management agreement.

Recent land reacquisitions supported by Government policy and funding initiatives, have also enabled Indigenous groups to maintain or establish their own forest enterprises for timber and firewood production.[18] Forestry on Indigenous-held lands is specifically supported by the National Indigenous Forestry Strategy, whose aims include improved economic and social outcomes for Indigenous communities and peoples through more active involvement in the forest and timber products industry,[19] as well as land reacquisition to assist Indigenous peoples to acquire and manage land to achieve the full spectrum of economic, environmental, social and cultural benefits in keeping with the mission of the Indigenous Land Corporation.[20]

National and international demands for greenhouse gas offsets is also increasing, offering important opportunities for Indigenous Australians to be involved in emerging carbon markets. Under Australia's Carbon Farming Initiative, reforestation of previously cleared agricultural land is one of the greatest opportunities for Indigenous Australians to generate carbon offset income in eastern and southern Australia.[21] With the emerging carbon economy, there is also a strong incentive for improving fire management to reduce greenhouse gas emissions and to protect biodiversity. Indigenous leaders from across Australia have expressed a desire to achieve a spectrum of goals from reforestation, fire management and other carbon offset management activities, from solely economic and employment benefits to broader environmental and cultural outcomes.[22]

Savanna burning activities that now occur across northern Australia meet an unprecedented confluence of interests: greenhouse gas abatement, biodiversity protection, and culturally appropriate economic opportunity for historically marginalized communities.[23] In the West Arnhem Land Fire Abatement (WALFA) project, Indigenous traditional owners and ranger groups have been employed to undertake prescribed burning early in the dry season, which limits the extent of unmanaged wildfires later in the season and thereby reduces overall greenhouse gas emissions and protects the biodiversity values of adjoining Kakadu National Park. It has led to important cultural enrichment for Indigenous peoples, reconnecting them to their traditional homelands, rekindling interest in traditional ecological knowledge, and providing opportunities to pass on this knowledge to younger generations.[24] The WALFA project has received $A17 million from energy company ConocoPhillips as an investment in offsetting greenhouse gas emissions.[25] Improved fire management right across Australia's savanna biome has the potential to abate more than 2.25 million tons of CO_2 each year,[26] and a range of WALFA-type projects are now being developed throughout the region.[27]

Forest conservation, fire management and other forest management activities being pursued across the country provide much needed livelihood opportunities for many Indigenous communities, some of whom represent Australia's most socially disadvantaged sector, and are taking place where mainstream economies are very limited. Many elders have a strong desire to fulfil their cultural obligations by re-establishing connections with forests as part of their efforts to sustain their communities and traditional estates.[28] Yet institutional arrangements and embedded cultural values underpinning forest access, management and ownership have not historically been designed in collaboration with Indigenous Australians and have created significant inequity and conflict.[29] Reforms to forest management and governance needs to continue, based on a solid understanding of this conflict to ensure forests can be redeveloped, conserved and re-imagined to be assets for Indigenous peoples of Australia.

A forestry joint venture on indigenous land in New Zealand

George Asher, Lake Taupo and Lake Rotoaira Forest Trust, New Zealand

When European settlers arrived in New Zealand in the early 1800s, all land (over 26 million hectares) was under the communal authority of over forty different Maori tribes. In 1840 the Maori and the British Crown signed the cornerstone Treaty of Waitangi, providing dual recognition of Maori customary rights over their lands and natural resources and forming the basis for the establishment of British sovereignty. Unfortunately Maori rights 'guaranteed' in the Treaty were never afforded subsequent policy or statutory recognition.

This article outlines the successful establishment of a modern, indigenous people's commercial forestry venture that is underpinned by world-class sustainable management practices. The venture epitomizes the remarkable response of the New Zealand Maori to historical challenges of land alienation and threats to their authority (mana whenua) over the land. A feature of this venture is maintenance of the intrinsic relationship of the Maori landowners with their ancestral land and how these values yield a vital reference for the sustainable management of the modern, commercial venture but also provide an important platform for contemporary and future social, cultural and economic development for the landowners and the wider tribal and community stakeholders.

Prolonged breaches and omissions of Treaty guarantees to Maori had devastating and irreversible consequences on Maori livelihood. Land legislation transformed tribal authority in Maori land to individual title, paving the way for individual landowners to ignore customary obligations to family and tribal members and dispose of their land interests. A number of historical Crown actions and instruments accelerated Maori land alienation between 1860 and 1900. Today, Maori own about 1.6 million ha (six per cent) of land in New Zealand.

Traditional Maori livelihoods were sustained through food sourced from the sea, waterways, forests and cultivations and were influenced by seasonal changes. Maori tribes, including the Ngati Tuwharetoa of the Central North Island of New Zealand, relied heavily on the resources available from indigenous forests for food, shelter, transport and medicine. All natural resources were managed under a customary stewardship and sustainable management system (kaitiakitanga) based

Image: Carey Carter

Lake Taupo Forest riparian protection zone around the Hinemaiaia River

Image: George Asher

Trustees of the Lake Taupo Forest Trust

on centuries of observation, practice and accumulated knowledge. While the practice was somewhat eroded by the loss of land and natural resources, the principle of Kaitiakitanga is still strongly adhered to by the Tuwharetoa (tribal group) which has authority (mana whenua) over the land administered by the Lake Taupo and Lake Rotoaira Forest Trusts.

Circumstances of the landowners — 1960s

In the early 1960s the Ngati Tuwharetoa faced further risks of major land alienation. Local authorities imposed land taxes (rates) on land even if it was non-income bearing. They were also implementing a policy to secure large tracts of land as part of the Lake Taupo foreshore reserves scheme. The targeted land was almost all in Maori ownership.

It became obvious to Maori that the only effective means of stopping further land alienation was to implement commercially viable developments on their land. The solution seemed clear but achieving this was fraught with obstacles created by the hybrid Maori land tenure system established in New Zealand.

Multiple Maori ownership and land tenure

Two Maori trusts, The Lake Taupo Forest Trust and The Lake Rotoaira Forest Trust, operate under joint venture arrangements with the Government of New Zealand. Both are governed by specific Maori land legislation. The total land area under the two Trusts is 48,000 ha, comprising 137 individual land blocks.

Tribal leadership under the elders, representing the owners and led by the Tuwharetoa paramount Chief, Sir Hepi te Heuheu, provided encouragement that successfully galvanized landowner support for the 'business case'. This leadership led to the many owners of these lands agreeing to amalgamate their properties into two separate business entities (trusts) for the purpose of negotiating forestry joint ventures with the New Zealand Government.

Financing the venture

The landowners had no financial resources of their own, nor did they have any capacity to raise capital from lending institutions, as the tenure position of their lands rendered them unacceptable as security. The only viable option for funding was through the New Zealand Government. Following a period of engagement and negotiation, the Government confirmed its participation by signing leases with Lake Taupo Forest Trust in 1969 and Rotoaira Forest Trust in 1973. The leases confirmed the agreed management, capital investment flow and share of profits between the venture partners.

Forestry as the preferred land use

The decision to adopt a regime of plantation forestry was not based solely on commercial benefit. Both the landowners and the Government recognized the importance of implementing a land use that was compatible with the culturally and environmentally sensitive geographical location. They also acknowledged that these production forests would take significant pressure off the logging of natural forests, a point that has been demonstrated in New Zealand following the establishment of vast radiata plantations.

The Trust leases

The original leases were for 70 years — considered sufficient for the land to be cleared and planted and two rotations of radiata pine to be grown, enabling the Government to receive its anticipated return on capital. These were subsequently reduced to one-rotation leases.

The landowners opted to take a share of stumpage (i.e. a share of eventual harvesting profits), rather than an annual rental. This was an important decision that signalled their aspirations for active engagement in the business of forestry rather than adopting the less risky and passive role of being a static landlord. This was also a completely unselfish act by the landowners of the 1960s. Most of them were of the older generation and they knew that under a stumpage arrangement, they themselves were unlikely to receive any financial return in their lifetime, as harvesting income would not start to be generated until harvesting commenced after around 25 to 30 years. Their focus was on creating benefits for the future generations of owners – their grandchildren and beyond.

Maori values associated with ancestral land

Maori refer to the land as their foothold (turangawaewae), which references their identity within a timeless and seamless geographical and historical landscape.

Maori genealogical networks link every entity within the universe, whether animate or inanimate, organic or inorganic. This relationship references the extensive and respected network of tangible and intangible elements that underpin the Maori holistic approach to

Image: George Asher

The Maori landowners' traditional welcome to guests and tribal graduates

stewardship and sustainable management (kaitiakitanga). A proverb of the Tuwharetoa tribe illustrates the primary relationship between the people, the land and its natural resources:

> Ko Tongariro te Maunga
> Ko Taupo te Moana
> Ko Ngati Tuwharetoa te Iwi
> Ko Te Heuheu te Tangata
>
> Tongariro is our sacred mountain and the pinnacle of our connection between Papatuanuku (the earth mother) and Ranginui (the sky father)
>
> Lake Taupo represents the gathering of the life-giving waters descended from Ranginui and Papatuanuku, forming, nurturing and connecting us as people of this land and the tribes further afield
>
> Ngati Tuwharetoa are the recognized people of these lands, waters and forests
>
> Te Heuheu is our esteemed leader and chief who has oversight and responsibility to maintain the life force (mauri) of our tribal treasure

Outstanding features of sustainable management

The Tuwharetoa proverb provides a constant reference for the sustainable management of the land and forests. The lease conditions reflect the landowners' priorities in protecting the cultural, spiritual and ecological integrity of the lakes, rivers and fisheries as well as their tribal heritage.

The first three objectives of the lease stipulate cultural, social and ecological bottom lines. The landowners sought assurance from the Government that these components would be addressed before the land clearance and commercial planting outlined in the fourth objective would be allowed. The main points of the two leases are paraphrased below:

- Preventing soil erosion and reducing pollution of Lake Taupo and of the related streams and rivers
- Conserving and protecting fish and wildlife habitats and other natural resources
- Preserving and safeguarding the graves and other sacred places of the Maori people, and the areas of natural beauty and scenery
- Consistent with the above purposes, establishing and managing a commercial plantation forest on the lands.

The degree of compliance achieved with the above conditions provides a remarkable example of partnership understanding and commitment. The examples far exceeded any compliance standards of local and national government agencies existing in that period. The high proportion of land area set aside for protection is unparalleled in New Zealand pine forests.

The trustees and their joint venture partner, the New Zealand Government, are under no illusion that their ambition to maintain a globally competitive, commercial forestry business relies on their capacity to demonstrate sustainable management practices of the highest order. Both forest estates are intensively managed and comply with Forest Stewardship Council accreditation attained in 2002.

Whanaungatanga

Whanaungatanga is a key Maori concept that refers to human cooperation, sharing and solidarity. It is most aptly demonstrated in the decision of the landowners to aggregate their 137 land blocks under the two trusts. The concept is also illustrated in the sharing of the 'positive' and 'negative' aspects of each block. Every hectare of land shares an equal proportion of the annual distribution, regardless of its suitability for commercial forestry. This recognition of the interconnectedness of all lands, and their different forms of contribution to the overall venture, is important in enhancing its long-term viability and sustainability.

Maintaining the ownership register

The 137 land blocks vary in size from 25 ha to 4,600 ha, and the number of owners in each block from 30 to 3,000. This is a characteristic of Maori land ownership that is further compounded by the inter-generational increase in owner numbers and the diminishing size of their interests in the land. These characteristics generate significant costs in keeping track of the more than 20,000 owners, living all around New Zealand and abroad. The trusts have a team of three people who are dedicated to maintaining ownership records and managing communications and distributions.

The trusts have accurate contact details for about 50 per cent of the owners. This represents around 70 per cent of the total shareholding. Of the 10,000 owners for whom there are no details, many are deceased, and their shares have never been formally succeeded to.

Income and distribution

The Lake Taupo Forest Trust made its first distribution to owners in 1995, the year harvesting commenced. Lake Rotoaira Forest Trust followed in 2002. Distributions

Lake Taupo and Lake Rotoaira Forest Trusts: in figures

	Lake Taupo Forest Trust	Lake Rotoaira Forest Trust
Year established	1969	1973
Number of land blocks administered	68	69
Number of owners in the land blocks	11,000	10,000
Number of trustees	11	9
Trustee elections held	Every three years	Every three years
Land area (ha)		
Total	32,000	16,000
Plantation (98% radiata pine)	23,000 (72%)	9,500 (59%)
Reserve/riparian	8,000 (25%)	6,000 (38%)
Roads, power lines etc.	1,000 (3%)	500 (3%)
Annual plantation harvest volume (sustainable) (m^3)	490,000	210,000
Number of people directly employed in the forests	140	60
Trust share of harvest profit: 'share of stumpage'	35%	28.5%
Average annual trust forest income (US$)	7 million	2.3 million
Trust debt (US$)	0	0
Average annual trust expenditure (US$)		
Replanting and managing the forests and land	3.2 million	1.3 million
Direct distributions to landowners	2.4 million	0.5 million
Educational grants to landowners and descendents	0.3 million	0.1 million
Grants for customary community meeting houses	0.1 million	0.05 million
Grants to the elderly	0.05 million	0.05 million
Trust administration	1.0 million	0.3 million
Year trust attains full ownership of the plantations	2021	2026
Forecast annual trust forest income with full ownership (US$)	20 million	8 million

Source: Trust Reports for Lake Taupo and Lake Rotoaira Forests 2010

have been made every year since, the total to date being around US$30 million. The trusts' average annual income and expenditure is summarized in the Table above.

Other owner and shareholder benefits

Over the past 20 years, the trusts' funds have been utilized to assist in many major tribal initiatives, including advocacy and representation of the owners and the tribes on Government policy, legislative change and tribal negotiation seeking recompense for historical Treaty of Waitangi breaches.

Owner land access

One of the important requests of the landowners in the 1960s was to retain their valuable deer and pig hunting and fishing rights over their ancestral lands to supplement their food requirements. Each year around 3,500 recreational permits are given out to owners. Apart from the above, they also gain access to visit sacred heritage sites and to gather firewood, as well as medicinal and other plants.

The future pathway to self-determination

Every year more bare land is handed back to the trusts after the annual harvest of the first-rotation trees. The trusts used their share of income from the first-rotation crop to replant and manage the second-rotation crop. By 2021 and 2026, the Lake Taupo and Lake Rotoaira Forest Trusts will each own 100 per cent of their respective commercial crops and the Government will have exited the scheme. The arrangement requires no venture or external capital because it is financed from cash flow. A remarkable feature of the trusts' business is that they have no debt.

In a period of 40 years, the owners of the 48,000 ha of trust land have progressed from having no income-generating assets to owning forests valued at US$90 million and having distributed profits to the landowners of around US$30 million. This has been achieved without taking on any debt or putting the ownership of their land at risk.

The trusts are now exploring the options available through participating in downstream wood processing, marketing and distribution. They are forever mindful of the need to maintain and enhance the social, cultural and spiritual well-being of the owners and their descendants and tribal members. They are, therefore, committed to continued improvement of human support and infrastructure, as demonstrated through their ongoing investment in education and partnership training liaisons.

Chile: a country with forestry tradition

Gerardo Tornquist Fernández, Corporación Nacional Forestal, Chile

"Chilean forests, represented politically by the Ministry of Agriculture through the National Forestry Corporation (CONAF), cover almost 22 per cent of the national territory, while also constituting the economic, social and cultural ambit for millions of people. By virtue of this, CONAF focuses a significant proportion of its public activity on reinforcing and expanding the synergy between human beings and the forest, part of which is summarized by means of concrete examples and actions contained in this report." (Eduardo Vial Ruiz-Tagle, Executive Director of the National Forestry Corporation, CONAF)

Chile and its indigenous peoples

Chile is as rich in the biodiversity of its flora and fauna as in that of its people. The indigenous peoples live in a hugely diverse ecosystem that makes up the national territory. For example, the Aymara, Quechuan, Atacameño and Colla peoples live in the arid northern zone, the Rapanui inhabit Easter Island, the Mapuches live in the rainy southern zone and the Yamana and Kawaskar peoples in the icy austral zone.

The world visions of each of these indigenous peoples are closely linked to nature. The Pachamama of the Aymaras, the Patta Hoyri of the Atacameños and the Wallmapu of the Mapuches are all concepts of land encompassing the territory with its people, animals, vegetation, history and climate.

The relationship between the indigenous communities and nature helps to satisfy religious, spiritual, medicinal, economic and cultural needs. However, with the world's development, indigenous culture has been deteriorating. In view of this, the State resolutely supports the restoration and conservation of nature, as well as that of the ancestral indigenous knowledge concerning nature, particularly with regard to the native forest.

Chilean forestry policies

Since the 19th century, Chile's public authorities have maintained a concern for the well-being of the coun-

Image: Hugo Rivera, CONAF

Secondary growth of lenga (*Nothofagus pumilio*) in the Trapananda National Reserve, Aysén Region

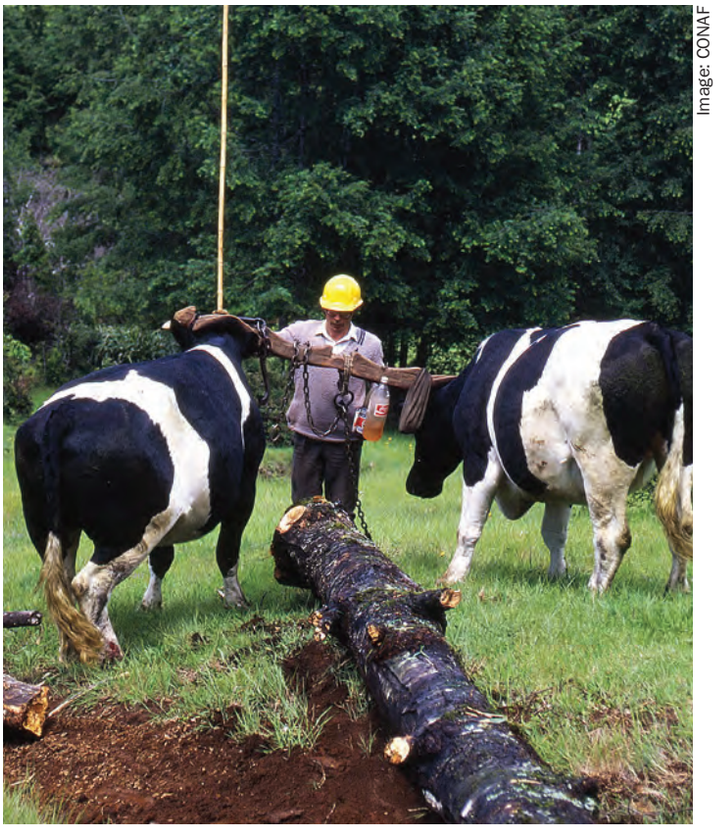


Image: CONAF

Logging with oxen in native forest in southern Chile

Image: CONAF

Rural worker carrying out horse-drawn hauling of pine logs

try's natural resources, with a particular emphasis on its forestry. This was made evident through several articles and declarations, although it was only in the 1930s that the importance of these resources was formalized in a body of laws, by means of Supreme Decree No. 4363 (Forest Law, 1931).

This legislation was followed in 1939 by the creation of the production development agency Corporación de Fomento de la Producción (CORFO), giving rise to a project that required the development of a strategy designed to gather information regarding the country's natural resources, explicitly concentrating on forestry, with a strong predominance of native forests, in the face of the deficit of statistical records that existed at the time.

In subsequent decades other actions were carried out, such as large-scale afforestation programmes, the creation of the Universidad de Chile's Forest Engineering School and the Forestry Institute (INFOR), the construction of pulp and paper plants and the enactment in 1974 of Decree Law No. 701 on Forest Development, evidencing the importance of the role of the State in furthering the growth of the sector.

The founding of CONAF was the result of a lengthy process during which the Chilean nation became increasingly aware of the need to preserve its forest and wildlife resources as well as to further their rational exploitation for the purpose of contributing towards the national economy and improving the quality of life for Chilean men and women.

This lengthy process came to a close on 13 May 1970, with the creation of the Corporación de Reforestación (reforestation agency), which was later renamed as the Corporación Nacional Forestal (CONAF).

Legislation and programmes

Decree Law No. 701 regarding forest development had a dual purpose: preservation of the forests existing at the time of its enactment and incorporation of new lands into the productive forestry process. The soil protection and recovery aspects of this political instrument are clearly laid down inasmuch as this body of laws determined the obligation to reforest.

Later, in 1998, came the enactment of Law No. 19561, which introduced several amendments to Decree Law No. 701, including a focus on smallholdings and the incorporation of soil recovery into the group of activities deserving bonuses, in addition to prolonging its effectiveness by 15 years.

The immediate and future challenge of sustaining the effort is entwined with improving the rural economy, where more than two million hectares of lands preferentially suited for forestry, with high erosion indices, are waiting to be afforested. For its part, the struggle against desertification and climate change, priority elements at both national and international level, are amply considered in the elaboration of a new Forest Promotion Law which is to be applied as of 2013, once the current one becomes extinct.

As a central element of its activity, CONAF carries out the Plantations Management Programme, which is inserted in the sectoral policy of the Government, for the purpose of contributing toward increasing the competitiveness of small-scale producers through improvement

Image: CONAF

Traditional Mapuche ceremony of homage to the land

Image: CONAF

Settler's house in the Malleco National Reserve, Araucanía Region

of their plantations, assisting them in the commercialization process and connecting them with the sector's public and private support network. With an annual target of 30,000 hectares for the 2007-2008 season, this programme includes 11 of the 15 political regions of the country, with private enterprise joining this initiative in some of these regions. This programme began in 2002 and has resulted in a year-by-year increase of the managed area, achieving a total of 31,442 hectares in 2009 and a record figure of 33,469 hectares in 2010.

Sustainable native forest

Similarly, a progressive step for the country, as well as for the forestry sector, was taken in July 2008 with the implementation of Law No. 20283, on Recovery of the Native Forest and Forest Promotion. The law had a particular focus benefiting small landowners who, according to CONAF estimates, own approximately 3.5 million hectares of the resource.

This same body of laws created the 'Native Forest Research Fund', whose purpose is to promote and increase knowledge in matters related to native forestry ecosystems, including their regulation, preservation, protection, increase and recovery. The avenues of research are defined by the Ministry of Agriculture with the participation of an Advisory Council in which the different interests with regard to the native forest are represented.

Furthermore, several initiatives associated with the adequate care of forests have been carried out with international cooperation, prominent among them being the Technical Cooperation Project (TCP) with FAO — 'Technical assistance for the recovery and revitalisation of temperate forests in Chile, with emphasis on the *Nothofagus* deciduous species' — carried out by CONAF between 2007 and 2009.

In initiatives of this type it is considered that Chile has around seven million hectares open to be converted into productive resources, more than half of them being in the hands of small and medium-sized landowners (approximately 100,000 families). For the rural and indigenous communities in Chile, this large area of native forest represents an important source of generational resources, owing to the gathering and processing of non-wood forest products, involving close to 200,000 people (mainly unqualified labour) and generating exports amounting to US$14 million a year.

Indigenous communities

The importance that the Chilean State attributes to indigenous communities is reflected in numerous initiatives undertaken by the Ministry of Agriculture, through the activities of CONAF.

The support of these communities in their development, as well as in maintenance of their own identity and culture, constitutes the basis for the actions carried out by those responsible for the CONAF Programme for Indigenous Peoples (CONAF-Orígenes), where it has been shown that working together with these communities on the conservation of ecosystems is a way to ensure that the traditions of the indigenous peoples are not lost.

Phase I of the CONAF-Orígenes programme included interaction with 300 Aymará, Atacameño Quechua and Mapuche communities, with close to

Image: CONAF

Training of indigenous communities and small-scale foresters

7,500 families having been favoured. Phase II of the programme, which began in 2008 and ended in 2010, was aimed at increasing the number of indigenous communities benefiting from forest development and management of natural resources, furthering their cultural identity and cooperating with the progress of public policy in matters affecting those communities.

Considered to be equally important is the application of the Mapuche Intercultural Forestry Model (MOFIM) and of the Andean Environmental Intercultural Model (MAIA). Also, by means of this same programme, CONAF furthers the 'Recovery of an eco-cultural medicinal dimension' project with two indigenous communities in the communal district of Tirúa, in the Araucanía Region.

In 2009, the 'Management of Natural Resources with Indigenous Communities' (PROMACIN) project was discontinued. Launched in 2003 and executed by CONAF, this project has enabled the performance of actions aimed at financing the recovery of degraded soils by means of the planting of 1,000 hectares with native and exotic species, investments in the recovery of native forests and recuperation of spaces, where 24 'Machis' (Mapuche herbal medicine-women) obtain their medicinal herbs. This is a reflection of the fact that CONAF understands its relationship with the Mapuche peoples through a fundamental factor: the native forest.

Within the cultural identity line of CONAF's Andean Environmental Intercultural Model (MAIA), a project has been carried out since 2008 with the Ayquina-Turi Atacameño Indigenous Community in the city of Calama, in the Antofagasta Region. The objective has been to support the restoration, conservation and use of the ecocultural spaces of the aforementioned community, by means of a combination of ancestral indigenous knowledge with the non-indigenous technical vision for the purpose of recovery, sustainable use and management of natural resources.

In the communal district of Ranco, in the Los Ríos Region, a project known as the 'Recovery of the Mapuche and Huilliche ceremonial and herbalist spaces in Lago Ranco' is under way. This project is carried out by the council of 'Médicas' – Mapuche medicine-women grouped together for the purpose of reinforcing Mapuche medicine – with CONAF's support, inasmuch as one of their main concerns is the loss of native medicinal flora.

Model Forests

In Chile, great importance has been given to Model Forests, of which at present there are four units, namely Cachapoal, Araucarias de Alto Malleco, Chiloé and Panguipulli. The work in these areas has been mainly along the lines of strategic planning and participative management.

This project, known as 'Establishment of forest plantations for the recovery of degraded soils, by means of silvo-pastoral use, in small and medium-sized properties in the communal district of Lonquimay', is a collaboration between the local community and the National Farming and Animal Husbandry Development Institute (INDAP), its purpose being to carry out income-producing activities that can enhance the quality of the environment but will enable owners to preserve the natural resources related to the forests, such as the water, the air, the flora and the fauna.

The work of the Convention on Biological Diversity

Johannes Stahl and Tim Christophersen, Secretariat of the Convention on Biological Diversity

It is estimated that more than two thirds of all land-based species live in forests or depend on them for their survival. Forest biodiversity sustains human well-being through a multitude of ecosystem services, such as water purification, timber production, provision of oxygen and medicine, as well as spiritual and cultural benefits. For many indigenous communities, forest biodiversity is fundamental to culture and identity.

The Convention on Biological Diversity (CBD) is an international treaty for the conservation and sustainable use of biodiversity and the fair and equitable sharing of benefits arising out of the utilization of genetic resources. The CBD recognizes that biological diversity is about more than plants, animals, micro-organisms and their ecosystems; it is about people and the need for a clean and healthy environment in which to live. With 193 Parties — 192 member states and the European Union — the CBD has near-universal participation.

In 2002, the CBD started a programme of work on forest biological diversity which promotes measures to enable the conservation and sustainable use of forest resources and the equitable sharing of benefits arising from their use. More recently, in October 2010, it adopted a new Strategic Plan for Biodiversity with the overall vision of living in harmony with nature by 2050. The new plan contains several targets that are of direct relevance to forests. The Conference of the Parties (COP) also adopted a Protocol on Access and Benefit-Sharing (ABS) which in the future may have major implications for forests.

The Forest Programme of Work

The CBD's programme of work on forest biological diversity consists of 130 measures, which the Parties have agreed to implement in accordance with national priorities (CBD decision VI/22). The measures are clustered in three elements:

Element 1 relates to measures for the conservation and sustainable use of forest resources and the equitable sharing of the multiple benefits arising from their use. The measures include activities to increase sustainable forest management, implement the ecosystem approach, establish effective protected areas, restore degraded forests, fight against forest fires and invasive alien species and ensure equitable access and benefit-sharing with indigenous and local communities.

Element 2 involves measures to further develop the institutional and socio-economic environment necessary to enable forest conservation, sustainable use and benefit-sharing. Measures in this cluster include activities to provide incentives (such as certification) for the use of sustainable practices, to develop good practices in forest law enforcement and governance and to clarify land tenure and resource rights.

Element 3 concerns scientific and technical measures for better knowledge, assessment and monitoring of forest trends. These measures include activities to advance assessment methods, research forest ecosystem functioning, develop a global forest classification system and improve the infrastructure for data and information management.

Since the inception of the forest programme of work, many countries and regions have moved ahead considerably with its implementation. For example, Brazil reduced deforestation in the Brazilian Amazon by some 50 per cent from 2002-2008. Similarly, Madagascar reduced the rate of forest loss by almost 50 per cent from 2000-2005, Liberia set aside 30 per cent of forest land for conservation, Malaysia and Viet Nam have established forest corridors to connect forest biodiversity hotspots and India enacted landmark legislation which assigned forest produce ownership rights to indigenous peoples and local communities. However, despite encouraging progress, a review of the programme of work and a global assessment of the state of biodiversity (the Global Biodiversity Outlook 3 published in 2010) indicate that still greater efforts have to be made to enhance the protection of forest biodiversity.

The Strategic Plan for Biodiversity 2011-2020

This new Strategic Plan, adopted by the tenth meeting of the COP in Nagoya, contains several targets to enhance forest biodiversity. It promotes the effective implementation of the CBD through a strategic approach meant to inspire broad-based action by all Parties and stakeholders in order to halt the loss of biodiversity and ensure that by 2020 ecosystems are resilient and continue to provide essential services and contribute to human well-being and poverty eradication.

At the heart of the Strategic Plan are 20 ambitious but realistic targets collectively known as the Aichi Biodiversity Targets. These targets must be met over the next decade if the Plan is to be realized. The implementation of the Plan coincides with the International Decade on Biodiversity 2011-2020, announced by the United Nations General Assembly in December 2010. Among the 20 targets for achievement by 2020 are four which are directly relevant to forests. These aim to:

- At least halve and, where feasible, bring close to zero the rate of loss of all natural habitats, including forests, and to significantly reduce degradation and fragmentation (Target 5)
- Sustainably manage areas under agriculture, aquaculture and forestry (Target 7)

Image: Varaporn/UNEP

Rainforest waterfall in Thailand

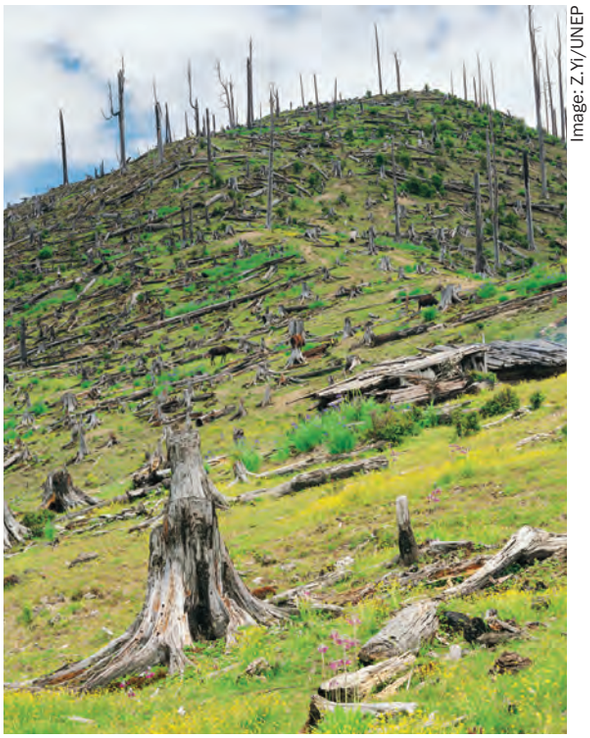


Image: Z.Yi/UNEP

Deforestation in Yunnan Province, China

- Conserve at least 17 per cent of terrestrial and inland water and 10 per cent of coastal and marine areas (Target 11)
- Enhance the resilience of and the contribution of biodiversity to carbon stocks through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification (Target 15).

Other targets, which are also relevant to forests, aim to eliminate negative incentives harmful to biodiversity and apply positive incentives for conservation and sustainable use (Target 3) and to restore and safeguard ecosystems that provide essential services and contribute to health, livelihoods and well-being, in particular of women, indigenous and local communities, and the poor and vulnerable (Target 14).

The Nagoya Protocol on Access and Benefit-Sharing

Next to the Strategic Plan, the Nagoya Protocol on Access and Benefit-Sharing is one of the most important outcomes of the Nagoya COP. The aim of this new protocol is to provide a transparent legal framework for the effective implementation of the third objective of the CBD: the fair and equitable sharing of benefits arising out of the utilization of genetic resources.

Genetic resources are of interest in scientific research and in the development of commercial products in a variety of sectors, including pharmaceutical, biotechnology, cosmetic and seed and crop industries. At its most basic, the Nagoya Protocol regulates the relationship between users and providers of these resources, including those from forests. The Protocol regulates access to resources in exchange for a fair and equitable share of the benefits derived from their utilization. Users seeking access should get permission from the provider country (known as prior informed consent or PIC) and should negotiate an agreement to share resulting benefits (known as mutually agreed terms or MAT).

In many cases, users of genetic resources consult indigenous and local communities on their traditional knowledge of biodiversity for leads in identifying useful properties of these resources. Such information can enable industries to develop new products for the benefit of humankind and have helped scientists better understand biodiversity. Whenever traditional knowledge associated with genetic resources is used, the prior informed consent of the indigenous and local communities concerned must be obtained and mutually agreed terms for the sharing of benefits with these communities must be established. Benefits to be shared may be monetary, such as royalties and profits, or non-monetary, such as technology transfer, research results and training.

Forests harbour a diverse pool of genetic resources and the use of these resources may in future be greatly affected by the new protocol. Examples of successful access and benefit-sharing in forests often lie in the realm of non-timber forest products. For instance, the bark and stemwood of the mamala tree (*Homalanthus nutans*) in Samoa contain a gene that naturally produces Prostratin, an active compound containing anti-viral properties. For many years, traditional Samoan healers made tea with this tree and used it to cure people with hepatitis. An ethnobotanist from the University of California at Berkeley studying traditional Samoan medicine sent some samples of the tree to be tested against HIV. When the researchers isolated Prostratin in the laboratory, they discovered that it stopped cells from being infected by the virus and it forced the virus outside the body's immune cells and

Image: Schneider/UNEP

An aim of the Strategic Plan for Biodiversity is to significantly reduce degradation and fragmentation of all natural habitats

into the line of fire of other HIV-fighting drugs. Before sending the samples of the tree for testing or proceeding with further development of Prostratin, the University of California followed PIC and MAT principles and agreed to give back a substantial percentage of the net revenue arising directly out of the research to the Samoan people. Funds have also been supplied to local villages for schools, medical clinics, water supplies and an endowment for the local rain forest.

Cooperation with partners

In addition to the Strategic Plan and the Nagoya Protocol, the Nagoya COP also asked the Executive Secretary of the CBD to further collaborate with relevant partners, particularly those in the Collaborative Partnership on Forests (decision X/36). In response to this request, the CBD Secretariat continues to collaborate with partners on a number of topics, including the following.

Collaboration with UNFF

In December 2009, the CBD Secretariat signed a Memorandum of Understanding (MoU) with the Secretariat of the United Nations Forum on Forests (UNFF). On the basis of the MoU, the two secretariats collaborate closely on a range of activities, including capacity-building on forest biodiversity and climate change, and forest financing in countries with low forest cover. UNFF's four Global Objectives on Forests are considered important stepping stones towards achieving the Aichi Biodiversity Targets by 2020.

ITTO and CBD initiative

In March 2010, the CBD Secretariat also signed a Memorandum of Understanding with the Secretariat of the International Tropical Timber Organization (ITTO). Based on the MoU, and with generous funding from the Government of Japan and other governments, the two secretariats started a joint initiative for the conservation and sustainable use of tropical forest biodiversity. The initiative supports the implementation of the CBD programme of work on forest biodiversity in ITTO producer member countries through specific country projects related to capacity-building, technical support and guidance. The implementation of the initiative is led by ITTO, in close consultation with the CBD Secretariat and the Government of Japan. The initiative prioritizes activities related to relevant goals identified in the CBD's Strategic Plan for Biodiversity. The country projects of the initiative focus, inter alia, on the linkages between forest biodiversity and climate change, biodiversity conservation in production forests and transboundary conservation of tropical forest resources.

CBD Liaison Group on Bushmeat

The CBD Secretariat also collaborates with partners in the CBD Liaison Group on Bushmeat to address the unregulated and unsustainable commercial hunting and trade of wild mammals, birds and reptiles ('bushmeat'). The growing illegal commercial trade of these animals and their parts is a critical problem across tropical and subtropical countries, causing widespread loss of forest biodiversity, imperilling the livelihoods of forest-dependent communities and destabilizing fragile tropical forest ecosystems. The Liaison Group on Bushmeat consists of more than 50 experts from twenty countries, and more than twenty international organizations, non-governmental organizations and indigenous and local-community representatives. To address the bushmeat crisis, the Group has developed national and international recommendations towards the sustainable use of bushmeat as well as options for small-scale food and income alternatives to bushmeat hunting which are based on the sustainable use of biodiversity.

REDD+ consultations

Finally, the CBD Secretariat supports the establishment of a mechanism for reducing emissions from deforestation and forest degradation, conservation of forest carbon stocks, sustainable management of forests and enhancement of carbon stocks in developing countries (REDD+), to ensure that REDD+ efforts are beneficial for biodiversity and contribute to the objectives of the CBD.

In sum, the CBD's forest programme of work, ABS Protocol and the new Strategic Plan for Biodiversity are highly relevant to the future sustainable management of forests. The International Decade on Biodiversity 2011-2020 will be a decisive period in setting the right policies for a sustainable future, through National Biodiversity Strategies and Action Plans and other relevant instruments and for achieving the vision of the Strategic Plan, so that 'by 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people.'

Restoring connectivity of people and ecosystems in the Greater Mekong Subregion

David McCauley, Javed Mir and Rowena Soriaga, Asian Development Bank

Forest ecosystem fragmentation and degradation is a major concern in the Greater Mekong Subregion (GMS) where six countries — Cambodia, Lao People's Democratic Republic (Lao PDR), Myanmar, People's Republic China (PRC), Thailand and Viet Nam — share political borders and services provided by these ecosystems. Forests in the GMS help to support the livelihood of 350 million people living in the Mekong River Basin, and provide the basis for the cultural identity of numerous ethnolinguistic groups and one of the world's richest storehouses of biodiversity. Though national governments have declared a large number of terrestrial protected areas, the landscape has become patchy and its ability to provide people's needs and critical habitats is increasingly threatened.

Economic and governance factors continue to drive this process. During the past three decades, Cambodia, Lao PDR and Viet Nam have experienced a series of political and economic upheavals, including a period of excessive logging beginning in early 1980s. By 1995, forest cover had been reduced in these countries to less than 60, 40 and 30 per cent respectively. As Asia's economy has grown, the intraregional trade in the GMS, especially with PRC, has risen sharply. In particular, rapid expansion of road corridors has improved GMS connectivity, enabling GMS countries to benefit from the PRC's economic boom.

While road and other infrastructure expansion has brought economic benefits, it has also contributed to pressures on the region's forests. The biggest challenges to keeping natural forest landscapes in the GMS are the large number of planned hydropower dams and other infrastructure investment, forest conversion to large-scale agriculture (rubber, palm oil) and expansion of mining concessions. Localized challenges include the illegal wildlife trade, forest clearance for

Image: S. Griffiths

Activities of the BCI are a decentralized, community-oriented approach to resources management

Image: S. Griffiths

BCI works to prevent forest ecosystem fragmentation

small-scale agriculture, illegal and unsustainable logging and non-timber forest products extraction, plus weak governance and environmental awareness.

A substantial portion of the population still lives below the poverty line, and socio-economic disparities are widening further. Poverty incidence among marginalized ethnic groups remains the highest. Part of this impoverishment is the loss of forest ecosystem services and a regional approach is very much needed to address ecosystem fragmentation. If neighbouring countries establish corridors to link protected areas, this can maintain and strengthen ecosystem services including watershed protection, biodiversity conservation and carbon sequestration while promoting and enhancing human well-being.

The GMS Biodiversity Conservation Corridors Initiative

The Biodiversity Conservation Corridors Initiative (BCI) is a flagship effort led by the Asian Development Bank (ADB) established as part of the GMS Strategic Framework 2002-2012. BCI works to prevent forest ecosystem fragmentation and is contributing to the achievement of the four global objectives of UNFF: (i) reversing forest cover loss through sustainable forest management; (ii) enhancing forest-based economic, social and environmental benefits, particularly through improving the livelihoods of forest-dependent people; (iii) increasing the area of sustainably managed forests, particularly protected forests; and (iv) mobilizing new and additional financial resources.

During the pilot phase (2006-2011), BCI focused on eight sites in Cambodia, Lao PDR, Viet Nam, PRC, and Thailand to integrate poverty reduction in forest biodiversity conservation practices through an integrative, multi-sectoral programme approach. BCI has five components: (i) poverty reduction; (ii) integrated land-use planning and management; (iii) restored ecosystem connectivity; (iv) capacity-building; and (v) sustainable financing.

Over 1.2 million hectares have been delineated as BCI corridors with improved security of land tenure in over 31,000 hectares of Community Protected Areas (CPA), established 500 hectares of co-managed forests, and reforestation of over 3,700 hectares. More than 28,000 households directly benefited in 164 villages/communes in Cambodia, Lao PDR and Viet Nam. A new survey shows the greatest changes are in increased awareness for forest protection (81 per cent), improved skills in forest protection and management (69 per cent), as well as in women's enhanced decision-making (63 per cent) and participation (59 per cent). Among the benefits most appreciated were the provision of help establishing agroforestry systems in Lao PDR and Viet Nam, support for land tenure improvements in Cambodia and improved local livelihoods with reduced forest dependence in pilot sectors.

BCI has also provided a venue for collaboration and partnerships between government and NGOs. Governments worked on policy and regulatory frameworks, while NGOs working on micro-level service delivery. Though this entailed high initial costs for coordination and administration, the benefits from relationships fostered between state and non-state actors have generated positive implications well beyond the project period and scope. Local government ownership

Image: S. Griffiths

Gathering medicinal seeds in the forest near Ban Namon village

and capacities have been built through institutionalization of new rules for sustainable land and forest resource management, embedding these in upstream planning processes from provincial to national level. Local management has encouraged decentralization, people's participation and greater accountability for resource management.

Exploring the potential for REDD+ and other sustainable financing opportunities

BCI recognizes that the valuation of ecosystem services is essential to correct market failures in reflecting the true value of natural forests to society and to the national economy, beyond timber revenues. The project established a method to describe forest-based ecosystem services in monetary terms to inform the decision-making process of economic planners and policymakers and applied it to 2.3 million hectares of forest areas along the biodiversity conservation corridors in Cambodia, Lao PDR and Viet Nam, for five types of services: (i) non-timber forest products; (ii) carbon storage/sequestration; (iii) watershed protection; (iv) water quality regulation and (v) soil erosion control. The total value of ecosystem assessed amounted to US$9.3 million, or almost US$4,000 per hectare. Carbon storage function provides the highest values, US$4.2 million or over 45 per cent of the total.

Mainstreaming ecosystem service values into economic development planning processes is important to addressing drivers of deforestation and forest degradation. These initiatives also increase the evidence base for leveraging new and additional sources of financing, including through reducing carbon emissions from deforestation and forest degradation and other associated actions to conserve and enhance forest carbon stocks (REDD+). The baseline information collected on forests and people as well as the economic valuation methodologies piloted under BCI can be tailored to REDD+ measurement, reporting and verification (MRV) requirements. BCI is already moving ahead with the establishment of reference levels, additionality tracking and design of performance-based REDD+ actions. There is also potential for designing bundled ecosystem payment schemes.

In spite of considerable progress by GMS countries in managing forest areas, the magnitude of pressures still outpaces the responses. While economic development in the GMS has improved human well-being, uneven distribution of wealth remains a challenge. Economic development, without balance and strategic planning, can put ecosystem services and the livelihoods of local people at risk. This is why promoting community forest management along biodiversity corridors holds such promise, even as it needs to be coupled with improving food security, providing small-scale infrastructure for basic services, and integrating livelihood improvement activities. The pilot activities under the Biodiversity Conservation Corridors Initiative have shown that a decentralized community-oriented approach to resources management offers an effective response to forest degradation. The economics of the GMS countries are often referred to as part of the rapidly growing 'Asian Tigers'. Let us hope that such an economic programme can be achieved in ways that will preserve the Tigers' namesake's habitat alongside other ecosystem services derived from this region's still rich forest resources.

Forests and people: Brazilian policies and initiatives

João de Deus Medeiros, Forest Department, Ministry of the Environment, Brazil

Brazil is the largest country in the Southern Hemisphere, having a territory that represents approximately 5.7 per cent of Earth's and 47.3 per cent of South America's land area. Its forests, both public and private, are treated as natural assets that can provide a range of goods and services which play a decisive role in economic development and social welfare on different scales. From an economic point of view, for instance, the various activities in natural and planted forests directly contribute to almost 4.5 per cent of the Gross Domestic Product (GDP). This value becomes greater if one considers the environmental services associated like water production, soil conservation and provision of pollinators, all crucial for several industry sectors such as agriculture and power generation.

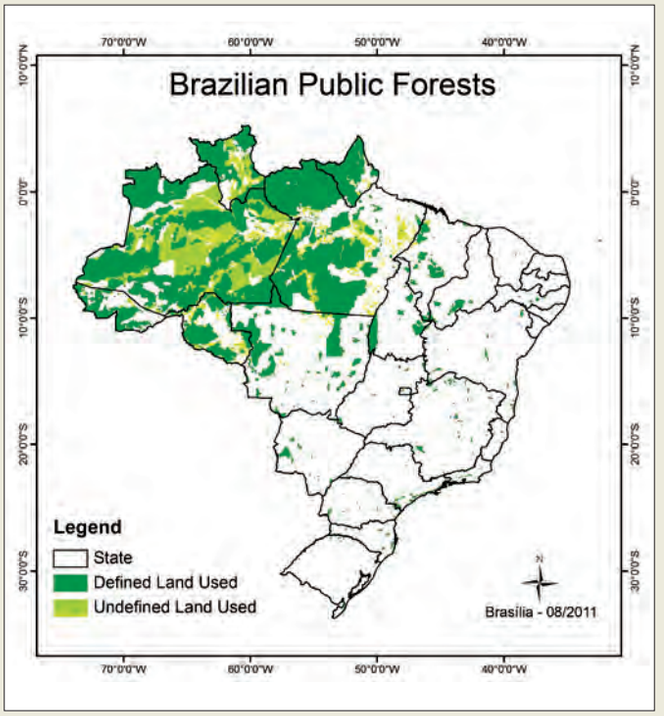
In order to promote the conservation and sustainable use of forestry resources, the Brazilian Government has developed a series of policies and programmes whose implementation relies on the participation of various sectors of society.

Beyond biological diversity, Brazilian forests are home to more than 200 indigenous tribes and a large number of local communities such as *quilombolas*[1], *caiçaras*[2], and *seringueiros*[3]. They bring a priceless collection of traditional knowledge on biodiversity conservation. In recognizing the importance of maintaining the traditional way of life of these people, the Brazilian Government created some typologies of protected areas, where the presence of human

Brazilian forest biomes

Brazil has a high diversity of forest types occupying about 61 per cent of its territory, which can be broadly classified by its biomes: Amazon rainforest (419.7 million ha (1), Atlantic rainforest (*Mata Atlântica*) (28.8 million ha) (2), Cerrado (70 million ha) (3), Caatinga (46.8 million ha) (4), and the Pantanal (8.55 million ha) (5).[4]

Map of the distribution of Brazilian public forests



Source: Brazilian Forest Service/MMA

Image: MMA

Basketmaking by a Kaxinawa woman at Carapana Indigenous Territory

populations can be settled with the conservation of the natural resources within.

National Forest Inventory

The main purpose of the National Forest Inventory (NFI) is to generate information on forest resources, both natural and plantations, to support the formulation of public policies and projects aiming at forest development, use and conservation. The NFI is nationwide and multi-source, reporting information on forest resources in a five-year measurement cycle. The sampling design for field data collection is based on clustered sample plots distributed over a 20 km x 20 km grid. Simultaneously, with measurement of each plot, interviews are conducted nearby with the aim of describing how local communities view and use their available forest resources. The NFI will provide information at country level for relevant themes, including sustainable forest management, biodiversity, and biomass carbon stocks.

The National Register of Public Forests (CNFP) is a geo-referenced database of public land covered by forest (as at March 2006). National Forests, Special Protected Areas, Indigenous Territories, and many other types of public land with forests are included in the register. The CNFP is an important instrument for identifying potential public forests to be included in the forest concession planning as well as to identify the geographic position of the Forest Management Units under concession for monitoring purposes.

Community forests are those legally used by traditional peoples and communities, indigenous populations, domestic farmers, or settlers of the national programme for agrarian reform. The different types of community public forests altogether add up to 145 million hectares and represent 50 per cent of the total number of registered public forests in Brazil. Community public forests shelter approximately 2 million people across Brazil and play a significant social and economic role, such as generating timber and non-timber forest products which are essential to its inhabitants. The Brazilian Ministry for the Environment assists with the identification of those populations, promoting community forest management by providing technical support and capacity-building.

The National Plan for Promotion of Socio-Biodiversity Product Chains (PNPSB)

PNPSB was launched in 2009 by the Brazilian Government to provide an environment for the development of specific work plans and the construction of a strategic vision to promote and strengthen local and regional production.

The first product chains selected to be worked were the Brazilian-nut, in the Amazon biome; and the babaçu palm, in the Transition Zone between the Amazon, Cerrado and Caatinga biomes, mainly because of their environmental and socio-economic importance. This strategy involves representatives who operate at national and local levels in order to strengthen the Brazilian socio-biodiversity product chains to help produce sustainable markets.

Moreover, under the PNPSB, the Government stepped up the purchases at the institutional market in programmes such as the Food Acquisition Program and the Brazilian National School Feeding Program and also entered these products on the agenda of a

Image: Anréa Oncala

Brazilian nut (*Bertholletia excelsa*) community processing

Image: Fernando Tatagiba

Pequi pulp (*Caryocar brasiliense*)

policy for setting a guaranteed minimum price on 10 socio-biodiversity products.

Bonuses are awarded to those who can sell their product at a price below the minimum price set by the Government, so far benefiting more than 16,000 families.

National School Feeding Program (PNAE)

Introduced in June 2009, PNAE determines that at least 30 per cent of funds transferred by the National Fund for the Development of Education be used for school meals, purchasing products from family farms and rural family entrepreneurs or their organizations, prioritizing agrarian reform settlements, indigenous traditional communities, and *quilombola* communities. 3,800 families have benefited through the PNAE, in partnership with the Ministry of the Environment and the Ministry of Agrarian Development.

'Green grant'

Established in June 2011, the Program of Support for Environmental Conservation publicly known as 'green grant' (*Bolsa Verde*), reinforces Brazil's commitments to the Convention on Biological Diversity by aiming to encourage the conservation of ecosystems and improve the living conditions and raise the income of a section of the population living in extreme poverty.

The Federal Government transfers funds of around US$180 per quarter (reviewed after two years) to families in extreme poverty to develop activities which help conserve natural resources. These measures support environmental conservation by incentivizing families to develop conservation activities in the following areas: national forests; federal extractive reserves; federal sustainable development reserves; forest settlement projects; sustainable development projects; and extractive settlement projects instituted by the National Institute of Colonization and Agrarian Reform — INCRA.

Family and community forest management

The year 2009 was a milestone for all community-managed forests in Brazil, as the Federal Government established the Federal Program of Family and Community Forest Management. This initiative, coordinated jointly by the Ministry of Environment and the Ministry of Agrarian Development, is aimed at promoting actions to develop forest management by countryside families, agrarian reform settlers, and traditional peoples and communities. Each year and in accordance with the Program, the Annual Plan on Family and Community-Based Forest Management is published, including: actions, activities, goals, areas, responsible bodies and foreseen resources for the year. The plan proposes different types of actions: organizational strengthening; institutional strengthening; land regularization and territorial organization; credit, fostering and incentives; technical assistance and rural extension; capacity-building in forestry activities; research, education, development and innovation; infrastructure; production, processing and trading; regulatory frameworks; and forest information systems. The first Annual Plan on Family and Community-Based Forest Management, the PAMFC 2010, involved seven Amazon states and approximately 17,000 families. The second, PAMFC

Image: sAndréa Oncala

Typical beneficiary of the Green Grant Program

Image: Eduardo Venticinque

Community meeting at a Reserva Extrativista (Brazilian type of protected area)

2011, is being carried out in 13 states and has expanded its influence to 20,000 families in both Amazon and Caatinga biomes. Hence, considering the growing number of initiatives and the potential extension of community-based forest management in all different Brazilian biomes, the prospects for the coming years look very promising.

Forest concessions

Forest concessions in Brazilian public forests have been regulated since 2006. The competition is based on a bidding process with broad social participation and its selection criteria are based on price ($/m^3) and best technical proposal, including social, environmental, and economic issues.

Currently there are five national forests going through forest concession processes, adding up to 1 million hectares. Of which 145,066 hectares are already operating and benefiting five companies, generating approximately 1,590 job positions and investments in local communities, which corresponds to more than US$300,000 per year. It is expected that approximately 2 million hectares of forest concessions will be operational by 2013.

Forest management in natural forests

The sustainable use of natural forest resources through forest management for timber production is promoted as a Government policy in the Amazon forest. A comprehensive framework of regulations and procedures is available for the Amazon region to drive users to implement good practices. The silvicultural system is polycyclic, based on selective logging of 4-6 trees per hectare harvested, in a 35-year cutting cycle. These guidelines are applied in order to retain enough seed trees to promote natural regeneration.

Image: Jefferson Rudy/MMA

Sustainable Forest Management at the Floresta Nacional do Jamari, the first National Forest under the forest concession regime

Conserving forest biodiversity in the ASEAN region

Rodrigo U. Fuentes and Norman Emmanuel C. Ramirez, ASEAN Centre for Biodiversity, Philippines

Forest biodiversity refers to all forms of life found in forests, including trees, plants, animals, fungi and micro-organisms, and their roles in nature. In biologically diverse forests, this complexity allows organisms to adapt to continually changing environmental conditions and to maintain ecosystem functions.[1]

South-East Asia, also known as the Association of South-East Asian Nations (ASEAN) region, has one of the most diverse forest ecosystems in the world.[2] However, a number of endemic plant and animal species that are dependent on the health of forest ecosystems are at risk owing to the pressure exerted on their habitat. The fragmentation of forests following the construction of roads, agriculture and human settlement development has reduced the corridors in which wildlife can move or migrate. For example, forest clearances in Indonesia, exacerbated by illegal logging in 37 national parks, have affected many orangutan populations, driving the species towards extinction.

The ASEAN region has a higher number of native species compared to the rest of Asia, including China, India, Japan and Korea. In 2010, as reported by the International Union for Conservation of Nature, the Philippines had the highest number of critically endangered and endangered native species, while Indonesia had the highest number of vulnerable native species, followed by Malaysia and Viet Nam.

Image: Ministry of Environmental Conservation and Forestry, Myanmar

Deciduous forest in Alaungdaw Kathapa National Park, Myanmar

The transformation of forests in the region has been extensive, especially over the last 50 years. Almost 8,000 years ago, the entire region was covered by forests. As of 2000, only 47 per cent of the ASEAN region was forested. By 2007, the forest cover of the entire region was down by four percentage points, at 43 per cent.[3]

Initiatives that support forest biodiversity

Forest ecosystems require effective governance focused on enforcement of binding laws and forest policies, engagement of communities, local government and private stakeholders and comprehensive capacity-building programmes for institutions involved in law enforcement.

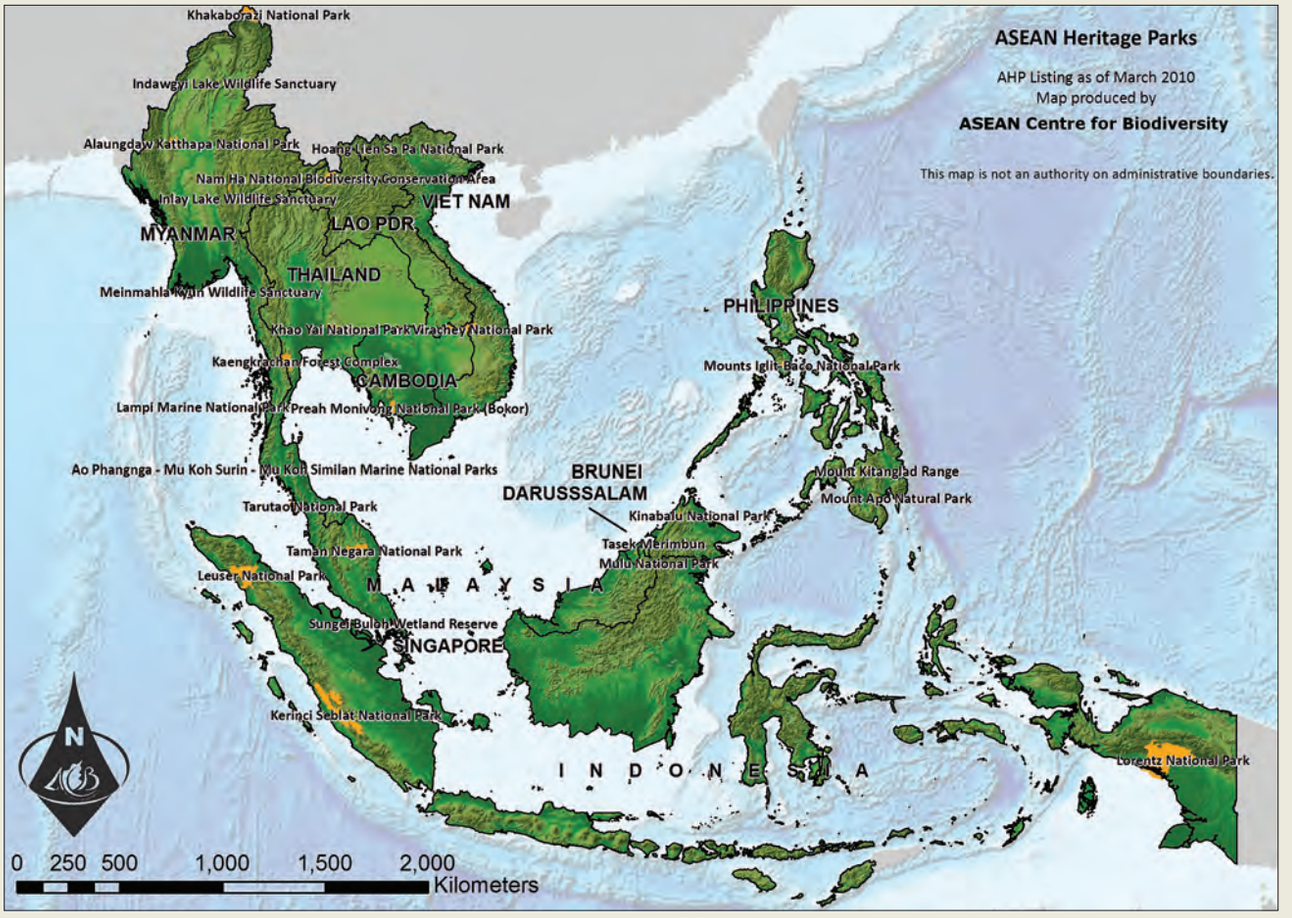
In this region, efforts are being pursued in reforestation and afforestation, social forestry and community-based forest management. Two ongoing key programmes merit support: the forest certification programmes based on sustainable forest management principles and the Action Plan on Forest Law Enforcement, Governance and Trade (FLEGT).

The formulation of a forest certification programme involves close partnerships between governments and the private sector. Each programme requires a third-party auditor to certify the environmental and social soundness of a forestry operator and the products that are produced. Malaysia has adopted this type of initiative to create the Malaysia Timber Certification Council. The FLEGT, on the other hand, involves partnership agreements between producer and consumer countries aimed at combating illegal timber trading.

Conservation of forest biodiversity is one of the major concerns of the ASEAN Centre for Biodiversity (ACB), an intergovernmental organization mandated to facilitate cooperation and coordination among the ASEAN Member States and with relevant national government and regional and international organizations on the conservation and sustainable use of biological diversity and the fair and equitable sharing of benefits arising from it.

ACB is active in international discussions on concerns such as payments for ecosystem services, economic valuation of biodiversity, taxonomy, invasive alien species, wildlife enforcement, climate change, ecotourism and

ASEAN Heritage Parks



Source: ASEAN Centre for Biodiversity

access and benefits sharing. It advocates a holistic approach to biodiversity conservation that emphasizes the importance of synergy in the natural environment.

Following its multi-sectoral paradigm, ACB has fostered forest biodiversity through several initiatives.

ASEAN Heritage Parks

The establishment of protected areas (PAs) remains one of the key cornerstones of biodiversity conservation. The Philippines, Indonesia and Malaysia have the highest number of PAs while Indonesia, Thailand and the Philippines have the most expansive areas. The region has also exceeded the suggested target of declaring ten per cent of its terrestrial land PAs, having established 13.2 per cent for such purpose. Six ASEAN Member States have exceeded the 10 per cent target and of these, Brunei Darussalam, Cambodia and Thailand have set aside more than one fifth of their total land area for protection and conservation.

Protected areas are established as ASEAN Heritage Parks (AHPs) to generate greater awareness, pride, appreciation, enjoyment and conservation of the region's rich natural heritage. AHPs are defined as 'PAs of high conservation importance, preserving in total a complete spectrum of representative ecosystems of the ASEAN region'.[4]

The ASEAN Declaration on Heritage Parks was signed in December 2003. The corresponding AHP Programme underlines the need for greater collaboration to conserve the region's globally significant biodiversity. As Secretariat, ACB supports the programme by promoting the parks, developing resource materials and enhancing the capacity of PA managers.

Invasive alien species management

Invasive alien species (IAS) are plants, animals or micro-organisms that have been introduced outside their natural distribution area and exhibit sufficiently rapid growth, reproduction and dispersal to become highly competitive and destructive to native species, particularly if the new ecosystem lacks the predators or pathogens of their own native range. The cost of damage caused by IAS globally is estimated at US$1.4 trillion per annum. In the ASEAN region, these species are becoming a threat to biodiversity and the economy. They are a major driver of environmental change, constraining environmental conservation, economic growth and sustainable development.

With financial assistance from the European Union, ACB implemented the Joint Research/Initiatives (JRI) on Biodiversity Programme from 2008-2010. Through the JRI, ACB provided technical and financial aid in the

Image: National Parks Board of Singapore

Mangrove forest in Sungei Buloh National Park, Singapore

implementation of high-quality research projects aimed at addressing priority problems, among them IAS.

Viet Nam implemented a research project on solutions to control the spread of the invasive Mimosa pigra in Viet Nam and ASEAN countries. The project included a subregional workshop with representatives from Cambodia, Lao PDR and Thailand, who shared their experiences on Mimosa pigra management.

REDD+, TEEB and PES

ACB supports and participates in local and international forums related to Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (REDD+), The Economics of Ecosystems and Biodiversity (TEEB) and Payments for Ecosystem Services (PES). These initiatives ensure that ASEAN Member States have a common understanding of current and emerging issues from a regional standpoint for policy development and implementation.

Following the TEEB and PES agenda, ACB co-organized a series of regional workshops on PES from 2009-2011 with the United Nations Economic and Social Commission for Asia and the Pacific, the Asian Development Bank's Environment Operations Center, the US Agency for International Development's Asia Regional Biodiversity Conservation Programme and the Governments of Thailand and Viet Nam. In June 2011, ACB collaborated on a regional TEEB workshop with the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), through its Biodiversity and Climate Change Project.

Biodiversity conservation and climate change

The effects of climate change on forests are manifested through the increased occurrence of forest fires during the dry season, the rising number of pest and disease infestations in forest areas and the threat to seedlings from changes in precipitation patterns. Other effects include the upsurge in the population of invasive alien species and intensifying soil erosion due to intermittent drought and flooding.

Researchers studying forest fires in Indonesia say that the destruction of forests and peatlands in the country is making it more prone to forest fires, especially during the dry El Niño years. Moreover, there was a significant increase in the intensity and scale of fires beginning in the 1990s due to industrial logging and expansion of oil palm plantations.

In support of ongoing efforts to address climate change, ACB and the Federal Government of Germany, through GIZ, are jointly undertaking a Biodiversity and Climate Change Project. The project officially kicked off in September 2010 and will be implemented initially for two years to support ACB in addressing emerging issues relevant to climate change and biodiversity in ASEAN.

Promoting regional cooperation and partnerships

All ASEAN Member States are Parties to the Convention on Biological Diversity (CBD), a global agreement that encompasses three major goals: the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of benefits arising from the use of genetic resources. They are also Parties to other international agreements such as the Convention on International Trade of Endangered Species of Wild Fauna and Flora, the Convention on Wetlands of International Importance (especially the Waterfowl Habitat), the Cartagena Protocol on Biosafety and the World Heritage Convention.

In addition, through the Singapore Resolution on Environmental Sustainability and Climate Change, the ASEAN Environment Ministers agreed in October 2009 to protect and conserve the region's rich biodiversity by taking into account the three objectives of the CBD and to work together to achieve a successful outcome of the tenth Conference of the Parties to it.

Image: Department of Environment and Natural Resources, Philippines

Mossy forest in Mt Kitanglad Natural Park, Philippines

The resolution also encouraged the ASEAN Member States to identify and establish more AHPs and to maintain the current parks through a system of protected areas to significantly reduce the current rate of biodiversity loss and to focus efforts on biodiversity conservation as a key measure in mitigating and adapting to climate change.

Lessons learned and ways forward

The ASEAN Heritage Parks Programme has shown how governments can establish and maintain regional representative systems of protected areas. There is clearly a need to provide the AHPs with continued support so that countries can demonstrate that they can effectively manage the parks.

One of the key challenges in halting biodiversity loss is the involvement of the larger stakeholder base beyond environment and conservation practitioners. Awareness campaigns must also target not only the general public, but also those outside of the environment sector, primarily the economic development sector.

Biodiversity must be mainstreamed outside of the environment domain and integrated into national policies and programmes on fisheries, forestry and trade, as well as into national poverty and development plans, including Millennium Development Goals strategies.

A better understanding of the value of biodiversity can significantly boost political support to effect changes in the way we do things and further mobilize financial resources to address the threats and drivers of biodiversity and ecosystems loss. TEEB 2009, a landmark document on promoting the value of natural wealth from ecosystems services, highlights the inextricable link between poverty and the loss of ecosystems and biodiversity.

Expanding REDD to the REDD+ instrument could create a revenue stream for national governments to meet emission reduction targets. In the ASEAN region, there is great potential for raising revenues in this way in Indonesia and Cambodia, but only if the institutional capacities of these countries can be improved.

In recent forums, ASEAN Member States have acknowledged the need to implement current commitments on forests, biodiversity and climate change, develop national information sharing networks and foster greater capacity-building on technical issues. There is also a need to integrate forest-related commitments into national development plans and strategies, harmonize multisectoral approaches, encourage mechanisms for benefit sharing and promote greater synergy between the work of CBD, the United Nations Forum on Forests and the United Nations Framework Convention on Climate Change.[5]

Challenges remain, such as addressing differences between safeguard approaches in the context of REDD+ pilot and demonstration activities. There is also generally a lack of capacity and expertise to monitor the biodiversity impacts of REDD+ and a need to improve indicators and tools for enhancing biodiversity benefits.[6]

Engaging the business community and the private sector is an emerging strategy to halt the loss of biodiversity. Corporate social responsibility investments, such as support to rehabilitation of degraded ecosystems, must be acknowledged and promoted.

Biodiversity captures media coverage and public awareness and gains the attention of leaders primarily when driven by unusual and extraordinary events. However, regular, sustained and concerted campaigns are sorely lacking. Recognizing the day-to-day efforts of concerned groups and individuals requires proactive and systematic methods.

The ASEAN region is home not only to biologically significant species and ecosystems, but also to individuals and groups who can have a global impact in the cause of conservation. We herald their initiatives and their impact on society at large.

Restoring and managing forest landscapes for better lives

Stephen Kelleher, Deputy Head, Forest Conservation Programme, International Union for Conservation of Nature

We can now begin to look back upon the International Year of Forests, 2011 (Forests 2011). Throughout the year, we witnessed an unprecedented level of attention placed on the world's forests and the challenges and opportunities that confront them. Along with its partners, the International Union for Conservation of Nature (IUCN) took advantage of this unique focus on forests to amplify and build on our work and progress.

Forests 2011 commenced with a dynamic meeting of the UN Forum on Forests in New York, where our team was joined by the IUCN Director General to highlight some of IUCN's significant contributions to sustainable forest management and forest-based livelihoods around the world.

At this event, the Rwandan Government committed to border-to-border restoration of its natural ecosystems, upon which a vast majority of its population already depends for livelihoods. This bold step has served as a catalyst for other Governments to adopt a similar scale of ambition. Along with the Government of Rwanda and the United Nations Forum on Forests, IUCN was a major partner in supporting Rwanda's Forest Landscape Restoration Initiative.

Significant outcomes

At the time of Rwanda's announcement, IUCN predicted that Rwanda's commitment might mark the beginning of the largest restoration initiative the world has ever seen — and it is beginning to look as though we were right. In September we co-hosted, along with the German Government, a high-level meeting of ministers and executives of major organizations and

Image: IUCN/Daniel Shaw

Harvesting seedlings for Mangrove restoration, Limpopo River, Mozambique

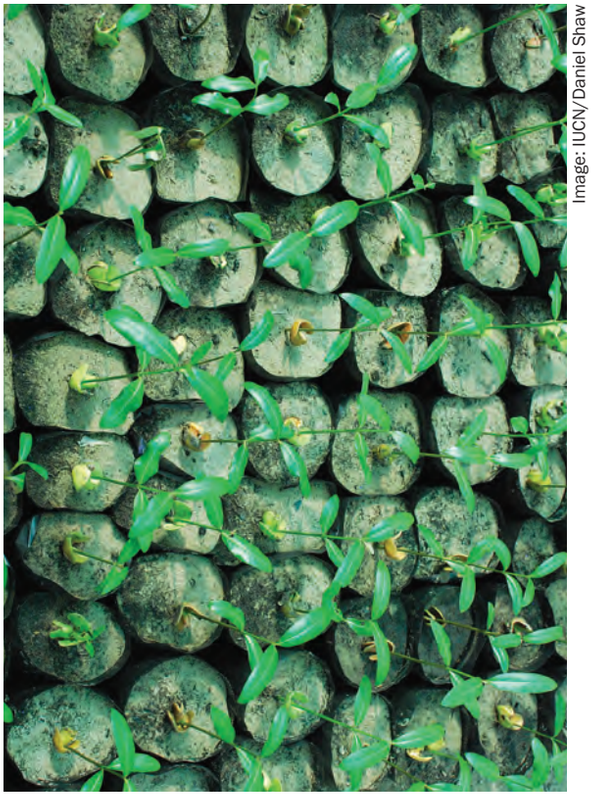


Image: IUCN/Daniel Shaw

Mangrove seedlings in a tree nursery, at the mouth of the Limpopo, Mozambique

companies to take on the challenge of forest landscape restoration. This concluded with an extremely significant outcome: a joint commitment to restore 150 million hectares of deforested and degraded landscapes by 2020. That is approximately equivalent to an area the size of Mongolia, with phenomenal benefits to biodiversity and livelihoods.

IUCN has estimated that restoration on that scale will be worth US$85 billion per year to local and national economies. Highlighting the worth of ecosystems and the services they provide in this way has also been a part of other work IUCN has been doing to come to a better understanding of the value of forests at each level of the global economy.

One such programme of work in this regard, which has also generated valuable new knowledge on the spatial variance of poverty and forest dependence in forest-adjacent communities, has been our Landscapes and Livelihoods Strategy (LLS).[1] Already in place for five years and ending its first phase in 2011, LLS has been improving sustainable management of natural resources — and the lives of people who depend on them — in more than 20 countries across Africa, Asia and Latin America.

On a global level, we have learned from LLS that the direct benefits from forests are worth around US$130 billion every year: roughly equivalent to annual official development assistance worldwide. We have also discovered that forest reliance globally varies between about 25 per cent and 40 per cent of total annual income.

LLS builds on the ecosystem approach in taking a 'landscape' view, which allows us to look at and manage forests as part of a broader and more complex ecological and socio-economic system. This has allowed us to deliver custom-made responses that deal with the specificities of each of the diverse landscapes.

Saving forests, saving water

To mention just one of many examples, in China, we have been working in the Miyun watershed, which supplies up to 80 per cent of the freshwater used in Beijing. Worsening water shortages in Beijing have been directly linked to the disappearance and degradation of much of the original forest in the watershed. When this was first recognized, the Government attempted to resolve the problems by imposing a strict logging quota but the forest quality and water supply continued to be less than ideal.

The LLS project initiated by IUCN worked with local authorities and communities to introduce a more integrated form of landscape management and restoration, which recognized the multiple needs and functions of the watershed and brought together the many different stakeholders. This included piloting a partial lifting of the logging quota. The introduction of a new set of forest management practices represented a shift from a strict protective approach, towards more sustainable resource use through active management by forest-based communities.

This has resulted in a formal agreement that recognizes different forest management and forest use regimes, merging the technical information held by

Image: IUCN/Daniel Shaw

Mother and baby planting seedling to restore forested area near precious water sources, Tanzania

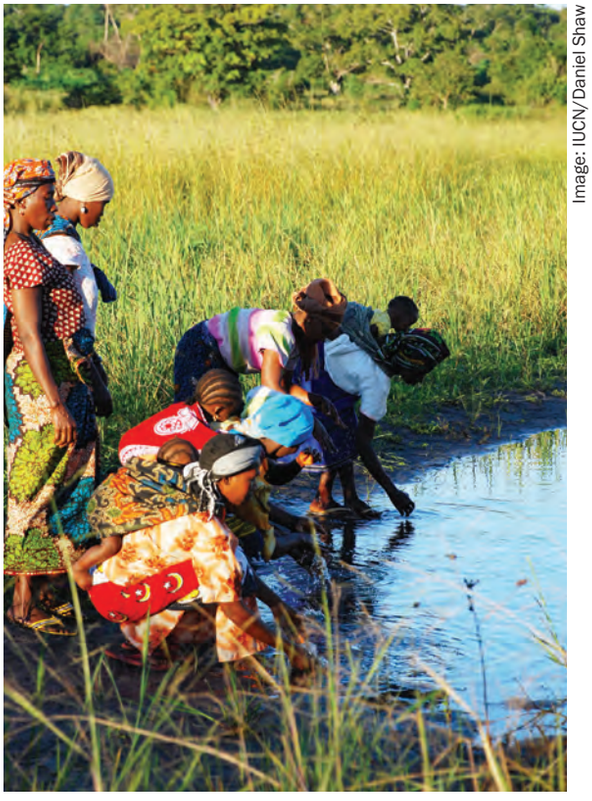


Image: IUCN/Daniel Shaw

Women drinking at water source in forest landscape, Tanzania. Safe water supplies result from forest protection

Image: IUCN/Samuel Kofi Nyame

Sorting cola nuts, Ghana

Image: IUCN/Gill Shepherd

Children in Kamaso forest village, western Ghana

Government foresters with local knowledge and priorities. Local communities are carrying out forest regeneration projects, resulting in improvements in forest structure, quality and function.

There are other positive outcomes. A permit for harvesting timber has been secured — the first to be issued in more than 20 years — and a new system of harvesting fuelwood has been established. Community-based cooperatives are being set up to develop the market potential of forest goods and services, with the aim of increasing and diversifying local livelihoods in the long term.

Scaling up

In a landmark result indicating the influence LLS has had in catalysing transformative change beyond the working landscapes, IUCN was delighted to hear in August that the party secretary of Beijing Municipal Government has recommended to the Beijing Municipal Parks and Forestry Bureau that a scaling-up plan be devised, following the Miyun model.

LLS is consistent with our work elsewhere on promoting and facilitating community-based, locally-controlled forests, which we see as key to sustainable forestry reaching its global objectives. At IUCN, with our partners, we have been working on many varied examples of this and in many cases we have found that, in addressing the issues of local rights and tenure of forested landscapes, it is often small, subtle changes that can unleash wide-scale, positive transformation.

In the area around Mount Elgon in Uganda, for example, we worked with the local community and partners and authorities on locally developed land-use by-laws, which went on to gain Government recognition and approval. This resulted in multiple benefits, including significantly increased agricultural yields, decreased soil erosion and reduced sedimentation. It also reduced tensions between stakeholders and neighbouring communities.

These are just some of the many outcomes that IUCN is proud to highlight from a very important year for forests, all of them made possible through the invaluable contributions of IUCN's members, partners and Secretariat.

Keeping the focus on forests

Although 2011 was a globally celebrated year for forests, of course every year is vital for the world's forests. IUCN will continue to build on its current success in the conservation of the world's forests and their enormous, irreplaceable contribution to the survival of biodiversity and human society.

Much work remains to be done and the potential is truly enormous. We know, from our work with the Global Partnership for Forest Landscape Restoration,[2] that the potential for working via innovative landscape restoration is truly enormous: more than 2 billion hectares have been identified worldwide. That is approximately equivalent to an area twice the size of Europe and represents a staggering opportunity for forests and all of us who depend on them and benefit from them.

Forests and people in the United States

Thomas L. Tidwell, Chief of the US Forest Service, US Department of Agriculture

America's forests tell a story of change. The forests first encountered by wanderers from Asia about 15,000 years ago were nothing like today. Many species of plants and animals are now extinct, and as trees and other plants advanced before the retreating Pleistocene glaciers, they gradually created the forest mosaics familiar today. Ponderosa pine, for example, now common across the Western United States, arrived in some locations only about 2,000 years ago.

Early human impacts

Aboriginal peoples cleared land for agriculture, cut timber for housing, maintained canebrakes and shrubfields for basketry and cultivated oak, walnut, hickory, chestnut, blueberry and other plants. They used fire to create and maintain prairie and open woodland for hunting and other purposes. By the 1600s, they were connected to European fur markets, contributing to great wars and population shifts; on the Great Plains, they tamed feral horses from Spain, created nomadic cultures around bison and used fire to stimulate forage.

The Europeans brought diseases that ravaged tribal peoples. Entire regions were depopulated by the effects of war and disease, allowing forest succession in places where it had been checked by aboriginal fire. American Indian fire use was suppressed in some places but mimicked in others for resource benefits, such as maintaining forage and mast nuts for cattle and pigs. Settlers also brought fire to landscapes where it had once been rare.

Frontier fire was connected to deforestation. As settlements expanded, the United States lost much of its original forest estate. In 1607, when the English first settled in Virginia, about half of what would become the United States was forested; by 1907, it was about a third. Roughly 100 million hectares of forest were lost, and nearly two thirds of that loss came in the second half of the 19th century due to forest clearing for timber and agriculture. The damage was mainly east of the Mississippi River — but now it threatened the West as well.

Image: USDA Forest Service

Privately logged timberland near Leadville, Colorado showing erosion due to deforestation. This area later became part of the San Isabel National Forest, Colorado

Image: USDA Forest Service

Wallowa Whitman National Forest, Oregon

The conservation movement

In 1891, concerned about timber shortages, floods, erosion and siltation resulting from deforestation, the US Congress authorized a system of Federal forest reserves. In 1903, President Theodore Roosevelt established the first national wildlife refuge to protect vanishing habitat for birds and other wildlife. Growing public demand for outdoor recreation and heritage protection gave birth to the National Park System in 1916. Lands in the public domain that never passed into private ownership became a system of public lands administered by the Bureau of Land Management, founded in 1946. Smaller Federal land systems are administered by the US Departments of Commerce, Defense and Energy and many forest lands, especially in the West, are owned by American Indian tribes. More than a third of America's forests are on tribal or Federal land; another tenth are administered by State, county and municipal governments.

US citizens have generally embraced conservation, including the need for protected areas. Large, flourishing national and State forests are scattered across the East on lands once devastated by logging, fires, floods and erosion. In the West, public lands protect some of the world's oldest and largest trees — giant sequoias and redwoods, as well as cathedral-like rainforests dominated by Douglas firs and western hemlocks. In biodiversity hotspots such as California and the southern Appalachians, public lands provide key refuge for rare and sensitive species. The United States also has 44 million hectares of wilderness areas untouched by civilization.

But by far the largest proportion of US forest land — 56 per cent — is in private hands; in the East, it is 83 per cent. Responsibility for regulating private forest management lies with the States, whose forestry laws vary widely. Still, the role of the USDA Forest Service is vital in forestry nationwide. With roots in the Division of Forestry established in the US Department of Agriculture (USDA) in 1876, the Forest Service was founded in 1905 to manage the Federal forest reserves, which became the national forests and grasslands, intended partly to model sustainable forestry. The agency also works through the States to provide private landowners with technical and financial assistance for sustainable forest management. In addition, the USDA Forest Service makes conservation-related science and information available, including more than 30,000 publications online. Across the United States, the cooperative foundations for sustainable forestry are strong, and the US forest estate has stabilized at about 300 million hectares.

Benefits from forests

Until the mid-19th century, almost all of the nation's energy came from wood. More than 60 per cent of the population lived in rural areas, and many people depended directly or indirectly on forests for their livelihoods. Wood and forests were vital in almost every sector of the economy, including agriculture, construction, shipbuilding, mining, manufacturing and transportation. Without railroad ties and trestles, for example, the United States might never have entered the industrial age.

Forests remain a vital industrial resource. Eighty per cent of the US population now lives in metropolitan areas, consuming three times more wood per capita than the global average, but most of the need is domestically met: the United States remains by far the world's largest producer of wood. The Southern States alone, from Virginia to Texas, constitute the world's single largest wood-producing region. In 2009, forest-related industries in the South accounted for the equivalent of about 350,000 full-time jobs, and the value of wood products from the region was more than US$115 billion.

Nevertheless, the greatest forest-related contribution to the US economy comes from outdoor recreation. A study in 2006 found that the active outdoor industry on all lands nationwide contributed about US$730 billion annually to the US economy, supporting around 6.5 million jobs. Forests also provide an array of ecosystem services, such as protecting and purifying drinking water. US citizens get more than half of their water from sources that originate in forests. The annual value of the water from the National Forest System alone has been estimated at more than US$7.2 billion for both instream and offstream uses.

Challenges ahead

Today, US forest resources are at grave and growing risk. In response to rampant fires, conservation agencies in the last century cooperated to suppress wildland fire. They effectively excluded fire from many landscapes where frequent low-severity fires had maintained open mosaics of forest, woodland and grassland, resulting in closed forests prone to catastrophic fires. Since the 1990s, the United States has reversed much of the

Image: USDA Forest Service

Green Mountain National Forest, Vermont

damage through ecological restoration. However, the following challenges remain:

- Climate change has contributed to regional drought while worsening wildfire severity. From 2000 to 2008, at least 10 States had their largest wildfires on record. With development pushing homes and communities into fire-prone forests, almost 70,000 communities are now at risk from wildfires, and fewer than 10 per cent have a community wildfire protection plan
- Beetle infestations have proliferated across 16 million hectares since the late 1990s, leaving entire landscapes full of dead and dying trees
- Non-native insects and diseases are attacking major forest trees across the nation, and more than 40 million hectares of rangeland have been degraded by invasive weeds
- Urban growth and development are threatening private forests with land use conversion and habitat fragmentation. From 2000 to 2030, substantial increases in housing density are predicted on about 23 million hectares of forest land, threatening rare and sensitive species
- Food and energy prices are rising around the world, and biofuels are becoming feasible as an energy source.

Ecological restoration and landscape-scale conservation of forests

In 2010, in his America's Great Outdoors initiative, President Barack Obama called for an all-lands approach to protect working farms, ranches and forests. The focus is on sustaining and restoring healthy, resilient forest ecosystems. For example:

- In 2009, the US Congress established the Collaborative Forest Landscape Restoration Program, authorizing the USDA Forest Service to use up to US$40 million per year to leverage local resources through 10-year projects to improve watershed conditions, restore landscape resilience and reduce the risk of catastrophic wildfire in high-priority landscapes. The first projects cover more than 0.7 million hectares in nine states
- In densely populated New England, the Quabbin-to-Cardigan partnership is working to protect the Monadnock Highlands, an area stretching across 160 km in Massachusetts and New Hampshire. Twenty-seven private organizations and public agencies are working together to conserve the region's largest remaining area of intact, interconnected habitats. Another goal is to protect the headwaters of rivers that supply drinking water to almost 200 communities, including the city of Boston
- Ecoregional initiatives include longleaf pine restoration in the South. Fire-adapted longleaf pine, which once covered more than 36.4 million hectares from Virginia to Florida and Texas, now occupies less than 3 per cent of its original area, most of it badly degraded. As a result, 29 animal species that depend on it are severely threatened. Private and public partners are working across the South to restore longleaf pine to over 9 per cent of its original area over a 15-year period.

An ecosystem services approach

Restoration treatments typically focus on restoring the functions and processes of healthy, resilient ecosystems. Ecosystem services from forests include supporting services such as soil formation and primary production; provisioning services such as wood and water delivery; regulating services such as pollination and carbon sequestration; and cultural services such as outdoor recreation. An ecosystem services approach has multiple advantages:

- It puts people at the centre of conservation. Management activities are designed to maintain or enhance services because people want and need them
- It fosters cross-jurisdictional collaboration. Based on mutual respect, stakeholders work together across shared landscapes
- It accounts for change. A 'restored' ecosystem might not mirror the original landscape, but it will continue to provide a broad array of ecosystem services

Image: Ken Hammond, USDA

Superior National Forest, Minnesota

- It accounts for the true value of ecosystems. Managers measure the stocks and flows of ecosystem services and ensure that the people who rely on them know their value and the cost of losing them.

Through careful market manipulation, the value that people get from ecosystem services can be translated into cash. One way is through forest certification, which draws on the willingness of consumers to pay a premium for wood generated from sustainably managed forests. Enrolment in certification programmes has been growing in the United States, especially for State and private industrial forest land. However, 42 per cent of forest land is in the hands of family forest owners, only 9 per cent of whom listed timber as an important management objective in a survey held in 2003. Less than 2 per cent of their lands are enrolled in certification programmes.

Another way of generating income from ecosystem services is through cash payments. In the Pacific Northwest, for example, municipal and industrial discharges have raised river temperatures above levels tolerated by salmon and other native fish. The States have begun enforcing water temperature limits by issuing discharge permits that require the installation of costly refrigeration units at the end of discharge pipes. In Oregon, a State/Federal partnership has developed a scientifically sound method of cooling rivers by planting trees along stream banks, making it possible for cities to pay upstream landowners to plant and maintain vegetation along streams. This method provides twice as many water temperature benefits at a third to one-half the cost of refrigeration units.

Payments for ecosystem services can involve Federal/local partnerships. In Colorado, for example, the USDA Forest Service has formed a partnership with the city of Denver to use municipal funds to restore forests that protect municipal water supplies. The Hayman Fire of 2002, the largest in Colorado history, severely damaged Denver's municipal watershed, which lies on a national forest in the Rocky Mountains. The Denver water board has made a five year commitment to match the USDA Forest Service's own US$16.5 million investment in treatments to restore and protect Denver's municipal watershed.

A land ethic

Protected-area management has long been a cornerstone of conservation in the United States. Sound ecosystem-based land management, especially in an era of climate change, is cross-jurisdictional, promoting partnerships and collaboration across landscapes and watersheds. In the end, the story of forests in the United States is about the people who own, manage, and use them. The outcome will depend on how they choose to relate to the land.

Forest resources and activities in Turkey

Dr Mahir Küçük, Deputy Undersecretary of the Ministry of Forestry and Water Affairs, Turkey

The vital role that forests play in the protection of biological diversity is incontrovertible, in addition to the fundamental function forests have in regulating water supplies, which is of great importance to communities and the environment, protecting soil and preventing environmental pollution.[1] Turkey has a significant potential resource in terms of biodiversity and protected areas (PAs), which have increasingly gained importance at national and global level and are among the priority goals of the Turkish forestry sector.

Relations with the European Union

As part of Turkey's pre-accession strategy to prepare for EU membership, there are moves to bring the Turkish forestry sector in line with European standards. One of the main differences between forestry in the European Union and in Turkey is that 65 per cent of forest land in Europe is private while 99.9 per cent in Turkey is owned by State, the majority of it managed by the General Directorate of Forestry (GDF).[2] Articles 169 and 170 of the Constitution of Republic of Turkey determine that the State shall enact the necessary legislation and take precautions for the protection of forests and their extension as well as the protection and development of the forest inhabitants.

Image: Aykut Ince

Forest are protected, developed and managed by the State in Turkey

Turkey's forest area covers about 21.4 million hectares (ha), which constitutes 27.4 per cent of the overall land area of the country. Almost half of its forests are coniferous and the other half are dominated by broadleaf trees, which are very rich in biodiversity. The total growing stock of trees amounts to 1.3 billion m^3.[3]

Protection of forests

Throughout history, forests in Turkey have been exposed to various negative impacts. However, nowadays there is a decrease in the illegal interventions that forests have traditionally been subject to. This tendency may be due to the decline in rural population, growing public environmental awareness, the rising cost of agricultural inputs and the substitution of other items for forest products.

Turkey's forests located in the Mediterranean climatic zone are seriously threated by forest fires, especially in the scorching summer. Approximately 12 million ha of forest area in the country are located in regions vulnerable to fires.

The most common cause of forest fires in Turkey is human-induced activities. Within the last decade, 7 per cent of forest fires have been started by lightning, 5 per cent by accidents, 13 per cent by deliberate actions, 25 per cent through unknown causes and 50 per cent by negligence. Renovating communication systems, increasing the number of fire towers and purchasing aerial vehicles and new equipment are some of the measures taken to prevent fires and Turkey has a good record of success in this.

Forest management services

Forest Management Plans have been prepared for 10-20 year periods and implemented at forest sub-district level (the smallest administrative unit) since 1963. Management plans for up to 2 million ha of forest area are renewed annually. A functional approach to management plans has been adopted since the last quarter of the 20th century, taking into account the environmental and socio-economic functions of forests.

Image: Aykut Ince

Almost half of Turkey's forests are coniferous

A project on Development of Forest Management Planning and Resource Information Systems in Turkey led to the establishment of a foundation for Forest Resource Information Systems and a model for Geographical Information Systems (the latter still in development). Additionally, several studies have been launched, such as a forest state assessment with satellite photographs and appropriate forest inventory, definition of protected areas and development of a digital map archive system, including preparation of maps for different purposes. Turkey began to share its knowledge and experience with many countries, especially its neighbours, such as Syria.

The maintenance and rehabilitation of forests

Throughout the country, silvicultural activities are being carried out to ensure forest health and maintenance, with a view to improving ecological and economic balance. In accordance with the management plans, which are developed based on age classification, regeneration has become an important subject of forest management.

Rehabilitation of forest areas, approximately half of which are degraded, is the main priority for forestry activities in Turkey. In the framework of action plans prepared since 2004, activities have been carried out to preserve and restore the existing forest areas by conserving resources in burned or destroyed areas as well as protecting biological diversity.

The Action Plan for the Rehabilitation of Degraded Oak Areas aimed to rehabilitate 20,000 ha of degraded oak forests per year and the Action Plan for the Rehabilitation of Degraded Cedrus Areas, which is intended to rehabilitate about 10,000 ha of degraded cedrus forests, was prepared and implemented for the period 2005-2014.

Utilization of forest resources

The productive areas of Turkey's forests account for 10.7 million ha and the annual increment obtained from these areas is 37.4 million m^3 (coppice forests cover 1.6 million ha). In Turkey, 18.5 million m^3 industrial wood and 6.5 million m^3 fuelwood are consumed, and 70 per cent of industrial wood and 85 per cent of fuelwood are derived from the State-owned forests. The supply deficit is met through private sector production and imports. State-managed forests produce 10 million m^3 industrial wood and 5.8 million m^3 fuelwood per year.[4]

Over 90 per cent of the industrial wood production from non-state forests derives from poplar production. However, there is no reliable figure for production and consumption of fast-growing plantations such as poplar and *eucalyptus*, since there is no

Image: Aykut Ince

Turkey has had great success in combating forest fires

record of the production of these species. The increased demand for non-wood forest products (NWFPs) as well as the rise in quality and quantity of raw materials needed means that there is an urgent need for development and promotion of Turkey's forests.

When examined in terms of tree species, 77 per cent of the production of the GDF comes from coniferous trees, with pinus species constituting 80 per cent of this. On the other hand, beech trees are predominant among broadleaf species.

Forest-village relations

There are 7.1 million people who depend fully or in part on forest resources for their livelihoods, living in 20,974 forest villages in and around forests. Because they cause pressure on forest resources by using them in an unsustainable way, these villagers are key actors in forest-community relations.

In recognition of the significant role of forest villagers, the General Directorate of Forest-Village Relations (ORKOY) was established in 1970 with a view to contributing to socio-economic development, strengthening the relationship between forestry administration and villagers and increasing the success of technical implementations in forestry.[5] ORKOY prepares development plans and provides credits to individuals, cooperatives and village communities.

Afforestation and erosion control

Around 2.2 million ha of the country's forests is appropriate for industrial afforestation. In order to meet the growing need for seeds to use in afforestation works, priority is given to the selection of seed stands and the establishment of seed orchards. Today, the number of selected seed stands amounts to 338, including 27 species, and the stands cover 45,868 ha. Most of the seeds of pinus brutia, pinus nigra and pinus sylvestris used in afforestation are supplied from clonal seed orchards. To date, 1.91 million ha has been afforested.

When taking into consideration the climate, topography, geology, hydrology, vegetation, features of rangeland and forest lands as well as population in Turkey, it is likely that the country will be affected by desertification. As much as 79.43 per cent of the country's land area is exposed to moderate, severe and very severe erosion and approximately 346 million tons of sediment is carried by streams per year.

Çakıt River Erosion Control Project (started in 1982) is a comprehensive and successful study involving 39 villages. East Anatolian Watershed Rehabilitation Project is another important initiative, which was implemented in 11 different provinces. This project

Image: Aykut Ince

Forest villagers are key actors in forest-community relations

took place between 1993 and 2001, involving rehabilitation works such as soil protection afforestation on 73,156 ha, rangeland rehabilitation on 19,882 ha, oak rehabilitation on 2,240 ha and cedrus rehabilitation on 1,687 ha.

Private afforestation works in Turkey, which started in 1986, had extended to 50,011 ha by the end of 2010. As a result of amendments made to the articles of the Afforestation Regulation, which incentivizes these works, a substantial increase in afforestation has occurred recently.

National parks in Turkey

In Turkey, 41 parks covering 808,172 ha have been declared as national parks since 1958. In addition, 17 natural parks, 34 nature protective areas and 102 natural monuments have been declared as PAs, covering 69,505 hectare in total. Of the 1,374 wetlands of international importance in the world, 135 are in Turkey.

Turkey has 9,000 plant species, 160 kinds of mammals, 454 bird species, 150 reptile and amphibian species and over 400 fish species. There is an urgent need to place some restrictions on the use of these resources.

Research in forestry

In Turkey, studies on forestry research are being carried out by 11 directorates of forestry research and faculties of forestry. In various parts of Turkey, ten research forests were established in order to carry out these studies.

The Turkish National Tree Rehabilitation and Seed Production Programme was implemented in 1994 and a selection of genetic conservation forests have been established since then. The aim to is conserve the genetic diversity of forests and to ensure that these values will be passed on to the next generation. Genetic conservation forests, nature conservation areas, national parks and natural parks are different from those protected without any interventions. In this regard, 172 seed orchards have been established to date over 1,200 ha as well as 13 clonal parks covering 29 ha.

Education and advertising activities

The first Turkish education in forestry was given in a 'Forest School', which was founded in 1857 in Istanbul, and training in forestry continued in several schools with different names. Today, there are nine forestry faculties at various universities.

Legal arrangements have been made to increase public awareness of the importance of forests. Law no. 4122 regarding National Afforestation and Erosion Control Mobilization called for the Turkish Television

Image: Aykut Ince

Turkey enjoys rich biological diversity

and Radio Institution (TRT) and other private radio stations and television channels to broadcast programmes and advertising activities at their own cost, to encourage a love of forest and trees. For this reason, World Forest Day on 21 March and National Tree Week was also celebrated across the country, and several awareness-raising activities were organized and broadcast in the framework of these events.

A long-term vision for the role of the Turkish forestry sector can help to formulate the agenda for sectoral change. The principal goals of forest development in Turkey have included sustainable production of forest products and services, poverty reduction, employment generation and environmental conservation. Realization of these goals in the context of strengthened economic discipline would be likely to lead to the following:

- Multipurpose planning and management of forest resources to provide multiple benefits (environmental, social, economic and cultural) at local and national levels and on a sustainable basis
- An increase in forest areas managed with a main objective other than timber production
- Expansion of areas set aside for national parks and protected areas to cover a representative range of Turkey's natural ecosystems, and extension of approaches already piloted to involve local people in management
- A significant rise in the levels of reforestation and rehabilitation undertaken annually on degraded forest lands, with the active involvement and contribution of local communities and other stakeholders. Joint management of many of these areas with rural communities to meet local demands for firewood, grazing, erosion control and non-timber forest products, employing forest management practices that conform to the principles of sustainable forest management
- Growing public awareness and sensitivity leading to a policy, legal and institutional framework for sustainable management of forest resources in the overall interests of Turkish society.

Efficient conservation and sustainable management of Turkey's forest resources will make an important contribution to sustainable forest management values at regional and global levels, in accordance with Turkey's commitments under the relevant global conventions and international processes.

With thanks to the Foreign Relations, Training and Research Department of General Directorate of Forestry

Mexico's forestry policy

Juan Manuel Torres Rojo, Director General of the National Forestry Commission, Mexico

Natural resources are a primary foundation for the life of a country's people and the promotion of competitiveness and economic development. The conservation of ecosystems and the environmental functions they perform are fundamental in the design and implementation of a comprehensive sustainable development strategy.

Mexico has large areas of forest vegetation in which a significant percentage of the planet's biological diversity exists and develops. Also, millions of people live in these areas and their livelihoods depend directly on forest resources.

During the last century, forest resources and their services were underestimated, neglected by national public policy design and lacking recognition by society. The result was a loss of natural capital, a decline in productive opportunities and deterioration of quality of life for the owners and holders of the country's forest and jungles.

Today, the scenario is completely different. The Federal Government and large segments of society have prioritized maintenance of the forest ecosystem's integrity and its associated resources, not only because of their environmental, social and economic benefits, but also as reservoirs of cultural diversity that identify our country and provide a foundation of welfare for their owners and holders and all people living in them.

Social participation has been a key point in the national forest policy vision because forestry activity is not just important for those directly involved, owners

Image: CONAFOR

Cascadas de Agua Azul waterfalls, considered as a natural protected area located north of the State Chiapas, Mexico

and dwellers. Moreover, recognizing that ecosystems produce public goods, their sustainable management and conservation is a responsibility shared by all sectors of society, including industry, civil organizations, academic and research institutions and social groups. In recent decades all these groups have been incorporated in the decision-making process through different agencies and consultation mechanisms within the sector.

In this context, the Ministry of Environment and Natural Resources, through the National Forestry Commission (CONAFOR), has been a strategic authority in the development and implementation of forest policy, which is currently reflected in, for example, the sector's support programmes, conservation and high-productivity issues, cross-cutting issues, training, technological development and international relations.

The National Forestry Commission, notably in the current administration, has determined an integration strategy through the ProArbol Program, whereby resources are provided to those who implement forestry projects. Its design takes advantage of the synergy between projects, which stimulates people to improve their productive integration, and also enables the targeting of all projects to take place where they represent the greater potential for profit, in accordance with each of their objectives. At the same time the ProArbol operational scheme ensures transparency in the allocation of resources by the Government and the proper use by the beneficiaries.

This favourable change towards stronger public policy in forestry is accompanied by a historical increase in the budget for the sector. In 2001, when CONAFOR was established, the budget was 392.4 million pesos which, by 2010, was 13 times higher at 5,252.9 million pesos.

Some of the priorities and results for the country's forest area, handled with ProArbol's comprehensive instrumentation, are described below:

Reduced loss of forestry surface

The Global Forest Resources Assessment 2010 report conducted by the Food and Agriculture Organization of the United Nations (FAO) indicates that Mexico is not part of the group of countries with higher levels of deforestation and is currently one of the nations with massive reforestation efforts and recovery of disturbed surfaces.

The update on the study, Dinámica de Cambio de los Recursos Naturales (Dynamics of Change in the Forest Resources), for the country during 2002-2007 by the National Forestry Commission with a projection to 2010, estimates that 2000-2005 saw an average annual deforestation of 235,000 hectares of forest and jungle, while 2005-2010 reported an annual average of 155,000 hectares.

Image: CONAFOR

Indigenous women working in a forest of Oaxaca. The whole community participates in forest health activities

A curtain of mist covers a Mexican forest in the state of Durango

The national goal is to achieve a zero balance of emissions associated with changes in the use of forest land by 2020.

Restored forestry ecosystems

From 2001 to 2010 the Federal Government promoted the implementation of conservation and restoration works in 569,621 hectares and the reforestation of 2,324,478 hectares. Moreover, through compensation due to change in land use, from 2005 to 2010 conservation and restoration works were carried out and 79,292 hectares were reforested and protected.

In 2009, as part of the tools development to support the forestry sector, target criteria were established to prioritize strategic areas. As a result, a Forest Restoration Program in Hydrological Basins was created, establishing a new restoration strategy for recovery and restoration of conditions which promote the evolution and continuity of the natural processes of the forest areas in priority watersheds, aimed at people living in these regions or with natural resources in them.

Payment for environmental services (PES)

The PES programme was created as an economic incentive for the forest landowners. These services are created in order to offset the costs associated with conservation and good practice in their lands. This programme is internationally recognized for its design and the surface area that it protects.

The programme began in 2003 and has since developed significantly. It is currently applied in strategic areas and recognizes the different ecosystems that are being protected, which is reflected in differentiated payments per hectare.

Today, as part of the evolution of the PES scheme and in order to be accepted by the producers and the hydrological service users, the creation of local funding mechanisms is encouraged, under a watershed vision or through development of biological corridors as priority areas for conservation of forest ecosystems (through matching funds). It is a primary strategy in the development of local markets for ecosystems services. In 2008-2010, with this funding, users of environmental services provided more than 141 million pesos for local schemes within the PES programme, covering an area greater than 153,000 hectares. This scheme (which combines federal, state and local financial resources),

Image: CONAFOR

Image: CONAFOR

The Mexican Territory offers visitors a range of ecotourism attractions

is already a real and successful option for forest ecosystem conservation.

With PES (from 2003 to 2010), more than 2,921,000 hectares have been incorporated, including the protected area through the mechanism of matching funds. Around 5,565 million pesos have been invested for the benefit of more than 5,400 ejidos, communities and small forest landowners. Due to the areas involved and the results, Mexico's PES is a leader in Latin America.

Strengthening the community forestry model

CONAFOR programmes have strengthened the social capital of communities and ejidos by supporting the planning processes of the use of forest land through studies of community land guidelines covering more than five million hectares and modification and development of the ejidos' regulations and community statutes to define the internal arrangements for the use and access of the natural resources and the diversification processes of forest management.

The Project for the Conservation and Sustainable Management of Forest Resources in Mexico (PROCYMAF), created in 1997 to promote community forestry, was incorporated into CONAFOR in 2002. Between 1997 and 2003, PROCYMAF supported around 400 ejidos and communities in six states, with an investment of 140 million pesos. In the period 2004-2010, CONAFOR supported 1,650 ejidos and communities in 12 states for forest development projects — which represent 55.1 per cent of the communities and ejidos in the country engaged in forest activities — with an investment of 338 million pesos. In 2011, the coverage of this support was extended to all 32 states in Mexico.

In addition to direct and indirect economic support, the momentum of this forestry model has expanded markets for goods and services produced by the agricultural and forest environment and improved the level of vertical integration of community companies. As a result, the value chain of goods and services produced in the agricultural areas has improved. Moreover it has contributed to management and organizational development (between and within communities) and the conservation and maintenance of the natural capital of Mexico.

A forest industry worker prepares material for making huts

Strengthening of sustainable forest development schemes

In terms of productivity and competitiveness momentum in the medium term, the Mexican forestry sector has made progress to continue the consolidation process. One strategy is to increase the area under management; which can take advantage of sustainability criteria of the forest resources. Between 2001 and 2010, the Federal Government supported forest technical management studies (timber, non-timber and wildlife) covering 18 million hectares.

In order to improve competitiveness in the forestry sector, support is provided in the timber industry for the purchase of equipment for production and processing, for road rehabilitation, capacity-building, organizational skills, and marketing for forest products.

To seize the opportunities in global competition, the Integración de las Cadenas Productivas programme enables the effective exploitation of comparative advantages in the forestry sector.

In terms of commercial forest plantation, Mexico has great potential for growth and the possibility to recover low agricultural productivity land back to forest use. To 2010, 180,000 hectares of these crops had already been established, of which two thirds are timber, estimating a total timber production of 26 million cubic metres in the next 20 years and 60,000 tons of non-wood raw materials. To promote the development of financing options, a National Forestry Fund was created to support the investors with clear advantages and guarantees under a scheme that is also attractive to financial intermediaries. This fund starts with 500 million pesos, capital which can be enhanced up to 1,130 million pesos for 25,000 hectares of estimated commercial forest plantations.

Undoubtedly, with the progress made since 2001, and particularly since 2007, Mexico has managed to establish a route to sustainable forest development, characterized at the global level, for its achievements in forest conservation issues. Despite the challenges faced in this area, our country is currently one of the nations with the largest area of first-growth forests and is also one of the five nations that had the largest decrease of first-growth forests in the last 20 years. According to FAO, Mexico has the sixth highest annual increase in the planted forest area for the period 1990-2010, with 178 thousands hectares, and has the sixth largest afforestation and seventh largest reforestation areas, with an average of 247,600 hectares per year.

Vision for the future

Even with the progress achieved through the implementation of sustainable forest development, Mexico has important challenges ahead, such as to consolidate and improve forest policy and consolidate the successful implementation of the REDD+ National Strategy in order to maximize benefits for owners and holders of forest land, while contributing to reduced deforestation and degradation of the forest ecosystems. The vision of sustainability that is the basis for forest policy seeks at all times the improvement in quality of life of individuals and thus ecosystems, and as such is the main motivation for improvement and consolidation in facing present and future challenges.

Afforestation in Israel — reclaiming ecosystems and combating desertification

David Brand, Itzhak Moshe, Moshe Shaler, Aviram Zuk and Dr Joseph Riov,
Department of Forestry, Keren Kayemeth LeIsrael-Jewish National Fund

Humans have lived in all regions of Israel since before Biblical times, with varying degrees of success. However, in the last hundred years, human activities and over-exploitation of natural resources have produced severe land degradation, erosion and salination.

Since its establishment in 1948, the State of Israel has embraced sustainable land management and has adopted public policies designed to restore, develop and manage its natural resources. About 240 million trees have been planted and regulations have been introduced to control grazing and ensure effective water management. Due to these activities, Israel is one of the few countries in the world that has more trees now than it had a century ago.

After the first pioneering stage of afforestation in Israel, which was initiated at the beginning of the 20th century, the Israeli Forest Service, Keren Kayemeth LeIsrael (KKL), launched a policy that encouraged the adoption of sustainable forest management practices for planted forests.

In 1995, the Israeli Government ratified a new National Master Plan for Forests and Forestry (NMP 22). Approval of this plan expanded KKL jurisdiction to areas beyond those of the planted forests, giving a statutory status to around 8 per cent of Israel's land. The plan affects 160,000 hectares (ha) of existing and proposed forest lands, covering approximately 7.3 per cent of Israel's total land surface which is 22,000 km^2. Five categories of forest type were assigned by the plan as follows: planted forest (65,900 ha, 41 per cent); natural forest (60,000 ha, 37 per cent); park forest (26,600 ha, 17 per cent); coastal park forest (4,200 ha, 3 per cent); and riparian plantings (3,900 ha, 2 per cent). These forest lands are distributed as follows: 59 per cent in the northern and central Mediterranean regions and 41 per cent in the semi-arid southern region.

Following many applied studies related to Israel's semi-arid and arid zones, KKL developed advanced methods to harvest runoff water for the benefit of the trees planted in these areas. Advanced studies carried out in KKL forests in the semi-arid region demonstrated that the carbon sequestration rate in these forests is similar to that recorded in temperate forests in central Europe. These findings underscore the importance of establishing forests in semi-arid zones to reduce the greenhouse effect in addition to its contribution to the local residents' amenity.

KKL forestry operations focus on four main areas:

- Afforestation and reforestation in Mediterranean and semi-arid zones
- Ecosystem goods and services from planted forests
- Community forests
- International cooperation and capacity-building.

Image: KKL Archive

Afforestation in semi arid zone: Hiran Forest 1998 (left), 2008 (right)

Image: KKL Archive

Thousands of scenic roads, observation points, hiking and biking trails and natural parks have been developed

Afforestation and reforestation in Israel's Mediterranean and semi-arid zones

Israel is divided into three phytogeography regions: the Mediterranean region, the Irano-Turanian region (semi-arid) and the Saharo-Sindi region (arid). The Mediterranean region has a yearly average rainfall of over 400 mm, which in the North may reach 1,000 mm or more. The mean annual temperature is 19º C. This area is characterized by natural Mediterranean oak trees, pistachio, Aleppo pine and carob. The Irano-Turanian region extends from the Beersheba district in the Northern Negev to the high elevations of the Negev Mountains. The average rainfall in this region ranges from 150 to 400 mm and the mean annual temperature is 20-23º C. Isolated pistachio (*Pistacia atlantica*) and Christ's thorn (*Zizyphus spina-christi*) are native to this region. The Saharo-Sindic region extends in the south up to the Red Sea, and includes the southern part of the Jordan Rift. The average annual rainfall varies in this region from 25mm to 150 mm and the mean annual temperature is 25º C. Tamarisks grow sporadically or in groups in the sandy and partly salty soil and *Acacia* in oases and wadis.

Afforestation and reforestation in the Mediterranean region

The first generation of the afforestation project in the Mediterranean region was mainly based on pure, even-aged Aleppo pine forests, which were established on hills and mountains. Aleppo pine was later replaced by brutia pine because of its susceptibility to pests. In the coastal plain and valleys, *eucalypts* dominate the planted forests, which were the outcome of a massive national programme to reclaim and restore Israel's degraded Mediterranean landscape. Over time, a more complex set of forest stands evolved resulting from the re-colonization of native tree and shrub species into the understory, the diversification of simplified stand structures, and the planting of mixed species.

A 'near-native' type of forest ecosystem is currently evolving, embodying elements of the pioneer afforestation plantings, mostly pines, along with a regenerating native Mediterranean oak maquis.

Afforestation in semi-arid regions

Afforestation is practised on a large scale in the semi-arid regions of Israel as part of the effort to combat desertification and to rehabilitate degraded areas, as well as to provide ecosystem services for the people residing in the Negev, the Southern region of Israel. It is based on planting drought resistant species and on proper management of soil and water resources. There are two main planted forest types in the Northern Negev, depending on the topography and soil characteristics. The first type is common pure, even-aged Aleppo pine forests, mostly planted on hilly slopes. These forests were densely planted in the past, about 3,500 seedlings per hectare. Today, the planting density is about 1,500 seedlings per hectare. These forests are gradually thinned to leave only 300 to 500 trees per hectare. The second type is sparse planting ('savanization') of native species such as *acacias* and tamarisk, and exotic species, mostly *eucalypts* — up to 200 seedlings per hectare, on moderate slopes, plains and valleys.

This type of forest depends on water harvesting, based on ancient methods used by farmers in the Negev for food production. Today, modern techniques and knowledge provide the soil with the moisture needed to grow planted trees, natural shrubs and herbaceous vegetation. Runoff water, harvested on slopes along

Image: KKL Archive

The oases and wadis are home to groves of trees that provide welcome shade to people and animals

contour terraces, is a renewable and sustainable resource, which can be provided to the planted sites even during droughts. Terraces are up to 0.7 metres high and the distance between terraces ranges from 8 to 25 metres. Excess runoff water flows through a spillway system, avoiding erosion damage during extreme rain and flood events. Trees and pasture are developed along the terrace.

In areas with rainfall below 100 mm, trees are planted in limans (ponds) constructed in wadis and valleys. Limans are dammed sites, into which floodwater flows to the planted trees. The area of limans usually ranges from 0.2 to 0.6 ha and is supplied by watersheds 10-100 times as large. They can be used for recreation, fuel or shade.

Implementing water harvesting methods and afforestation on a watershed scale provides a means for flood and erosion control. Controlled grazing reduces fire hazard and provides additional runoff for planted trees. Soil-conservation measures, such as gully head and bank control and proper drainage of cultivated areas, are major components in the rehabilitation effort.

Natural forests in Israel

Nearly one third of the forests in Israel are unplanted 'natural forests'. They are mostly composed of Mediterranean vegetation, similar to the Californian maquis or chaparral. In protected sites, there are large trees of the same species that grow in the maquis areas. This indicates that maquis formation is the outcome of centuries of overcutting, overgrazing and fires. Natural forests are mainly located in the mountain regions in the central and northern regions of Israel and cover about 40,000 ha. The main tree species in the maquis areas are oaks (*Quercus calliprinus*, *Quercus boissieri* and *Quercus ithaburensis*), *Pinus halepensis*, *Ceratonia siliqua*, *Pistacia palestina* and *Cercis siliquestru*m.

Ecosystem goods and services from planted forests

Israeli forests, both planted and natural, are multifunctional, ecological landscape systems, which are managed for multiple services to the public and ecology of their surrounding regions. The primary goal of KKL is to protect the planted and natural forest resources and maintain quality forested environments.

Timber production

In Israel, forests are not planted for timber production, but there has been some wood production as a result of forest management (thinning, sanitation operations and clear cutting after fires). The timber serves mostly for firewood and some industrial uses. As a result of the rising cost of fuel and other energy resources, the demand for firewood has increased significantly. In the last five years, a programme has been run in rural areas to provide families with free firewood from the forests. Non-wood/timber products such as mushrooms, fruits and herbs are also collected on a small scale.

Grazing pasture

Most of the forests in rural areas are used for grazing, mainly for cattle, but sometimes for sheep and goats. In open spaces, special groves are being planted to provide shade for animals as well as for honey production.

Recreation and tourism

KKL provides recreation and tourist services, park infrastructure and sustainable development for the more than 12 million people who visit the forests every year. Thousands of picnic sites, scenic roads, observation points, hiking and biking trails, playgrounds, natural parks and historic sites have been developed or reconstructed, all open to the public free of charge. KKL has initiated 'e-yarok', a green newsletter that offers information on activities, field trips and cultural activities in the forests.

Image: Moshe Shaler

More than 50 per cent of Israel's urban residents have visited the forests set up in partnership with KKL

Image: KKL Archive

Nature excursions provide opportunities for children to learn about sustainable forest management

Community forests

There is a growing need for urban forests and woodland around built-up areas in Israel. More than 91 per cent of the population in Israel resides in urban areas. Immigration to Israel, especially in the 1990s, has contributed significantly to the already high population growth rate and has created tremendous pressure on green open spaces, particularly on forests near urban areas.

The urban forests help to improve air quality, reduce city heat and radiation, maintain biodiversity, and create pleasant residential environments. In 2002 KKL assumed the strategic mission of improving the development and management of community forests in and near urban areas. The work is guided by the principle of partnership between residents and local authorities, increasing the likelihood that communities will maintain the forest for themselves and future generations.

Every community has its own forest team, which devises the forest vision and master plan and handles ongoing maintenance and publicity. Volunteers guide forest visitors on topics of botany, archaeology and environmentalism. Survey results show that more than 50 per cent of residents have visited nearby community forests for activities such as walking, biking or picnics.

The first community forest was planted in 1956 as a green belt around Jerusalem. By 1967, KKL had planted some million trees in the Jerusalem Forest, which today covers an area of 450 hectares. The forest has become the city's main site of nature excursions and recreation for city residents. In July 2011, there were 16 active community forests in Israel.

International cooperation and capacity-building

Over the years, KKL has actively cooperated with many countries and international organizations on a wide range of projects. KKL is at the forefront of technology in the following areas:

- Managing open areas and forests in semi-arid and arid regions
- Combating desertification
- Developing and implementing advanced methods for harvesting water runoff
- River and stream rehabilitation and water purification through wetlands and biofilters
- Land conservation through sustainable agriculture
- Research into and application of biological pest control techniques.

KKL shares and exports its knowledge and experience all over the world, and has participated in or sponsored numerous international conferences and workshops. Recent activities include a project with young adults in Rwanda, where KKL established a nursery and training programme that includes greenhouses and beehives for honey production. Other projects include helping India, Thailand, South Africa and other countries cope with serious infestation problems in large *eucalyptus* plantations by means of biological control, and sharing knowledge and experience with the Palestinian Authority in afforestation, forest management and firefighting.

Israeli forests, both planted and natural, are multi-functional, ecological landscape systems, which are managed for multiple services to the society and ecology of their surrounding regions. Since the 1980s, planted forest lands have undergone a transformation from pure, even-aged forests to a mosaic of mixed, multiple-use forests, with a greater degree of ecological stability, biological diversity and landscape aesthetic value. This process will expand as more and more stands are renewed and as new lands are added to the nation's forest inventory.

Sabah shows the way to sustainability

Frederick Kugan, Deputy Director, Sabah Forestry Department, Malaysian Borneo

Worldwide, rainforests support a myriad of plants and animals, each with a crucial role in keeping the ecosystem alive and vibrant. A healthy rainforest ecosystem is central to the survival of humans, in particular the millions of indigenous people who depend on the forest for food, shelter, traditional ways of life and culture. In Malaysian Borneo, the state of Sabah is leading the way by actively pursuing the true principles of sustainable forest management (SFM) – timber extraction based on well thought through harvesting plans, care for people and conservation of key areas that host iconic wildlife and flora and unique landscapes. Sabah's commitment to sustainably managing its forests was born out of the harsh reality that indiscriminate logging had led to a crisis point. The only other choice was to continue timber harvesting until there was nothing left, a choice that Sabah knew would be the wrong path.

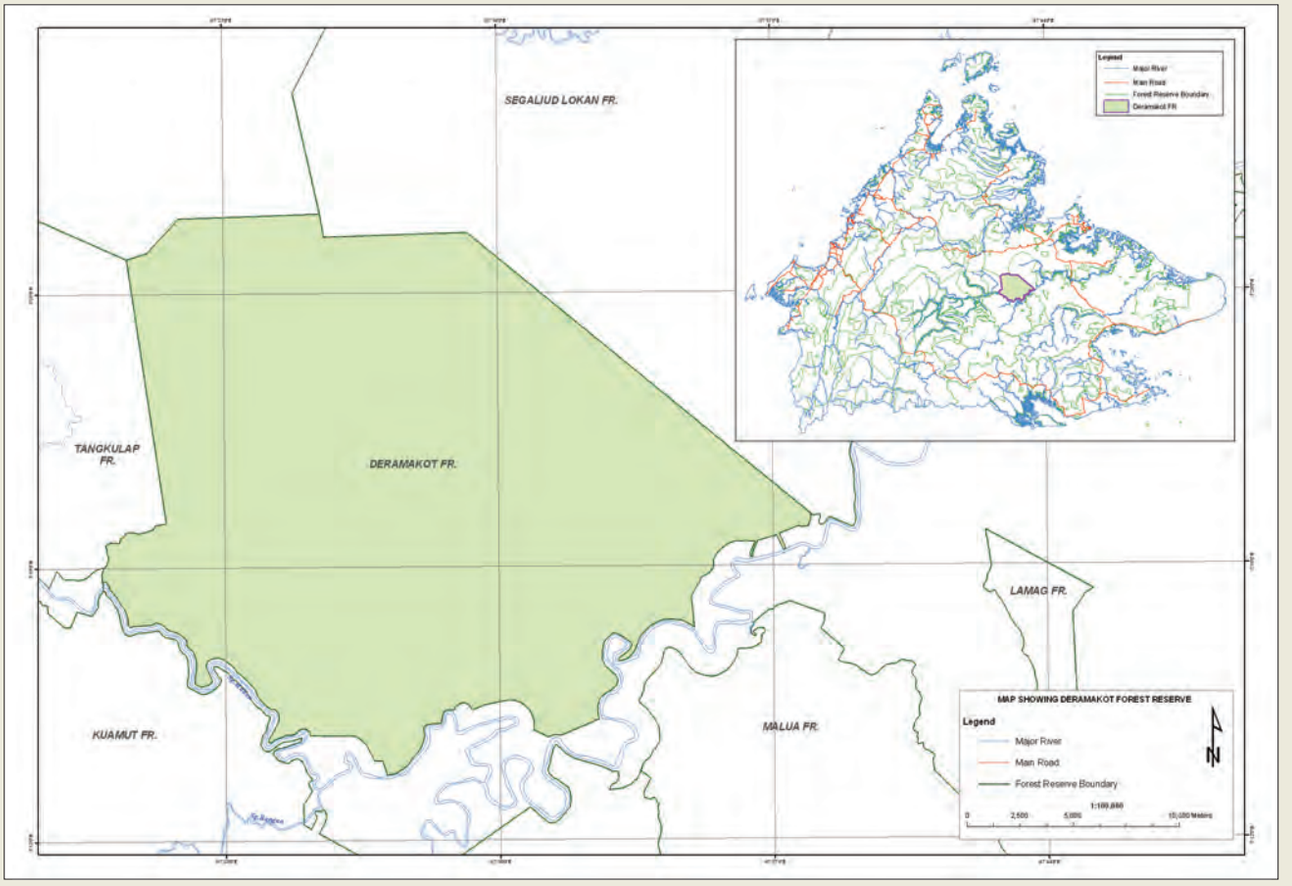
In 1989, the Sabah Forestry Department started on a journey that would see it delicately balance the use of its forests for timber, research, tourism, watersheds and a plethora of other needs. The Department decided to collaborate with the German Agency for Technical Cooperation (GTZ), which picked the Deramakot Forest Reserve in central Sabah for a joint Malaysian-German Forestry Research Project. This reserve, comprising 55,139 hectares of mixed dipterocarp forest, had at that time been logged at least once with subsequent silvicultural treatment. Numerous studies were carried out under this collaboration, including some that indicated the timber industry was grossly oversized, both in terms of processing and logging capabilities. At this point, the Department knew there was no turning back if it was to salvage what was left, and continued with the project. Substantial investments were made as part of the commitment, covering the training of foresters in new techniques, the purchase of low impact harvesting equipment and forest planning.

Despite challenges, especially in its early years, the Deramakot Forest Reserve has gone down in history

Image: Peter Lagan

Local community engaged in forest restoration works

Deramakot Forest Reserve



Source: Sabah Forestry Department

as the first natural tropical rainforest in the world to be certified under the Forest Stewardship Council (FSC), an accolade it earned in July 1997. Through a focused vision, Deramakot remains the oldest tropical rainforest in the world. While it seemed a mammoth task over two decades ago, the Department is, with strong support from the Sabah State Government, currently replicating its Deramakot model to cover other forest reserves in Sabah. This process started in September 1997 when the Sabah State Government signed agreements with 10 partners to manage commercial and natural forests based on sustainable forest management (SFM) principles. The 10 pioneer private companies that signed Sustainable Forest Management Licence Agreements were allocated some 1.8 million hectares in total, with each given 100 years to manage their sites based on the Deramakot model. While not all of the original licensees were able to sustainably manage their sites, causing their agreements to be cancelled, there are currently 25 long-term licensees in Sabah. The Department remains vigilant on how these licensees manage forests, and those unable to deliver risk losing the licensed areas allocated to them.

At Deramakot, the Forest Management Plan (FMP) sets management standards and is deemed workable only if stakeholders are fully consulted. This includes input from local communities, non-governmental organizations and researchers. Currently under its second FMP covering 2005-2014, this document supports the production of high-value timber and enables improved growing stock with a high degree of tree species diversity. The FMP is implemented by the Department under the supervision of its Deramakot District Forestry Officer and contractors. Guided by the FMP, the Department prepares an annual work plan that lists the necessary strategies for a given year. This includes preparing a Comprehensive Harvest Plan (CHP) that guides sustainable logging, vital for Reduced Impact Logging (RIL). Timber extracted uses RIL methods that minimize damage to potential crop trees, soil and the regeneration process. RIL guidelines dictate that the minimum cutting limit is maintained at 60 cm DBH (diameter at breast height), while the maximum limit is fixed at 120 cm DBH. The CHP is an essential primary field reference and roadmap and is used to ensure sufficient monitoring, including when harvesting is over, by putting in place mitigation measures to promote regeneration of the logged area. The CHP is so detailed that it even includes the layout for feeder roads and skid trails to minimize disturbance to soil.

Image: Peter Lagan

Deramakot Forest Reserve

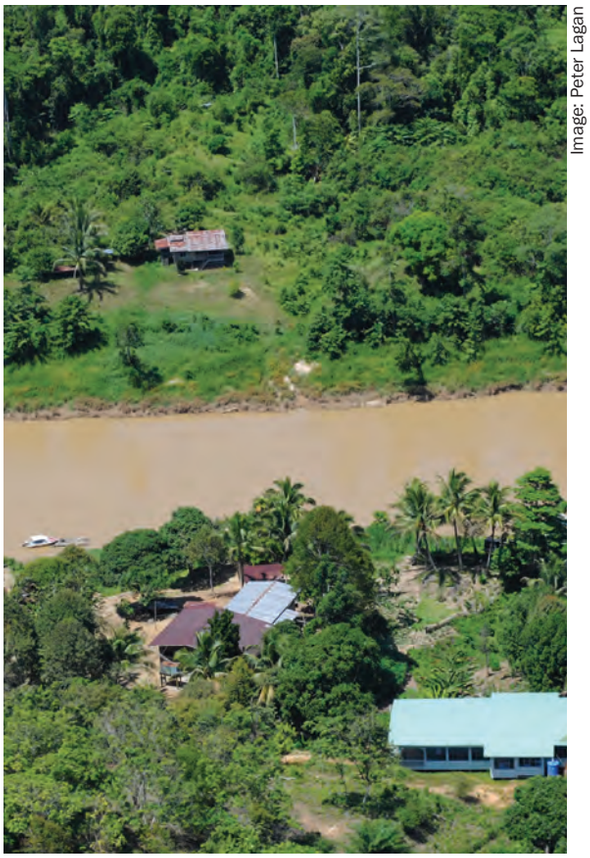


Image: Peter Lagan

Desa Permai, a village located adjacent to Deramakot Forest Reserve

Image: Andy Chock

Deramakot is a refuge for many mammal species such as orangutan

Aware that the needs of indigenous peoples are crucial for the long-term well-being of Deramakot, the Department has allocated 18 ha of the reserve for community forestry activities. While there are no communities that live within Deramakot, the Department has reached out to those who live at its fringes. This is in line with its foray in 1984 into a series of community forestry projects to provide income and livelihood to indigenous peoples living in and at the boundaries of forest reserves. SFM principles require the active participation of indigenous peoples and the Department continues to develop strategies to accommodate the needs of an estimated 20,000 people who live in and close to forest reserves. The Department's experience of over two decades in community and social forestry has led it to conclude that the meaningful involvement of indigenous communities is an effective part of the long-term solution to deforestation and land degradation. It has collected almost RM100 million from timber companies for its Community Forestry Cess Fund and almost half of this has allowed 4,000 families to move into new homes, and to enjoy gravity water feed systems and clinics. Recognition for Sabah's efforts is perhaps best chronicled by the United Nations Development Programme book *Sustainable Community Forest Management in Sabah* that outlines the need for roads, healthcare and access to clean water as among the requirements to ensure community projects remain sustainable.

Image: Peter Lagan

Social needs are supported in villages adjacent to Deramakot Forest Reserve

Image: Sabah Forestry Department

The use of skyline to reduce the impact of harvesting

Local communities in and around Deramakot are an important component of the reserve's FMP. Five villages outside Deramakot's southern border — Balat, Tangkong, Kuamut, Desa Permai and Tulang-Tulang — are home to 784 people who are part of 218 households. A majority come from the Orang Sungai (river people) ethnic group, the others being the Kadazan, Murut and Dusun. Of these, the Balat settlement enjoys clean and continuous water supply from a gravity feed system that originates inside the reserve. It also has a primary school and a library for children. The village of Kuamut has a Government clinic, primary school and library, while the Tangkong and Desa Permai villages have primary schools. One of the main benefits of community forestry in Deramakot is its capacity to integrate villagers into forest management activities, such as for forest restoration. This helps the Department to develop approaches that encourage the sustainable use of forest resources while improving standards of living. The Deramakot Forest Reserve Social Forestry Committee, which unites the Department and the five villages, serves as a forum for villagers and Deramakot managers to talk about development and social issues such as access to clean water, education, healthcare and meaningful participation in the reserve's success as a model for the world. A new agroforestry initiative based on villagers' interests in non-timber forest products such as rattan, bamboo, medicinal plants and fruit trees is available within the reserves, and further research is ongoing to determine how local communities might benefit from cultivating these species.

In addition to caring for indigenous people, Deramakot is also a refuge for at least 75 mammal species, including globally threatened wildlife such as the orangutan, the Borneo pygmy elephant and clouded leopards. There are over 220 bird species and more than a hundred reptile, fish and amphibian species in the region. The reserve continues to draw the interest of researchers who want to discover more about Deramakot's iconic wildlife, offering management solutions to the Department along the way. This is especially crucial as the Department forges ahead with efforts to extend the model to other reserves, some of which are equally important hubs for biodiversity.

Under the leadership of its Director Datuk Sam Mannan, the Department is working to expand the Deramakot model to other parts of Sabah in order for SFM to be truly accepted. In the Department's publication *Forever Green: A Sustainable Future With Deramakot*, Mannan perhaps best wraps up Sabah's vision: "(SFM) is not merely about introducing changes in techniques of harvesting. It first requires a change in mindset that sustainable forest management is the only way for the forestry sector to remain productive in the long term. The Deramakot model is revolutionary. The planning, preparation and training needed are all substantial, from field work to securing the compliance of logging companies. Now, we also gain knowledge in wildlife and it is attractive for researchers from all over the world."

Indeed, the Sabah Forestry Department has, through Deramakot, shown the way for the region and the rest of the world.

The Sahara Forest Project — enabling restorative growth

Joakim Hauge, CEO, Sahara Forest Project

In 2050 about 9.3 billion people will be sharing the same planet.[1] Already today the world is facing intertwined challenges associated with the processes leading to climate change, desertification and shrinking forests, and of food, water and energy security. None of these challenges are without solutions, but it is becoming increasingly clear that we should not be developing responses to one challenge that are detrimental to another. When the greatest challenges of our time are so closely interlinked, the same must be true for the solutions. To borrow the words of Albert Einstein: "We can't solve problems by using the same kind of thinking we used when we created them."

There are indications that the rate of deforestation has been somewhat reduced in recent years.[2] However, despite regional differences the overall rate still remains alarmingly high. While the world's forests are shrinking, the world's deserts continue to grow. This global trend causes serious negative impacts on future food, water and energy security, as well as contributing to climate change.

Today, the livelihoods of more than one billion people in some 100 countries are threatened by desertification. It is estimated that desertification and land degradation represent an income loss of US$42 billion per year. Further, the barren lands lost annually could have provided 20 million tons of grain.[3] Even though desertification is most often directly triggered by localized drought, human activities are almost always a key underlying cause. It is therefore of major importance to introduce sustainable cultivation and irrigation practices, and to implement programmes to prevent over-grazing and unsustainable outtake of biomass.

Image: The Sahara Forest Project

An artistic impression of what a Sahara Forest Project Test and Demonstration Centre might look like

For areas already severely affected by desertification there is a need to implement restorative practices to bring back natural vegetation. The Sahara Forest Project is an attempt to realize such practices through revegetation and the creation of green jobs through profitable production of food, water and energy in desert areas. The concept is known as restorative growth and has gained considerable scientific and political support in recent years.

From vision to technology

Considerable parts of what are now considered desert areas were formerly vegetated. The army of Julius Caesar conquered much of the African territory north of the Sahara, turning forests into farmland. For some 200 years North Africa supplied around two thirds of Rome's total grain supply. This resulted in deforestation, increased salinity in the soil and loss of minerals. Around 250 AD St Cyprian, Bishop of Carthage, wrote that the "world has grown old and does not remain in its former vigour. It bears witness to its own decline. The rainfall and the sun's warmth are both diminishing; the metals are nearly exhausted; the husbandman is failing in his fields. Springs which once gushed forth liberally…now barely give a trickle of water."[4]

In the same way as an extractive use of resources has contributed to loss of natural vegetation, the Sahara Forest Project proposes the use of restorative practices to establish vegetation in arid areas and reverse the trend of desertification. The ambitious target of restorative growth will be achieved through a combination of existing and proven environmental technologies, such as evaporation of seawater to create cooling and distilled freshwater (i.e. in a saltwater-based greenhouse) and solar thermal technologies. The technological combination in the Sahara Forest Project is hence designed to utilize what we have enough of to produce what we need more of, using deserts, salt water and carbon dioxide to produce food, water and energy.

The Sahara Forest Project proposes to establish a range of interconnected economic activities in different low-lying desert areas based around a pipeline that creates an infrastructure for seawater to be brought inland. The seawater is used to condition the desert air in a greenhouse to create ideal growing conditions for the crops inside. The evaporation cools the dry desert air significantly, and the high humidity of the air inside the greenhouse reduces the need for freshwater for irrigating the high-value plants grown inside. Some of the water vapour in the greenhouse will condense on cold surfaces such as the roof at night to provide the necessary freshwater for the crop.

A flow of water vapour from the greenhouses will add moisture to the surrounding environment. This moisture has proven to have considerable potential for aiding revegetation of the surrounding environment outside the greenhouses. The salt water will also be evaporated over outside structures 'hedges' so that a considerable area will be provided with sheltered and humid conditions. Further, the seawater infrastructure, solar thermal installations and evaporative structures can provide salt water, power and brine-handling for

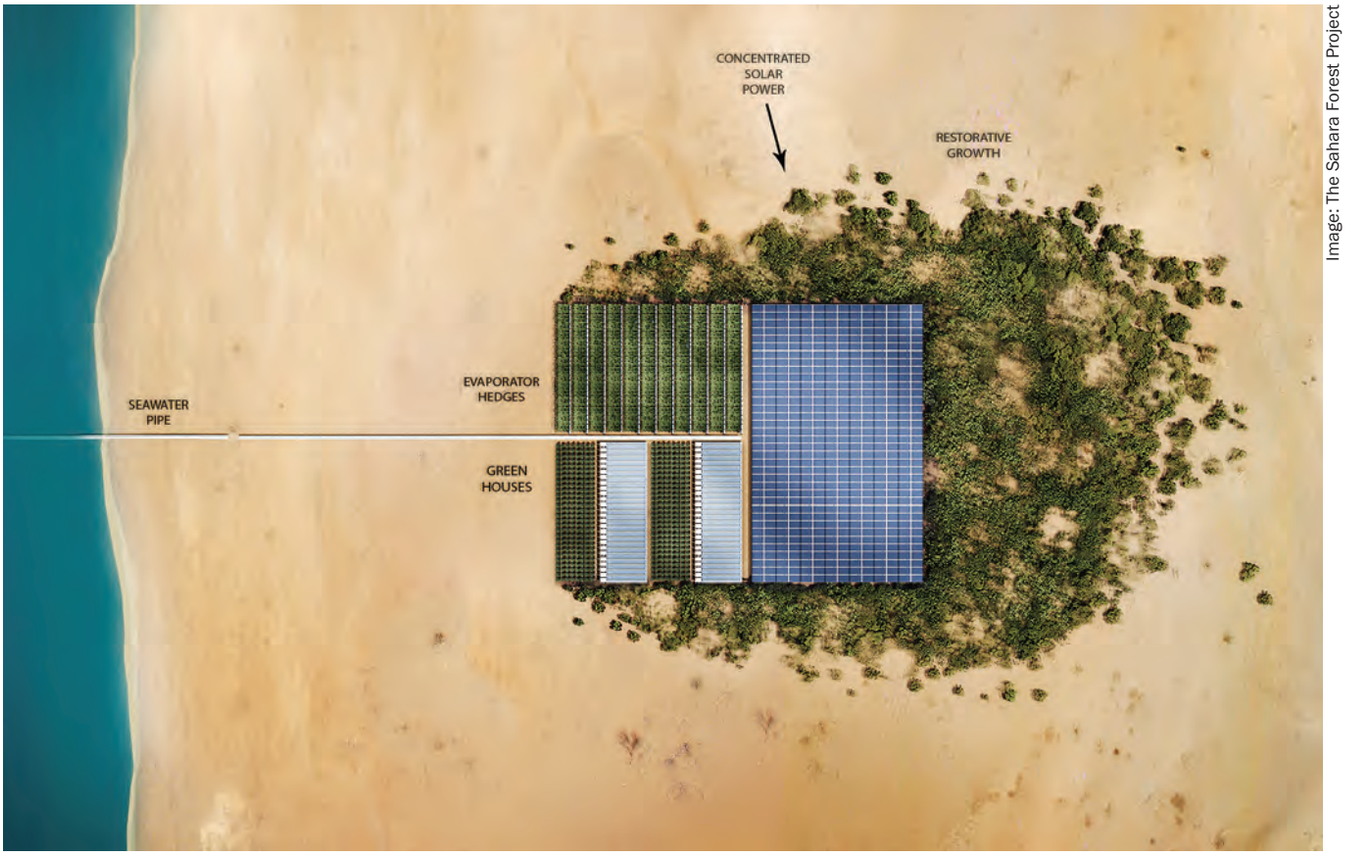


Image: The Sahara Forest Project

By establishing a seawater infrastructure it is possible to construct a value-chain in the desert

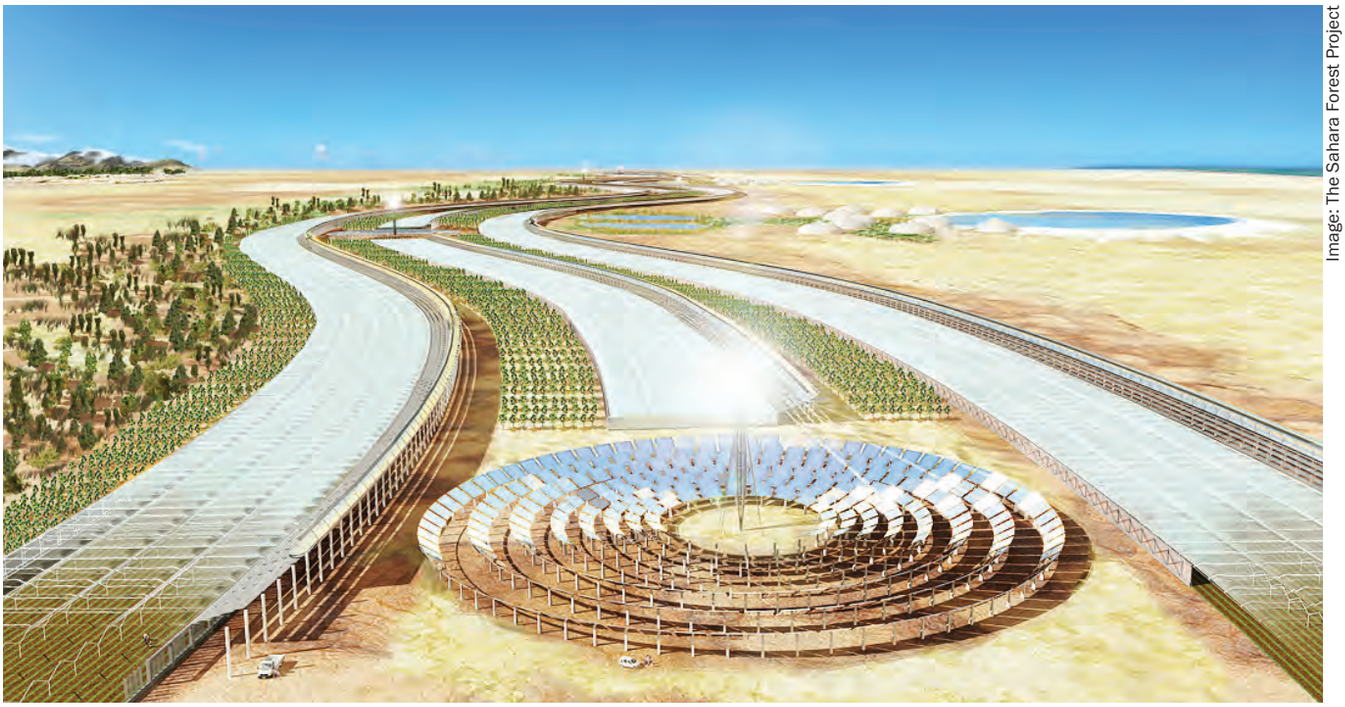


Image: The Sahara Forest Project

A large-scale roll out of the Sahara Forest Project could give rise to new growth in desert areas

a traditional desalination facility integrated with the Sahara Forest Project facility. This could deliver an additional supply of freshwater to greatly extend the potential for revegetation.

The saltwater-based greenhouses are combined with Concentrated Solar Power (CSP) facilities. CSP is widely considered as one of the renewable energy technologies with the highest potential for rapid deployment and impact on the global energy mix. CSP systems use mirrors to concentrate the energy from the sun and create very high temperatures which produce superheated steam that can power a conventional steam turbine.

The Sahara Forest Project proposes to combine CSP facilities with a salt water infrastructure to achieve highly beneficial synergies:

- Salt water can be used for cooling of CSP, increasing the power production
- Both the new outside vegetation and the greenhouse structures will provide dust arresting. The outside vegetation will also stabilize ground conditions. Less dust in a CSP field means more sun reaching the mirrors and less dust settling on the reflecting surfaces
- Freshwater from the greenhouse facilities can be used for cleaning of the mirrors
- Electricity from the CSP facility can be used for running pumps and greenhouse equipment
- The waste heat from the CSP facility can be used for evaporating more water vapour from seawater that can be distilled back into freshwater.

In contrast to most traditional desalinisation facilities, the Sahara Forest Project operates without emissions of brine back to the sea. As the water is evaporated from salt water the salinity increases to the point that the salts precipitate out from the brine. The extraction of the minerals from seawater is an alternative to mining them from the ground. The largest component is table salt (NaCl) that has many uses and is valuable as an industrial feedstock.

From vision to reality

In January 2011 a memorandum of understanding was signed between the Aqaba Special Economic Zone Authority and the Sahara Forest Project in Amman, Jordan. This agreement committed the Sahara Forest Project to conducting three comprehensive studies in Jordan financed and supported by Norwegian authorities. The ongoing studies will prepare for the construction of a Sahara Forest Project Test and Demonstration Centre, located in Aqaba, Jordan. The memorandum also states that the Aqaba Special Economic Zone Authority will facilitate the necessary land area for the Sahara Forest Test and Demonstration Centre, including a corridor for the salt water pipe from the Red Sea to the Centre. The initial area needed for the Centre will be 20 hectares. ASEZA will also assist the Sahara Forest Project in identifying and securing 200 hectares for possible later expansion.

The Sahara Forest Project has also entered into cooperation with Yara ASA, the world's largest supplier of fertilizer, and the Qatari company Qafco, the world's largest single-site producer of urea and ammonia. The first step of the cooperation is for the Sahara Forest Project to conduct a comprehensive feasibility study in Qatar. Yara and Qafco are committed to providing finance, knowledge and technical support to the Sahara Forest Project in these studies. As an example, Yara and Qafco will contribute scientifically on how to create an environmentally friendly fertilizer for the greenhouses, as well as a special fertilizer for use in desert areas.

The landscape of Qatar consists mainly of relatively flat and low-lying arid land. The climate is characterized

Annual productivity forecast

Product	2025	2035	2050	Unit
Tomatoes	26	52	91	million tons per year
Electricity for export	73,692	147,375	257,899	gigawatt hours per year
Greenhouse jobs	566,864	1,133,654	1,983,839	employees
Salt	22	44	78	million tons per year
Carbon dioxide stored in vegetation/forests	14	28	49	million tons per year

Source: The Sahara Forest Project

by very high seasonal peaks in temperature and humidity. These conditions, combined with poor freshwater resources, pose a real challenge to agricultural and revegetation efforts. The parties are therefore also in the process of preparing the construction of a local calibration station at the Qafco facilities in Qatar to provide accurate measurements of how the technology can best be optimized to local conditions. After the completion of the ongoing studies the goal is for the three parties to establish a Test and Demonstration Centre in Qatar.

In the words of Dr Dan Kammen, Chief Technical Specialist for Renewable Energy and Energy Efficiency at The World Bank: "The Sahara Forest Project is a pioneering project that reflects the kind of holistic vision and solution that we need to explore so that we can address the interconnected challenges of food, water and energy security. It is about optimizing the whole system rather than maximizing one goal. As a result, I am very pleased to see the Qatar project launch because it shows the project's potential for commercial partnerships to address environmental and social needs."[5]

The ongoing studies in Qatar and Jordan are performed by the Sahara Forest Project in close cooperation with a number of partners and contributors from diverse fields. The Sahara Forest Project emphasizes a strong focus on interactions with the scientific and business communities in the relevant countries, and promotes a high degree of knowledge sharing between the various sectors of expertise. In-depth knowledge on local conditions, whether they are ecological or financial, is a key to the success of the project.

Potential for large-scale revegetation

Assuming growth in the greenhouse industry towards 2050 is similar to its growth in the period 1995-2009, and that ten per cent of this greenhouse industry would be part of a Sahara Forest Project facility, it is possible to see how the scheme could contribute significant positive effects. Consider a set-up in desert areas of:

- A one-hectare saltwater-based greenhouse for the production of tomatoes
- A 0.75-hectare CSP to make electricity for operations and export
- A 0.25-hectare CSP to power a reverse osmosis desalination facility
- 7.5 hectares of planted *eucalyptus*.

Based on observed data of *eucalyptus* plantations[6] on latitudes similar to the Sahara, we assume that one hectare of *eucalyptus* forest stores 33 tons of carbon dioxide per year.

Given the assumptions above this would give rise to a yearly profitable production shown in the table above.

Before establishing forests in desert areas, thorough ecological impact assessments would be required. In suitable areas it would be highly preferable to use a locally adapted mixture of species. Nonetheless this simplified model clearly demonstrates the potential for reforestation of desert areas as well as easing the pressure on existing forests.

The Sahara Forest Project could be set up in a range of configurations based on the combination of solar thermal technologies and technologies for evaporation of salt water and condensation of freshwater, such as in seawater-based greenhouses. The exact set-up will be designed to meet local needs and market demands, as well as local meteorological and ecological conditions. Independent of the specific design of each facility, a Sahara Forest Project-style unit will offer a profitable way of vegetating arid areas. A widespread deployment of such units will lead to the establishment of considerable areas of vegetation in regions now threatened by desertification, while at the same time producing large quantities of sustainably produced food and clean energy.

Image: Vladmir Wrangel, fotolia.com

The Namibian Fog Basking Beetle has been an inspiration to the design of the Sahara Forest Project. The little beetle is able to harvest moisture in the desert air by condensing water on its back then tilting its body towards its mouth when it needs a drink

Conservation and sustainable management of forests in Saudi Arabia

Mohamed Al-Shiha, Deputy Minister of Agriculture Affairs, Ministry of Agriculture, Saudi Arabia
and El Mostafa Darfaoui, Natural Resources Expert, Food and Agriculture Organization of the United Nations

In the Kingdom of Saudi Arabia (KSA), famous for its aridity and immense deserts, there are approximately two million hectares of forests, covering 1 per cent of the total area.[1] The main forest cover is located in the Sarawat Mountains, characterized by elevations ranging between 500 m and 3,100 m and by higher rainfall than the rest of the country. Forest lands are composed of evergreen coniferous juniper trees, growing in pure stands at elevations exceeding 2,900 m above sea level and with annual rainfall ranging between 350 mm and 500 mm.

The dominant species are *Juniperus phoenicea* in the Hijaz Mountains in the north and *Juniperus procera* in the Assir Mountains in the south and the two species are found mixed in between. At lower altitudes, the junipers grow in varying mixtures with other trees. The remainder of the forest stock is mainly *Acacia* trees growing on the warmer western Sarawat slopes in addition to tree mixtures scattered along valleys, meadows and catchment areas all over the country. Mangrove forests dominated by the *Avecennia marina* and *Rhizophora mucronata* species exist in small patches along both the Red Sea coast to the west and the Arabian Gulf shores to the east, covering approximately 3,500 hectares.[2]

Forest lands in Saudi Arabia are multi-purpose and are 98 per cent State owned.[3] They produce negligible volumes of roundwood; however, they have evolved with the local populations for thousands of years and have been providing them with invaluable social, economic and cultural benefits, supplying wood and non-wood products as well as grazing and recreational sites. The environmental services provided by forests in KSA are inestimable and include protecting watersheds and soils, regulating the flow of rainwater, supporting wildlife habitats and biodiversity, sequestering carbon and providing oxygen.

Forest use trends

The total population living within the main forest lands of the country in the provinces of Assir, Al-Baha and Makkah is estimated at three million people, represent-

Image: Ministry of Agriculture, KSA

Abandoned terraces in Al-Baha

Image: Ministry of Agriculture, KSA

Urban expansion in Sarawat forest

ing 11 per cent of the total population of 27 million.[4] A recent study conducted by the Ministry of Agriculture in collaboration with the King Abdulaziz City for Science and Technology and King Saud University[5] showed that among a surveyed sample of the population living within the three provinces, a proportion of 92 per cent use the forest for recreation purposes, 76 per cent practise agricultural activities, 32 per cent use it for livestock grazing, 16 per cent harvest forest firewood and 14 per cent own beehives or grazing land in the forest. In addition, 2 per cent collect forest medicinal and aromatic plants and products.

Reliance of the local populations on the forest in these areas was almost total in past centuries as it provided them with all their needs, including air, food, fibre, shelter, water and medicine. However, during the last half century, important changes have occurred as a result of the mutation of the Saudi economy generated by the oil boom, reducing direct reliance on the forest as a source of livelihood and increasing its use for recreation. This has led to the creation of 16 wildlife reserves and 14 national parks in various parts of the country, among which, two reserves (Raida and Shada Alaala) and three national parks (Assir and Al-Baha, Taif) are located in the mountain forests. These parks attract more than five million summer visitors annually, generating important economic activity and creating jobs, but also causing a great deal of soil compaction, tree injury and pollution.

Agriculture has been abandoned to a great extent in the mountain forests in favour of Government jobs and other more lucrative activities.[6] Terraces, which are scattered all over the mountain slopes, supported the main agricultural activities in the past. Currently most of them are abandoned or no longer maintained, leading to soil erosion, soil crusting and subsequent drastic soil disturbances. Throughout the juniper ecosystem an important proportion of rainfall now runs off instead of infiltrating or percolating into the soil, causing moisture stress for the trees and leading to low vigour and eventual decline. Furthermore, the substantial increase in income and rapid demographic inflation has led to fast, unmanaged urban expansion into forested areas, causing significant shrinking of the natural vegetal cover, especially in the Sarawat Mountains.

Forest and wood lands in KSA are currently subject to rigorous stress conditions, causing degradation and shrinking. Such stress is the result of anthropogenic factors, including fuel wood cutting, overgrazing, urban expansion, wildfires and misuse of parks and picnic areas, in addition to harsh environmental conditions (low rainfall averaging 106 mm per year, hot temperatures, high evaporation rate, severe droughts and poor soils).

For more than three decades now, the juniper forests of the Kingdom of Saudi Arabia have been exhibiting symptoms of widespread decline, including unhealthy trees, poor production of berries and cones, top dieback, mortality of scattered individual trees and entire stand mortality. The dieback and decline of juniper have been attributed to a range of factors, including localized climate changes, water stress resulting from poor water harvesting due to damaged and abandoned terraces, secondary insect pests and pathogens, heavy pressure exerted by tourists in national parks, soil compaction, road network expansion, urban development and lack of management plans.[7]

Forestry policy and intervention

To stop forest degradation and set the conditions for sustainability, the Government of KSA took several steps, including adopting the Saudi Forest and Range Act and by-laws (1978) and updating them in 2005 to secure forest tenure, assure protection and encourage sustainable development. A National Forest Strategy and Action

Image: Ministry of Agriculture, KSA

Juniper ecosystem in Assir

Image: Ministry of Agriculture, KSA

Conocarpus and Tamarix green belts to stop sand advance

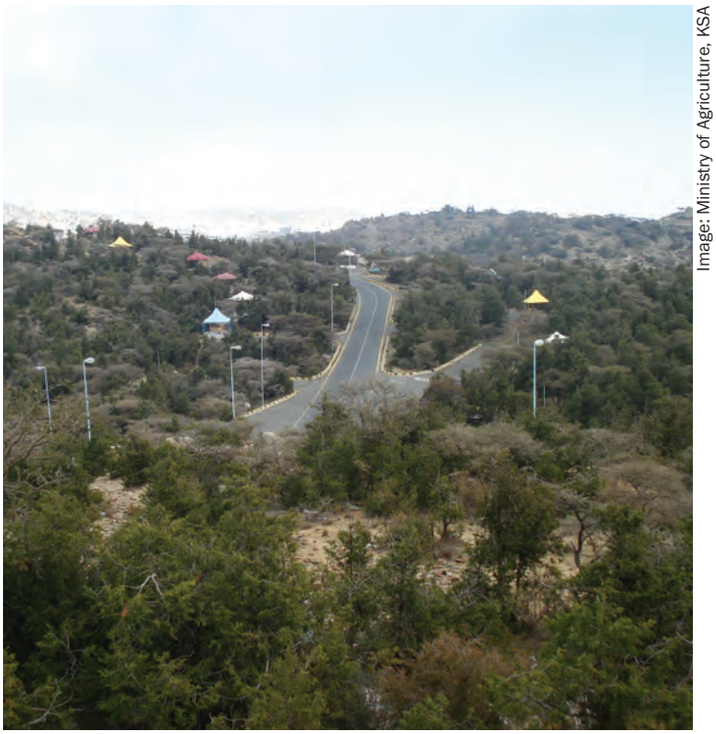


Image: Ministry of Agriculture, KSA

Recreation site in Namasse

Image: Ministry of Agriculture, KSA

Reforestation in Assir Park with local juniper

Plan (NFSAP) was also adopted for the period 2005-2022 to streamline the forestry efforts started in the country in the 1950s and to focus on achieving the strategic objective of 'maintaining and enhancing the vigour of forest ecosystems and ensuring the sustainable provision of environmental, social and economic benefits for all living organisms, including for current and future human generations'.

The NFSAP, which has been implemented since 2006, includes 11 specific objectives and 15 projects covering all aspects of forest inventory and monitoring, delineation, tenure securitization, preparation of management plans, protection of sensitive sites and endangered species, watershed management, afforestation/reforestation, national parks development, control of desertification and sand advance, institutional development, strengthening of forest extension services, capacity-building, awareness raising and advocacy.[8]

Juniper ecosystem rehabilitation

A success story that is worth mentioning here is the implementation of a project on Monitoring and Rehabilitation of the Juniper Ecosystem in the Sarawat Mountains.[9] The overall objective of this project, which was initiated in 2005, was to put the juniper ecosystem and the services and benefits it renders into national focus, highlighting the impact of the dieback and initiating a process of rehabilitation and sustainable management. Many valuable recommendations and techniques developed by the project are being implemented successfully in various affected forest sites in the Sarawat Mountains.

The main outcomes of this rehabilitation project are focused on strengthening and mastering the techniques of afforestation/reforestation programmes by improving local capacity. Local tree species such as juniper are used to compensate for problems such as narrow range of diameter, reduced height and low stock density and to guarantee sustainability. Another important outcome is the improvement of available soil moisture for trees by rainwater harvesting through construction of soil embankments and ditches along contours, as well as by enhancing soil infiltration and repairing and maintaining abandoned terraces.

Current focus issues

The key issues currently facing KSA in relation to forest management and sustainable development as reflected in the NFSAP are:

- Developing a participatory approach and further involving local communities and the private sector in natural vegetal cover management
- Capacity-building and institutional strengthening to overcome the constraints recorded in this area
- Enhancing the coordination among all stakeholders dealing with vegetal cover conservation, protection, rehabilitation and management
- Reinforcing the application of the Forest and Range Act and its by-laws to stop natural vegetal cover degradation and to enhance forest and range sustainable development.

A comprehensive forest inventory and the formulation and implementation of sound management plans for juniper stands are now among the top priorities of the Ministry of Agriculture and the other Government agencies dealing with forest management.

Efforts are also being made to curtail the detrimental behaviour of visitors in the national parks by raising their awareness through well-planned and well-executed extension programmes and developing more recreation areas to release the high pressure on the existing national parks.

The Japan Aerospace Exploration Agency's forest monitoring programmes

Dr Masanobu Shimada, Earth Observation Research Center, Japan Aerospace Exploration Agency

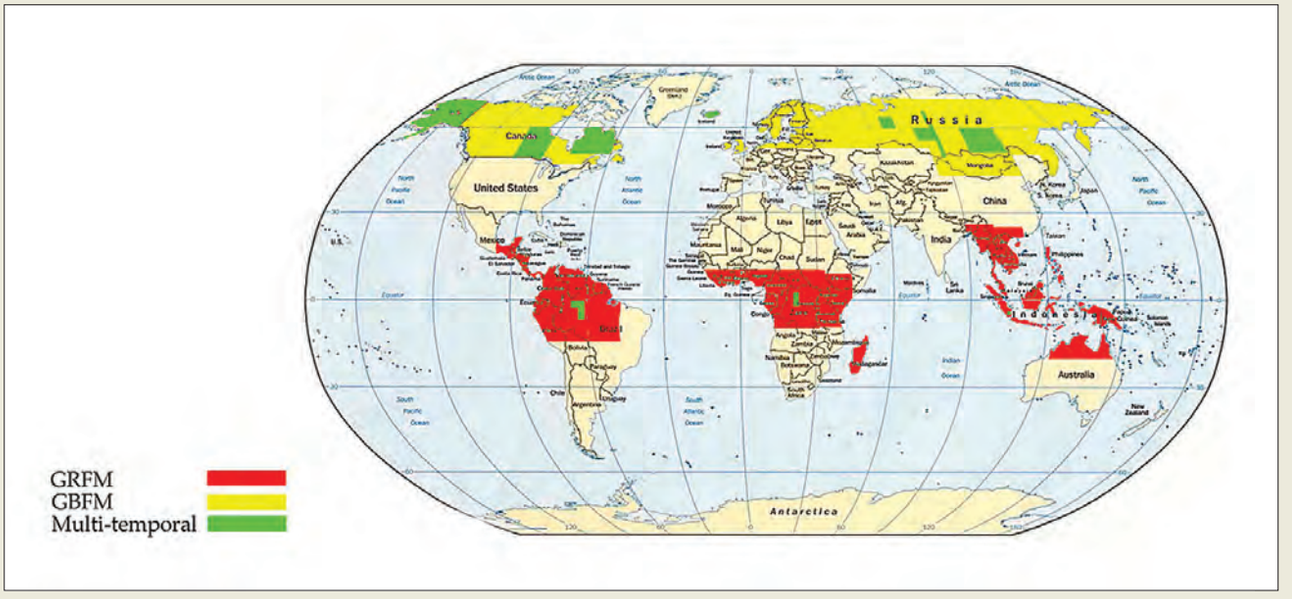
The Japan Aerospace Exploration Agency (JAXA) has been conducting spaceborne L-band Synthetic Aperture Radar (SAR) programmes since the 1990s to contribute to global Earth monitoring and more specifically, forest monitoring. The associated satellites are the Japanese Earth Resources Satellite-1 (JERS-1), the Advanced Land Observing Satellite (ALOS) and ALOS-2, which will be launched in 2013. These programmes aid in the advancement of global forest monitoring as they enable systematic observation of global land and generation of space-time consistent high-resolution SAR images, as well as allowing for related time-series analysis. In particular, the tools used by JAXA to perform these tasks assist in deforestation monitoring and forest carbon estimation. Under this framework, we produced the world's first global 10 metres per pixel (10-m) resolution forest/non-forest map in October 2010. This chapter introduces JAXA's activities and the typical outcomes of these satellite programmes.

JERS-1 SAR: a world first

JERS-1 was launched on 11 February 1992, carrying the world's first operational spaceborne L-band SAR, a visible and near-infrared sensor with stereo viewing capability and a 20-minute data recorder. It entered a 568-kilometre sun-synchronous orbit with a revisit cycle time of 44 days. Following its launch, JERS-1 operated for six and a half years (1992-1998), which corresponded to the mission request from users both inside and outside JAXA as well as several foreign ground stations. During this period it collected 400,000 SAR images globally.

In 1995, two events initiated forest monitoring using the JERS-1 SAR. During the initial mission check of the SAR, global images were collected. Several images from the Amazon were severely contaminated with dark stripes, which were not artificial patterns but were strongly related to the land features of smooth surfaces, which showed a strong correlation to deforestation in Rondonia. The second initiating event was the JERS-1 verification programme, which included an announcement of opportunity to investigate the potential of JERS-1.

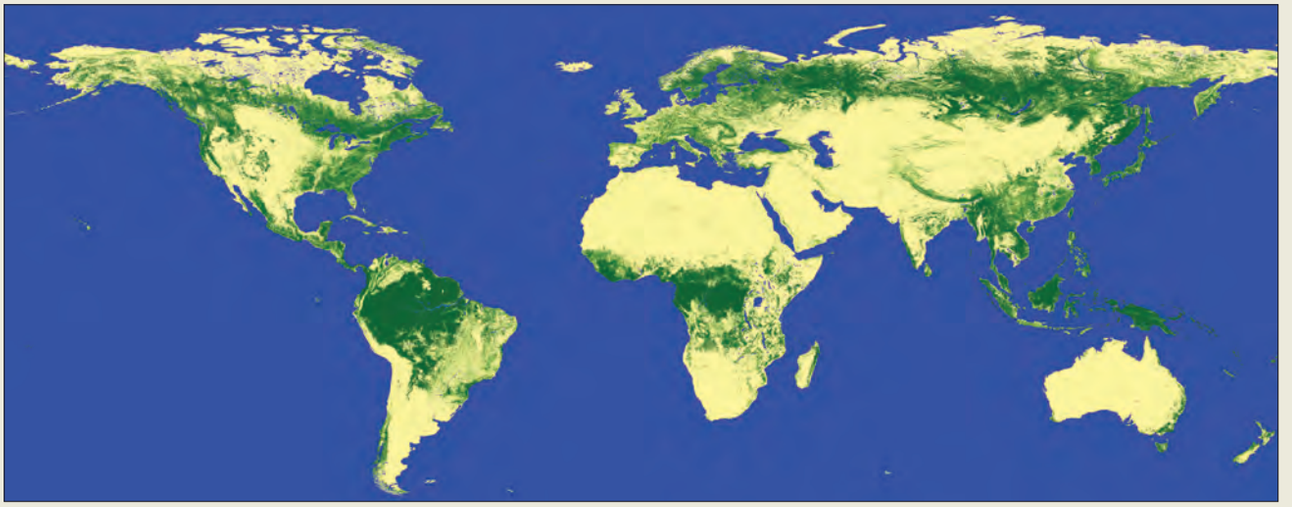
NASDA/JPL/JRC Forest Mapping Projects



Forest monitoring areas: by Global Rain Forest Mapping Project (GRMP) (red) and by Global Boreal Forest Mapping Project (GBFM) (blue)

Source: ©JAXA

Global forest/non-forest dataset for 2009



Source: ©JAXA/METI analysed by JAXA

The final report meeting concluded that the most effective and important applications for research using L-band SAR would be forest monitoring and interferometry.

Based on these scientific episodes, JAXA initiated two consecutive forest research projects, the Global Rainforest Mapping Project (GRFM: 1995-1998) and the Global Boreal Forest Mapping Project (GBFM: 1998-2002), collaborating with approximately 10 international forestry researchers. These two projects targeted observations of the pan-tropical region and the boreal forest regions. Although JERS-1 carried a data recorder, limitations in data recording and linking with ground stations limited the collection of pan-tropical and boreal forest region coverage during its mission life. Even with its limited processing capability and the unavailability of a digital elevation model, however, JERS-1 succeeded in creating the world's first 100 metres per pixel (100-m) resolution SAR mosaics for the Amazon, Southeast Asia, Central Africa, Central America and Siberia. These products were freely distributed throughout JAXA and the data were used for forest monitoring in early 2000. As an example of the product the occurance of fish-borne deforestation can be clearly identified using L-band HH polarization SAR images.

From these scientific results, the L-band SAR was recognized as a very effective tool to monitor the forest status (deforestation and land cover changes) and developments occurring over time.

ALOS/PALSAR: a view below the canopy

L-band SAR is more effective than higher frequency SAR for forest monitoring because the electric signal partially penetrates the forest canopy and reaches the forest trunks, which contain large amounts of biomass, and because the clear-cut regions can easily be seen as they appear darker than the natural forest regions. This is because the surface roughness is relatively smaller than the wavelength, a phenomenon known as the Kirchhoff condition.

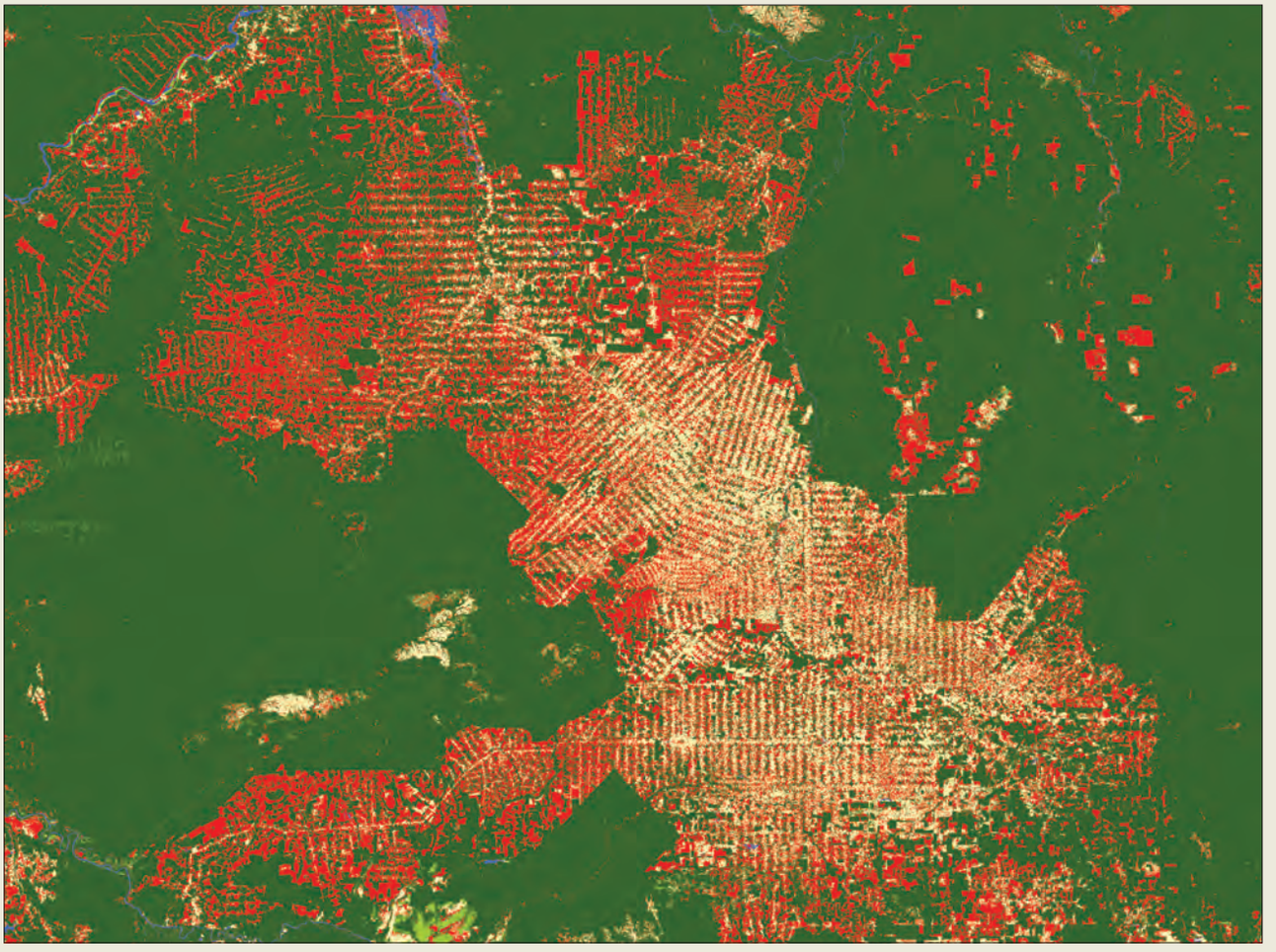
Based on experience gained from JERS-1 and its science project, we established larger scale international collaborative forest research projects such as the Kyoto & Carbon Initiative in 2002. This international programme is supported by 19 forest institutes.

Time-space consistent global PALSAR data are acquired using Fine Beam Dual (FBD) polarization from June to September and Fine Beam Single (FBS) polarization from November to January. ScanSAR is used frequently for registered areas, where the reference observation rule is defined in the Basic Observation Scenario. Frequent ScanSAR observation becomes especially important to the process of monitoring seasonal and annual forest changes in spite of lower resolution. ScanSAR observation was directed at limited areas of the Amazon, Southeast Asia, Central Africa and Siberia for deforestation and wetland monitoring.

SAR is an oblique observation system and the geometry and radiometry are easily distorted by terrain height and spatial distribution. Correction of these distortions using a global digital elevation model (SRTM-DEM) is essential to the generation of accurate high-level products (ortho-products) and for reliable forest classification. Under this project, we have produced global 10-m resolution SAR mosaics and forest/non-forest maps. The resolution of the data is 10-m and it is possible to track the decadal or annual change of the forest status in that geospatial scale.

Frequent ScanSAR observation over Brazil is one representative operational example using PALSAR. Since ScanSAR has a wide swath of 350 km and the equivalent revisit time is shortened to nine days, frequent ScanSAR imaging of the Amazon has contributed to decreasing its deforestation. ALOS data acquired over the Amazon was recorded and sent to the Earth Observation Research Center of JAXA in two days via the Data Relay and Tracking Satellite. The data was processed using high-level processing and distributed to the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA) via FTP transmission. IBAMA compared the 'before' and 'after'

A 14-year change map of the forest at Rondonia, Brazil



Red is used to show deforestation during the period (PALSAR-JERS-1 SAR), green the forested area as of 2010

Source: ©JAXA/METI analysed by JAXA

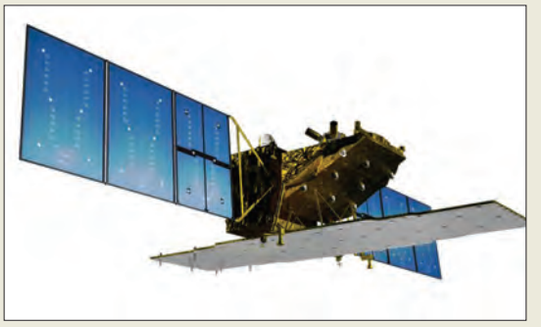
images and through manual operation detected any possible deforestation. This quick progress from data observation to information dispatch was demonstrated in a successful collaboration between JAXA, IBAMA, the Brazilian Federal Police and the Japan International Cooperation Agency.

Unlike JERS-1, ALOS was able to achieve systematic acquisition and high-level image processing over several years. Additionally, ALOS became the workhorse for monitoring the global forest and the related reductions of emissions from deforestation along with the forest degradation REDD+ projects.

ALOS-2/PALSAR-2: addressing deforestation with a new satellite

ALOS operation was terminated on 12 May 2011, due to a power failure. ALOS-2 is the successor of ALOS and will be launched in August 2013. ALOS-2 is a SAR satellite and carries PALSAR-2, an enhanced version of PALSAR. Its mission objectives involve both forest and disaster monitoring. To suppress global warming, we will conduct biomass measurements, deforestation watches and wetland monitoring on a global scale. Decreasing forest carbon is an important target and quantitative measurements and reducing deforestation are the main goals. ALOS-2 houses the SAR antenna underneath the satellite body, enabling both right- and left-side observations. The main objectives using ALOS-2 are to observe the global forest using FBD and to carry out quick deforestation monitoring using the dual-polarization ScanSAR in Brazil, Indonesia and other locations.

An artist's view of ALOS-2



Source: ©JAXA

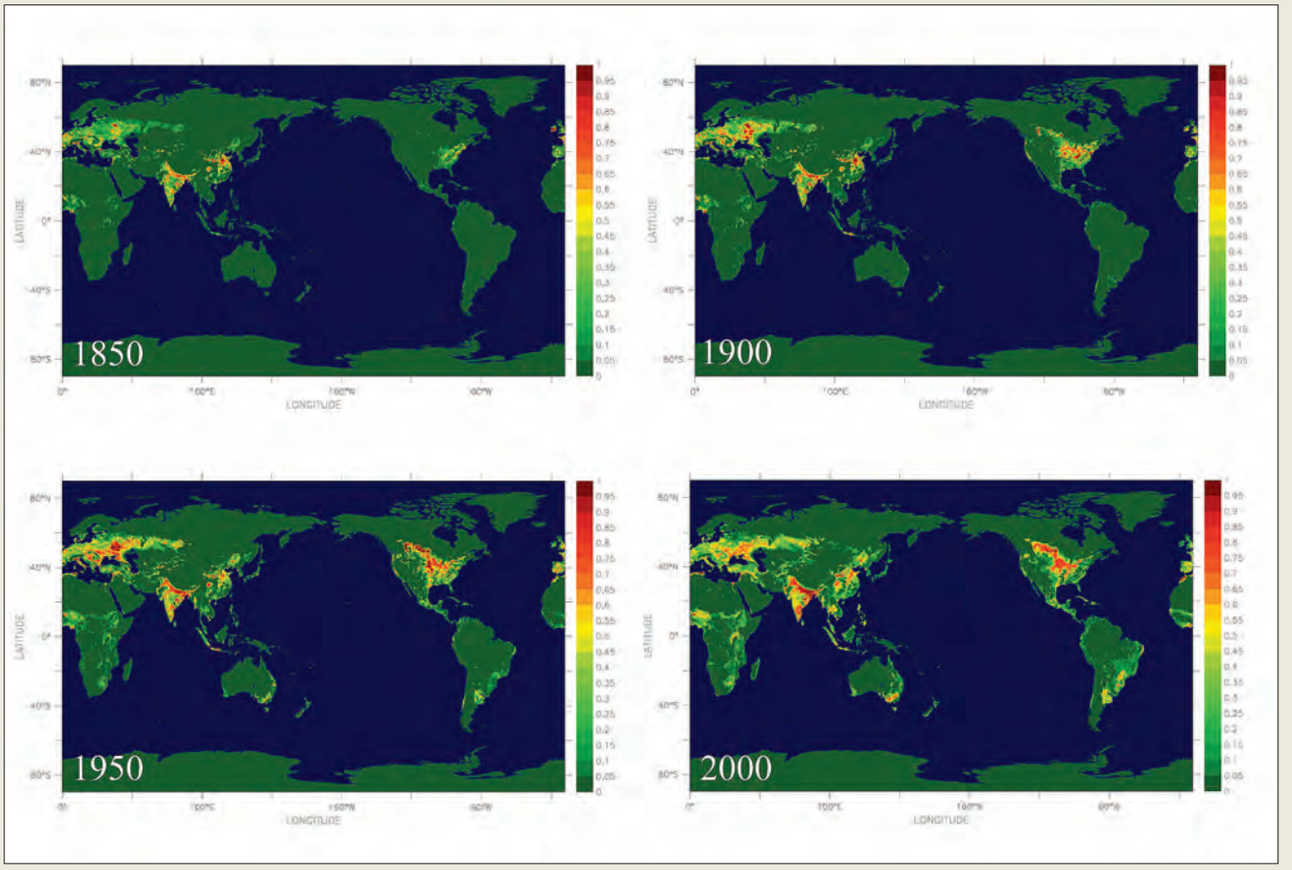
Foreseeing the forests: vegetation dynamics in an Earth system model

Michio Kawamiya, Tomohiro Hajima, Tatsushi Tokioka,
Japan Agency for Marine-Earth Science and Technology

The notion that vegetation is influenced by climate has been widely accepted and visualized in models such as the Köppen-Geiger climate classification, which many of us remember from our school days and to which professional scientists still refer. In this model, boundaries between climate zones, associated with annual and monthly mean temperature, precipitation and seasonality of precipitation, are defined with vegetation distribution in mind. Such a view naturally leads to a concern that current global warming, due mainly to fossil fuel burning, may also change the distribution of vegetation, necessitating projections using ecosystem models.

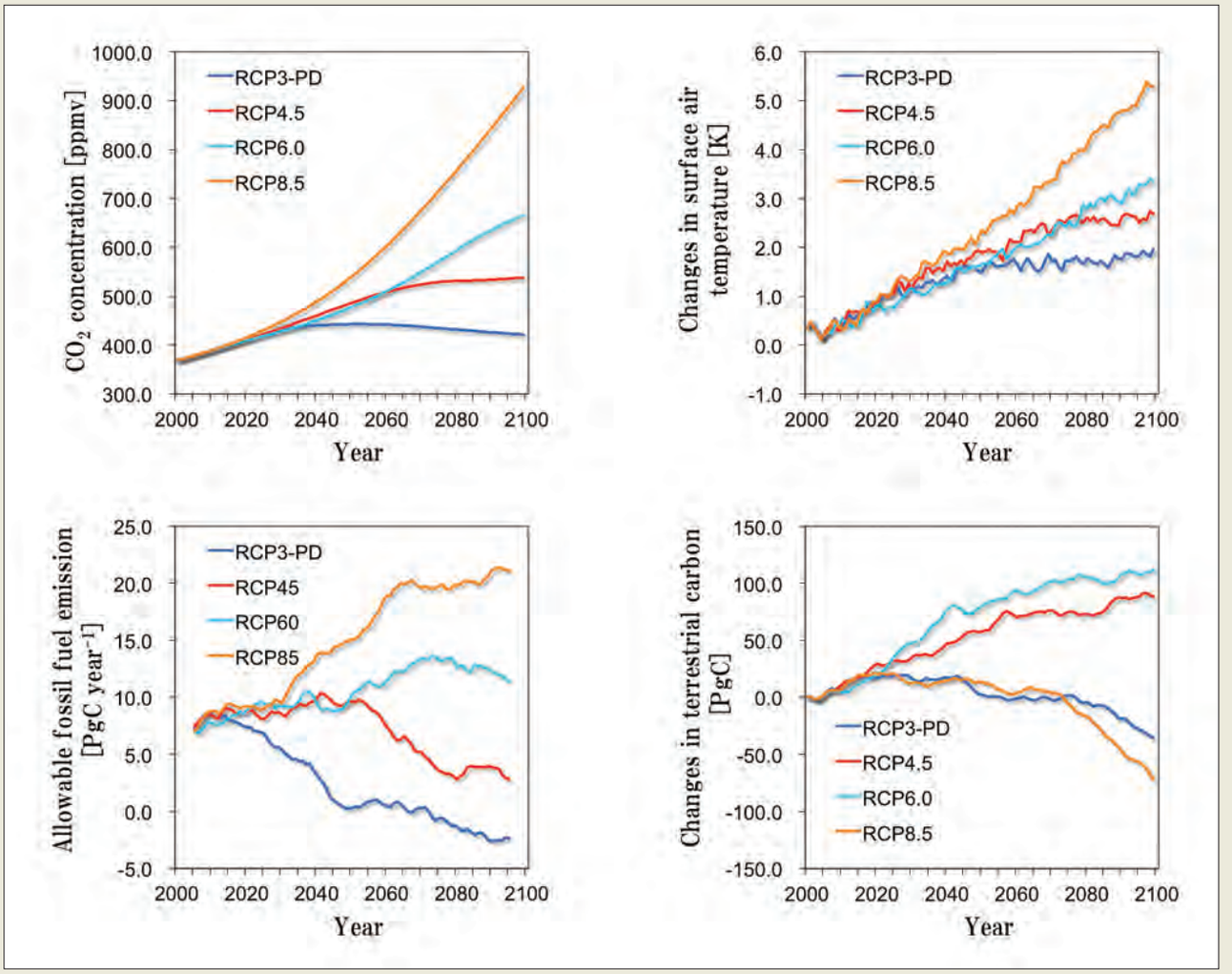
Climate is, on the other hand, also influenced by vegetation. Heat and water budgets and albedo (reflectivity of solar radiation) are among the key factors for surface climate and vegetation plays an important role too. Concentration of carbon dioxide, one of the main atmospheric components regulating the surface temperature, is determined as a result of exchanges among carbon reservoirs such as vegetation (in particular forests), oceans and atmosphere. It can thus be said that the present global distribution of vegetation has been established though its interactions with climate

Historical evolution of cropland



Source: Hurtt et al. (2009)

Global environment projections



Time series for (upper-left) CO_2 concentration scenarios, (upper-right) global mean temperature rise relative to mean for 1980-1999 simulated by MIROC-ESM, (lower-left) CO_2 emission pathways required to achieve the concentrations in the upper-left panel, calculated based on MIROC-ESM simulation, and (lower-right) changes in land carbon simulated by MIROC-ESM

Source: JAMSTEC/MEXT

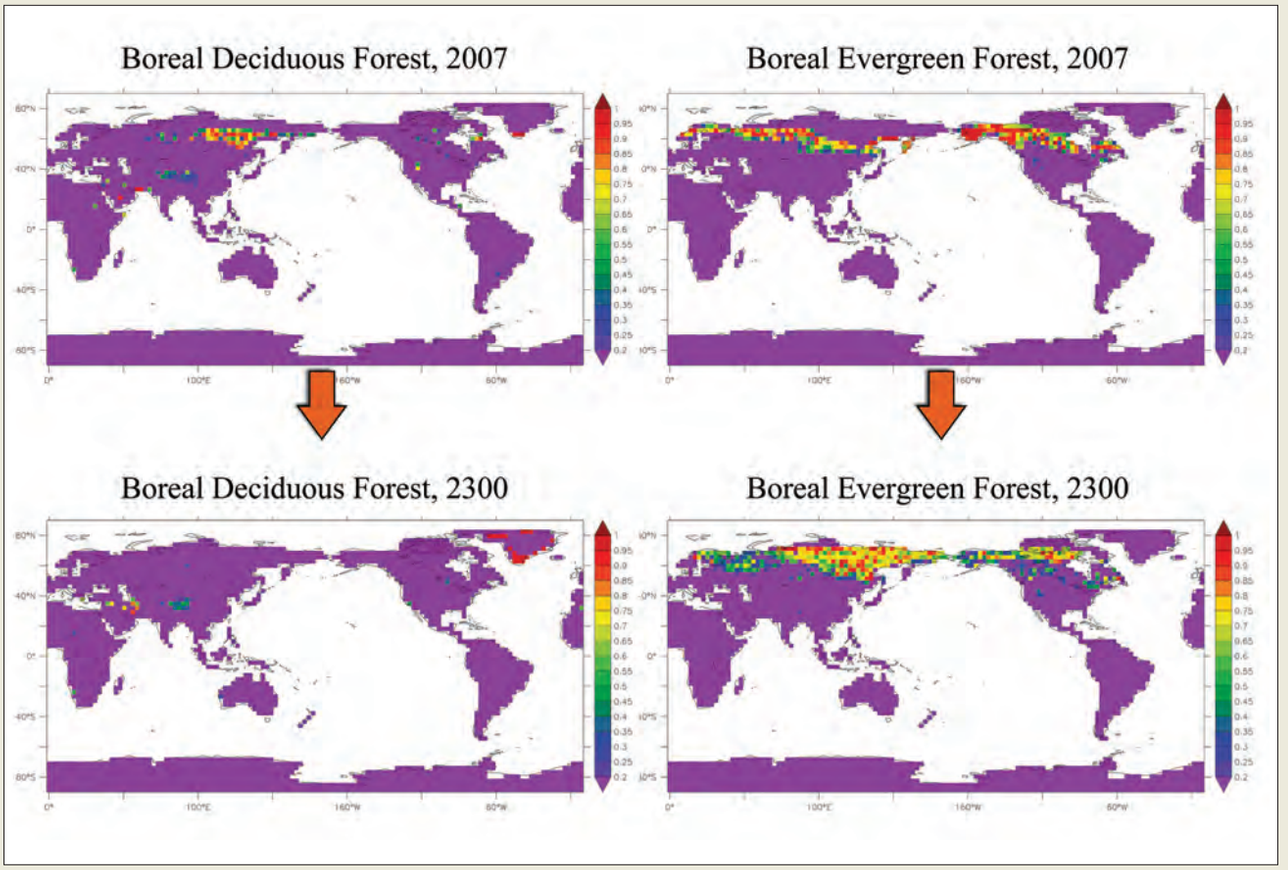
and that projecting its future on time scales longer than a century requires consideration of those interactions. This is why it is becoming common to incorporate geographical dynamics for vegetation into Earth system models (climate simulation models with biological and chemical processes used to project how the global environment changes as a result of human emission of greenhouse gases).

Another anthropogenic factor that has to be taken into account is land use change (LUC) such as transformation from forest to agricultural land or cities, or vice versa. Human pressure on natural vegetation is rapidly growing and cropland now occupies a significant portion of the Earth's surface. Carbon emission from LUC, largely deforestation, is never negligible compared to that from fossil fuel burning, and is the largest source of uncertainty for total anthropogenic carbon emission. Human activities are posing considerable constraints on vegetation dynamics, including the carbon cycle, and there is no reason to believe that the constraints will diminish in future. On top of the interactions between climate and vegetation, there is a need for projections of future human land use to tackle this complex problem of foreseeing the forests.

Modelling forests

The structure of a simulation model for terrestrial vegetation can be divided into two categories, a physics module and a physiology module. The former deals with heat and water budgets as well as microscopic meteorological processes near the surface. This module is often treated separately as part of a land surface model and incorporated in a climate model even when vegetation dynamics is not explicitly taken into account, since the above mentioned processes are so important for surface climate. The latter module covers physiological and ecological processes such as photosynthesis, stomatal conductance (facility for gas exchange through the leaf surface), respiration, leaf phenology, turnover of plant

Projected transitions in vegetation distribution



Distribution of boreal deciduous (left) and evergreen (right) forest at 2007 and 2300, simulated by MIROC-ESM based on the RCP4.5 scenario

Source: JAMSTEC/MEXT

organs, decomposition of soil organic compounds, and the resultant carbon cycle in land ecosystems. The response of vegetation to high CO_2 concentration, one of the essential parts of the module for projecting future behaviour of vegetation, is also formulated in most cases considering the balance of photosynthesis, stomatal response, and availability of environmental resources such as soil, water and nutrients. Combination of the physics and physiology module enables the projection of changes in vegetation dynamics due to those occurring in the future climate.

The investigation of possible transitions in vegetation distribution under a changing environment also needs to take into account the time lag between changes in climate and actual shifts in biome. A dynamic global vegetation model (DGVM) used for this purpose deals with processes such as settlement of trees and competition for light and water among different species in order to estimate the time lag. Many available DGVMs assume that the model's single grid is shared by multiple plant types and that their respective assignments evolve gradually, based on indices such as productivity of the plant types involved.

Another scheme to describe competition involves directly simulating the life cycles of individual trees. The merits of this approach include the fact that competition for light can be expressed in an explicit way and that parameter values obtained in observations can be reflected with ease and utilized for model improvement. In the light of these advantages, the Japan Agency for Marine-Earth Science and Technology's Earth system model for interdisciplinary research on climate (MIROC-ESM) adopts a terrestrial vegetation sub-model, the Spatially-Explicit, Individual-Based DGVM (SEIB-DGVM).

Under the framework of the Coupled Model Intercomparison Project Phase 5 (CMIP5), which is expected to contribute to the fifth Assessment Report of the Intergovernmental Panel on Climate Change, MIROC-ESM has been used for projection of the global environment for the next 100 years, or 300 years for certain scenarios, as completion of a biome shift would require an extremely long time. The scenarios used are called Representative Concentration Pathways (RCPs) and consist of four datasets, that is, RCP3PD, RCP4.5, RCP6.0 and RCP8.5, with an ascending order of projected CO_2 concentration. RCPs include LUC projection, and SEIB-DGVM has been modified so it can evaluate impacts of LUC on vegetation distribution, carbon cycle and climate.

Forest management and the carbon cycle

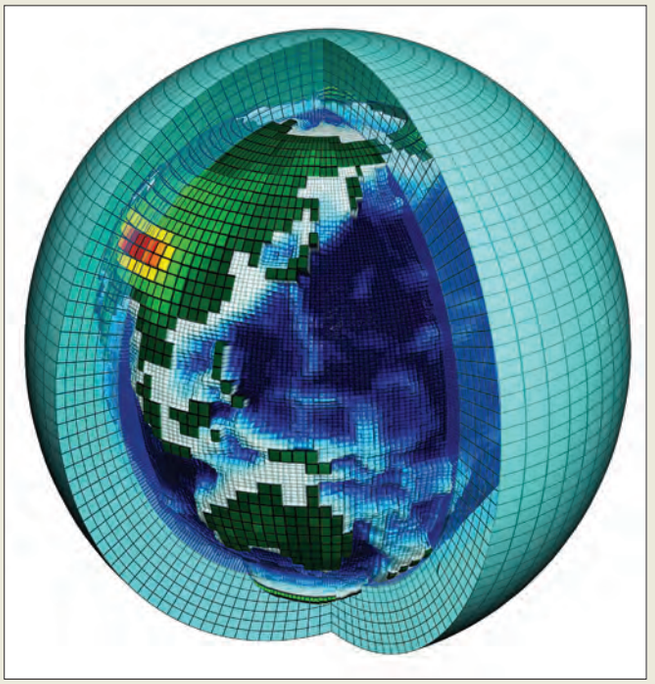
In a study of the global mean surface temperature projected by MIROC-ESM for the four RCPs, it can be seen that RCP3PD is the scenario that roughly

corresponds to the 2°C criteria, referred to in discussions on 'stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system' (United Nations Framework Convention on Climate Change). Anthropogenic CO_2 emission pathways required to achieve the concentrations calculated by MIROC-ESM must also be calculated.

What follows from this is that, based on MIROC-ESM results, to stay below the 2°C criteria, it is necessary to reduce emission to nearly zero by the 2040s and further continue the reduction so that emission is negative by the 2070s, going into an artificial sequestration phase of atmospheric CO_2. It has to be pointed out that fulfilling such a requirement is an extremely difficult task, though it cannot be ruled out that such an artificial sequestration of atmospheric CO_2 could be achieved in future thanks to technological advancements.

Carbon accumulation on land from 2000, simulated by MIROC-ESM, demonstrates that RCP3PD and RCP8.5 have the lowest carbon storage. This is rather a counter-intuitive result because the scenario with the lowest carbon emission (RCP3PD) and the highest (RCP8.5) fall into the same category of low terrestrial accumulations, while the scenarios with medium emission are associated with high accumulations. Analysis has shown that the key for understanding this apparent paradox is the LUC scenarios. That is, in RCP3PD and RCP8.5, agricultural land use is projected to expand, preventing forest growth and its large carbon sink, because biomass energy is promoted in the former scenario and economic growth has a higher priority in the latter. Due to this suppressed forest growth, carbon accumulation on land is also suppressed.

The grid system of MIROC-ESM



In Earth system models, Earth's atmosphere and oceans are divided into grids in which variables such as temperature and humidity are calculated. The horizontal grid size illustrated roughly corresponds to the actual one adopted in MIROC-ES

Source: JAMSTEC/MEXT

This finding is ironic in that biomass energy production for reducing CO_2 emission could act to shrink the terrestrial carbon sink. It is at the same time intriguing that human activities such as LUC, which can be controlled to some extent by policies, could have a significant impact on the global carbon cycle. Future decision-making on energy and climate mitigation policies should pay attention to such possibilities, although it has to be borne in mind that the results here are obtained by a single particular model and further examinations with multi-model ensembles are desirable.

Vegetation shift

A visualization of changes in vegetation distribution in the experiment under RCP4.5, where the model integration is extended to the year 2300, puts the focus on boreal forest, where the changes are most drastic. In this simulation, the boreal evergreen forest expands northward into northern Siberia, which was originally covered by tundra, whereas boreal deciduous forest almost disappears from eastern Siberia, perhaps because the survival strategy of deciduous trees no longer functions in the warmer climate. If boreal evergreen forests expand as is projected, this might affect the physical surface conditions of the forest. In late autumn or early spring, when the surface land is covered with snow, boreal evergreen forest will help absorb more solar energy through the decrease of surface albedo.

Again, care should be taken because what is shown is a result from a single particular model and examination of the validity of the model processes critical for the biome shift is by no means sufficient because of the inherent difficulty of observing phenomena with centennial or even longer timescales. It can be said, however, that a possibility has been demonstrated by a vegetation model that the Earth has a considerably different distribution of forests after a couple of hundreds years ahead. It should also be pointed out that decisions made by our generation can be crucial factors for the ecosystem centuries later. When that is the case, results from 300-year projections could be a matter for consideration in establishing mitigation policies.

We have seen that ecosystem dynamics in future, ranging from plant distribution to carbon cycling, can be significantly modified, not only though emission of greenhouse gases but also by more direct means, such as deforestation. It has at times been pointed out that the Earth's history has entered a new geological period called 'anthropocene', and that the 'anthroposphere', consisting of human societies, should be regarded as a sub-system of the entire Earth system as well as other sub-systems such as the atmosphere, ocean (or hydrosphere) and biosphere. It appears that the topics presented here demonstrate the validity of the concept and the fact that interactions between the biosphere (including forests) and anthroposphere are one of the most important agents for the future of the global environment.

Tropical rainforest monitoring with ALOS/PALSAR in Brazil and Indonesia

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Remote Sensing Technology Center of Japan

The Advanced Land Observing Satellite (ALOS) was developed and launched by the Japan Aerospace Exploration Agency (JAXA) in January 2006. ALOS carries two optical sensors and one radar sensor on board: the Panchromatic Remote-sensing Instrument for Stereo Mapping (PRISM), the Advanced Visible and Near Infrared Radiometer type 2 (AVNIR-2) and the Phased Array type L-band Synthetic Aperture Radar (PALSAR). While optical sensors PRISM and AVNIR-2 cannot observe the ground surface when it is obscured by cloud, PALSAR provides 10 m ground resolution fine radar data regardless of weather conditions. PALSAR also has a wide observation mode called ScanSAR. The ground resolution of ScanSAR is 100 m, but it covers a width of 350 km. In addition, PALSAR uses L-band frequency which is suitable for forest monitoring because L-band radar waves can penetrate forest leaves and obtain information on both the tree canopy and below. Therefore, PALSAR data is attractive to countries which have a large forest area in their territory — in particular tropical rainforest countries (such as Brazil and Indonesia) and which have been struggling with cloud cover when observing forest areas from satellites.

Image: ©RESTEC

Illegal logging is a very serious issue in Brazil, with large areas of trees being cut down

The Remote Sensing Technology Center of Japan (RESTEC) has supported JAXA with the reception, calibration, validation, analysis and dissemination of ALOS data since its launch in 2006. RESTEC also supported JAXA when it developed various data products for users, particularly in a forest field, such as global mosaic products. In addition to the collaboration with JAXA, RESTEC has conducted other forest-related research and projects by using PALSAR data with domestic and foreign partners. This article introduces two typical forest projects by RESTEC in Brazil and Indonesia.

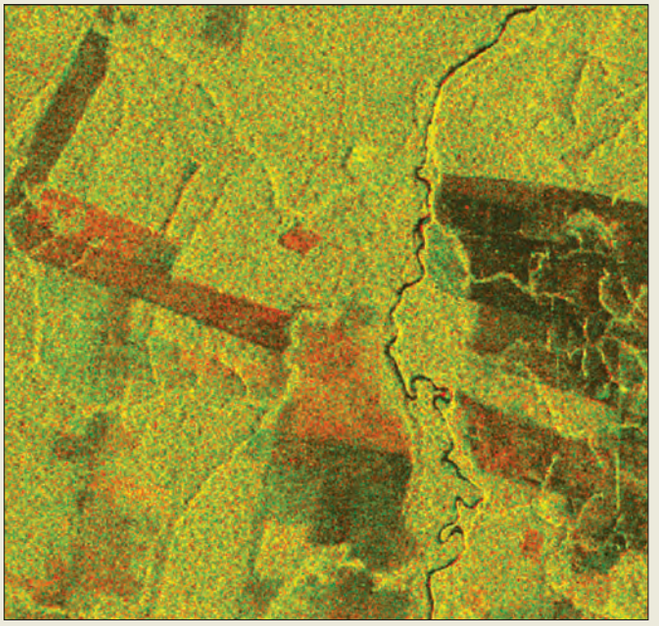
Detecting illegal logging in Brazil

Brazil has a long history of using satellite data for forest conservation since the 1970s and developed the near real-time forest monitoring system DETER. This system contributed to preventing illegal logging, a very serious threat to forests in Brazil. However, one problem is that the system uses optical satellite data and cannot observe the ground surface during almost five months of the year because of thick cloud. The Brazilian Institute of Environment and Renewable Natural Resources (IBAMA) and the Federal Police Department (DPF) obtained PALSAR data from JAXA, but they did not have mature analysis techniques.

Thus, based on a request from Brazil, the Japan International Cooperation Agency (JICA) agreed to transfer the required techniques to IBAMA and DPF in 2008. In February 2009, JICA launched a three-year project called 'Utilization of ALOS images to support protection of the Brazilian Amazon forest and combat against illegal deforestation' in order to detect and prevent illegal logging in the Amazon using PALSAR data. JICA selected RESTEC as an implementing organization of this project.

During this project, IBAMA and DPF receive PALSAR ScanSAR strip data approximately every five days from JAXA. The strip data covers a region 350 km wide and over 3,000 km long, which means that one single strip data covers more than 1 million square kilometres. IBAMA and DPF overlay the strip data on the previous data observed from about five days before, and then make a colour composite image using the original software developed by RESTEC. The original strip data is black and white, but the colour composite image helps users identify land classification and obtain valuable

Colour composite image



Colour composite images can be made from multi-temporal strip data. New deforestation areas are visible as a reddish dark colour and old deforestation areas are dark brown

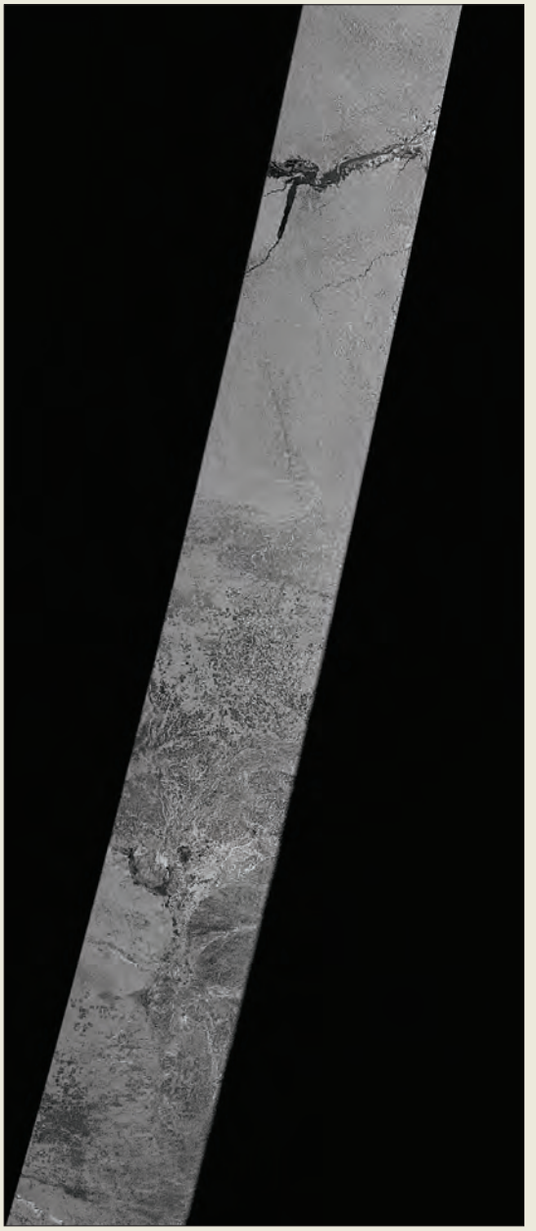
Source: ©RESTEC included ©JAXA, METI

information. If large areas are deforested during the period between the two sets of observation data, the colour composite image would show an area of deforestation as darker than a normal forest area. Furthermore, new deforestation areas are shown as a dark reddish colour, while old deforestation areas are shown as dark brown. In other words, illegal logging is probably under way in the areas shown as dark reddish in the colour composite image.

The colour composite image was divided into several scenes and delivered to interpreters of IBAMA and DPF in order to detect the dark reddish suspected logging areas. There are several interpreters to check the colour composite images covering the whole area of Brazilian Amazon forest. The divided scenes can be extracted as GeoTIFF or KML format so that the interpreters can easily overlay the images on the other optical satellite images on their GIS or even using Google Earth. Needless to say, GIS helps the interpreters identify the position of suspected logging areas. When the interpreters find such areas, the DPF officials rush to the area to prevent further illegal logging and protect the forest. The rapid delivery, process and analysis of PALSAR data is the key to preventing illegal logging. This has only been made possible with ScanSAR data because it can cover the whole of Brazil within five or six days. While ground resolution of ScanSAR data is only 100 m, speed of delivery and the extent of coverage are more important for this project.

To complete the project, RESTEC transferred the required analysis techniques through training. As radar satellite data is very different from optical data, RESTEC started the first training with very basic radar theory and handling techniques. Then, more advanced techniques such as change detection, multi-temporal composite, visual interpretation and so on were transferred. In parallel, RESTEC

PALSAR ScanSAR strip data



The original PALSAR ScanSAR strip data is a black and white image, with a single strip covering an area 350 km wide and 3,000 km long

Source: ©JAXA, METI

developed the original software to detect the suspected logging areas routinely and smoothly. Functions of the software include making multi-temporal colour composite images, cutting out certain areas from the colour composite image, and extracting those areas as GeoTIFF or KML formats.

Estimating forest biomass in Indonesia

Since the 1990s, Indonesia has used optical satellite data (Landsat) for forest monitoring, but cloud cover has been

Colour composite image on Google Earth

Colour composite images can be overlaid on the other optical satellite images

Source: ©RESTEC included ©JAXA, METI/Background ©Cnes/Spot Image, ©2011 GeoEye and ©2010 Google

the main obstacle to getting consistent images, and they are only able to cover the whole area of the country once per three years. On the other hand, the need for obtaining information on forest and forest carbon has been significantly increased after the IPCC Conference of Parties (COP) held in Bali on December 2007, specifically to support programmes dedicated to reducing greenhouse gas emissions in Indonesia. A presidential task force suggested that the use of GIS and remote sensing data from various satellites for mapping and monitoring deforestation and degradation should be the key components for successfully reducing carbon emissions in Indonesia.

RESTEC has long cooperated with Indonesia through various projects and cultivated good relationships with Indonesian ministries and agencies. The Ministry of Forestry (MoF), the Agency for Assessment and Application of Technology (BPPT) and RESTEC recognized that PALSAR data would be suitable for forest monitoring and can solve the cloud problem, enhancing the existing forest monitoring system in Indonesia. Despite the many forest monitoring projects with satellite data conducted in Indonesia, the country would still benefit from the additional capabilities of PALSAR data.

RESTEC has conducted research and analysis for monitoring forest and estimating forest biomass with ALOS/PALSAR data since its launch in 2006. A project established in 2009 involved the development of methods of estimating forest biomass from PALSAR data. Three different methods were developed in different regions: the first was to estimate above-ground biomass (AGB) directly from the intensity of radar reflection (Normalized Radar Cross Section, or NRCS); the second to calculate and estimate AGB from the results of tree height analysed by Interferometric SAR (InSAR) techniques; and the third to calculate and estimate AGB from the classification map made from SAR data.

Based on the situation in Indonesia and RESTEC's previous development work, MoF, BPPT and RESTEC submitted a proposal to the Group on Earth Observation (GEO) and the proposal was accepted in October 2010.

GEO is a voluntary partnership of 87 governments including the European Commission and 61 international organizations. GEO started its activities in response to calls for action by the 2002 World Summit on Sustainable Development and by the 29th G8 summit in Evian. GEO released the Call for Proposals (CFP) in February 2009, in order to identify and promote practical applications of Earth observation to improve decision-making and to call attention to specific examples in which Earth observation provides societal benefit. The CFP also has a particular objective to increase the capabilities and capacity of end users in developing countries to use and apply Earth observations.

The proposal to the GEO-CFP programme was titled 'Utilization of ALOS satellite data to support mapping and monitoring deforestation and degradation in Indonesia'. The project aims to integrate Earth observations into decision assessments and other strategic and operational decision-making processes in mapping and monitoring forest and peatland deforestation and degradation in Indonesia. This overall objective will be completed by the accomplishment of the following objectives: 1. To develop new hierarchical change detection mapping and monitoring methods for forest and peatland in Indonesia using ALOS/PALSAR satellite data; 2. To assess the applicability of the new methods, in terms of reliability, credibility, and consistency to improve capacity, capability, and quality of mapping and monitoring for deforestation and degradation on forest and peatland; and 3. To incorporate the newly developed hierarchical methodology to operate within both national and local levels of the decision-making process.

The project started with a kick-off workshop in Indonesia in July 2011. At this workshop, the participants discussed the current applications of PALSAR in Indonesia in order to avoid duplication and agreed that Indonesia still needs basic training for forest and forest biomass monitoring. As a result of the discussions at the workshop, RESTEC will hold the first PALSAR data training for BPPT, MoF and the other related Indonesian partners in 2012 in Tokyo, Japan.

While the project in Indonesia has just started, the Brazilian project has achieved great success. The success builds on RESTEC's 35-year history, its expertise dedicated to remote sensing and experience of capacity-building. RESTEC conducts satellite data training in both Japan and overseas every year. Since its foundation in 1975, over 3,000 trainees have visited Japan and participated in training with many more having attended RESTEC training overseas.

Collaborative research to enhance benefits and livelihoods from forests

Tony Bartlett, Australian Centre for International Agricultural Research

The Non-legally Binding Authoritative Statement of Principles for a Global Consensus on the Management, Conservation and Sustainable Development of All Types of Forests (Forest Principles) calls for a strengthening of the contribution of science and research in advancing sustainable forest management, as well as the development and application of scientific and technological innovations that can be used by forest owners and indigenous communities to that end.

Over the past 30 years, the Australian Centre for International Agricultural Research (ACIAR) has been investing in international forestry research, predominantly in the Asia-Pacific region. ACIAR's forestry programme facilitates collaborative research by Australian and international forest scientists with developing country scientists, to build capacity and enhance the contribution made by sustainable forestry to livelihoods and economic development in partner countries.

ACIAR has facilitated significant advances in scientific knowledge and transfer of Australian tree germplasm, enabling the widespread adoption of Australian species in plantations in China, Viet Nam, Indonesia, Laos, India, Thailand and southern Africa. In more recent years, ACIAR's forestry projects have been located in Indonesia, Papua New Guinea, Viet Nam, Laos and several Pacific Island countries. These projects focus on adding value to local and introduced species, developing non-timber forest products and supporting forest industries and agroforestry to benefit small landholders.

Improved management of tropical forests

In many places, tropical forests are the only forest resources available to local communities and therefore there is an urgent need for research to assist communities in managing them. In Papua New Guinea (PNG), ACIAR has conducted collaborative research on improving the contributions that secondary forests make to national and local economies by developing appropriate strategies for their management and marketing. These include enhancing PNG's network of permanent forest

Image: Tony Bartlett

Papua New Guinea farmer with 10-month-old balsa trees

Image: Julian Fox, University of Melbourne

Landowners in Papua New Guinea conducted participatory forest inventory research

inventory plots and analytical capacity, developing community-based forest assessment and management planning capabilities with four communities and modelling the possible financial outcomes.

The project developed innovative individual-tree growth models that can be used in combination for forests with virtually any species mixture or size structure. These models were used to calculate changes in merchantable volume and carbon stocks over time in different forest types. The research demonstrated that commercial timber resources in most secondary forests are recovering, with above-ground woody biomass recovering at an average sequestration of 1.12 ton C ha^{-1} yr^{-1}, and that it will therefore take about 75 years to return to the pre-harvest carbon stock. Forest scientists can now calculate the impacts of different forest management scenarios on carbon sequestration using PNG forest inventory data, rather than having to use default values from the Intergovernmental Panel on Climate Change's reports.

Another finding was that community-based small portable sawmill operations can be profitable if they process about 1,000 m^3 yr^{-1} of logs into sawn timber, which can be sold within 100 km of the mill without the need to construct roads. The work undertaken to develop forest management plans for four community forests, together with the improved information on carbon sequestration rates and profitability of small sawmill operations, provides these communities with the ability to decide how to manage their forests sustainably.

Better returns from plantations

About half of Viet Nam's plantations are comprised of Australian tree species of *eucalypts*, *acacias*, *casuarinas* and *melaleucas* and about one third of the plantations are owned by smallholder farmers. In some areas, more than 65 per cent of the total annual income of poorer households is derived from forestry.

Since 1989, ACIAR has supported the development of these plantations through research on species selection, genetic improvement, plantation productivity and, more recently, plantation silviculture. ACIAR's impact assessment modelling found that its A$1.5 million investment in plantation productivity research in Viet Nam has delivered benefits with a net present value of around A$129 million. About two thirds of these benefits flow to consumers via lower prices but the rest go to the producers, including large numbers of smallholder farmers, who have planted the better quality genetic material. On average a farmer growing *acacia* pulpwood on a 7-year rotation would get an extra 11 m^3 ha^{-1} of product to sell as a result of this collaborative research. Smallholders can achieve greater income and make more informed decisions on whether to grow short-rotation pulpwood or longer-rotation sawlogs.

Some smallholder plantations can be grown on short rotations in conjunction with agricultural crops. In PNG, farmers are growing balsa plantations on a five-year rotation. Following a decline in productivity due to the introduction of seed of poor genetic origin, research is being conducted to improve the availability of high-quality balsa germplasm. It is anticipated that this collaborative research will increase yields by at least 75 per cent and thereby generate an additional revenue of PGK5,900 per hectare for farmers.

Adding value to plantation-grown wood products

Viet Nam has a very substantial wood processing sector, which includes pulp and panel mills as well as thousands of small and medium-sized wood manufacturing enterprises. Its furniture industry is now the fifth largest contributor to exports, but the industry currently relies

Image: Tony Bartlett

Australian and Vietnamese researchers carried out thinning trials on four-year-old *Acacia mangium* trees

Image: Tony Bartlett

Vietnamese researcher with one-year-old *Acacia mangium* clone

Image: Tony Bartlett

Farmers in Viet Nam have benefited from the production of sliced veneer from 9-year-old *Acacia mangium* trees

Image: Tony Bartlett

Teak-based agroforestry system near Luang Prabang in Laos

on imports of 4 million m^3 of hardwood timber each year. At present, almost all of Viet Nam's plantation timber is processed into pulp or reconstituted panel products. New technologies, such as spindle-less lathes and veneer slicers, do not require logs as big as those for sawn timber, giving rise to an emerging interest in veneer production.

ACIAR is researching the production of veneer and engineered wood products from small diameter plantation logs and linking of certified timber to high-value markets. Fast-growing eucalypt and *acacia* logs can be used for the production of veneer, provided they have appropriate log and wood quality. This research aims to help smallholders achieve higher prices for their plantation timber, leading to reduced demand in Viet Nam for hardwood logs sourced from primary forests in other countries.

In Laos, up to 50,000 hectares of predominantly teak-based plantations have been established over the last twenty years, primarily by small landholders. ACIAR's research in Laos has focused on enhancing teak log quality and improving the quality of furniture made from plantation timber, through better knowledge of timber properties and applying appropriate processing, drying and manufacturing systems. Working collaboratively with local researchers and nine sawmills and furniture factories, the capabilities, weaknesses and opportunities of the individual participating companies were assessed. Methods were developed and training held to make production processes more efficient, reduce wood waste and improve the health and safety of the employees.

Agroforestry systems

In northern Laos, ACIAR's teak agroforestry project has established trials of teak grown with other high-value agricultural crops, such as paper mulberry, bananas, pineapples, broom bush and 'Job's tears', to generate cash income during the early years of a teak plantation. Most of these agroforestry systems are being established on land formerly subject to shifting cultivation. This project has already demonstrated good results with important information on growth rates, financial returns and farmers' motivations for planting teak and other species. Landowners are benefiting from additional income from the sale of products in the short term with the promise of a long-term revenue stream from the sale of teak logs within 20 years.

In PNG, ACIAR's agroforestry projects are fostering the adoption of commercial high-value tree growing and firewood production by landowners. Landowner decision-making has been assessed in relation to incorporating commercial trees into existing agricultural systems and community-based plant nurseries have been developed. Trials of potential fuelwood species with coppicing characteristics have been established in different regions and the production of charcoal from different species is being explored. To tackle the problem of poor availability of high quality tree seedlings, research is being conducted on improving the quality and availability of seedlings through seed collections locally and overseas, vegetative propagation and the development of teak seed stands and nurseries. Participatory rural appraisals have been conducted in a number of regions to assist local communities in identifying the most highly valued local tree species for inclusion in the project.

In Indonesia the expansion of smallholder teak growing faces various impediments, including inferior wood quality due to poor silviculture, inability of farmers to wait for teak returns and low log prices for smallholder-grown teak. An ACIAR project, managed by CIFOR, aimed to improve the livelihoods of smallholder teak growers through research on introducing and adapting silvicultural technologies, the development of financial incentives and improved market access for smallholder teak growers. Project activities,

Image: Tony Bartlett

Communities in Papua New Guinea undertook participatory research to identify the highest-value local tree species

Image: Tony Bartlett

Solomon Islanders process *Canarium* nuts using traditional methods

such as farmer visits and training, establishment of on-farm demonstration trials and the development of a silvicultural manual, have improved farmers' knowledge and capacity to implement better practices.

Thinned and pruned teak trails resulted in a 60 per cent increase in diameter growth and a 124 per cent increase in height growth over a two-year period. The project led to the establishment of a microfinance institution to enable farmers to borrow against the value of their planted teak trees. In the Gunungkidul region where the project operated, most farmers allocated about 10 per cent of their land to growing teak under a 'tegalan' rain-fed agroforestry farming system. Surveys found that 70 per cent of farmers at project sites had increased knowledge of appropriate teak silviculture and about 50 per cent had been applying these skills. Farmers who were able to retain their trees until they reached diameters of 30-40 cm received 13 times the value for their trees of those who sold their trees at diameters of less than 20 cm.

Increasing livelihoods from non-timber forest products

Most forest-dependent people or communities utilize a variety of non-timber forest products, which offer considerable potential for increasing livelihoods. In the Pacific, ACIAR has conducted research to support the growth of the sandalwood industry in Vanuatu and the *Canarium* nut industries in PNG, Solomon Islands and Vanuatu.

In the past 15 years, Vanuatu has developed domestic sandalwood oil processing facilities and has encouraged landowners to plant sandalwood in their gardens and in plantations. ACIAR's research has analysed oil concentrations from natural sandalwood trees from six different islands and found that only two of these populations have oil contents that meet the international standard. A research programme is being conducted to enhance the production of germplasm from these populations. On average, landowners who are currently participating in the sandalwood industry sell about 120 kg of sandalwood each year and receive about $A1,000 in revenue, which is used to meet a variety of domestic needs.

Indigenous nut trees of the *Canarium* genus grow in south-east Asia and the Pacific and local people have used these highly nutritious nuts in their subsistence lifestyles for generations. These trees also produce high quality timber and can be grown in and around traditional gardening areas. ACIAR has been conducting research on the production of high-yielding plants that begin flowering after four years and also on the processing of these nuts and the development of higher value products, such as coated nuts and blended foods. This will enable the development of high-value products for sale in urban and export markets. It is estimated that potential markets in Vanuatu and the Solomon Islands could be worth more than $A1million each year, while an export-focused market in PNG would be worth many times this amount. While local people understand how to process the nuts for local consumption, research is needed on how to manage local processing in a manner that ensures high-quality nuts can be delivered from remote locations to value-adding processing facilities.

Collaborative forest research is both an essential component of sustainable forest management and a very effective mechanism for generating enhanced benefits for forest owners, forest-dependent communities and people engaged in forest industries. ACIAR's work in a number of countries clearly demonstrates that these enhanced benefits can be achieved throughout the broad spectrum of forestry, including management of native forests, plantation growing, wood processing, agroforestry and utilization of non-timber forest products. In addition, this approach to supporting forestry research develops local capacity and establishes lifelong friendships and networks between the research partners.

Youth and nature: next-generation awareness

Nico Boele, Ranger, Westerkwartier, Jenny van Leeuwen, Ranger, Balijbos,
Erna van de Wiel, Senior Policy Officer, Recreation and Youth, National Forest Service, the Netherlands

Forests and nature serve an important recreational function for people living in a densely populated country like the Netherlands. As forests in the Netherlands are considered an intrinsic part of nature, the Dutch Government includes them in its nature policy. Though the focus in the past was on the ecological value of forest and nature, there is now a growing awareness of the need to involve people, especially youngsters, in the conservation and development of forests and nature. This can be achieved by ensuring that the functions of forests and nature are more accessible and more closely aligned to the wishes of the public. Forests should also be protected, managed, maintained and developed by people.

Encouraging people to support forest and nature conservation requires effort: they first have to feel involved before they can take responsibility. That is why the Ministry of Economic Affairs, Agriculture and Innovation is working towards a sustainable future by means of a green economy, with a particular focus on the younger generation.

The Netherlands has an ageing population and fewer young people are choosing studies that lead to work in the green sector. They are also less likely to take responsibility for the green areas around their homes, for instance by volunteering for local nature management projects. Only sufficient knowledge and active involvement in issues like sustainable production and biodiversity will enable young people to make sound choices later, to feel responsible for the care and management of their environment and to contribute to the sustainability of our society. Outlined below are two National Forest Service initiatives which have been implemented in partnership with the Ministry.

Putting policy into practice

The National Forest Service, which is the largest nature manager in the Netherlands, implements Government policy on forests and nature and manages around 7 per cent of the country's territory. This is equal to 260,000 hectares of woodland and nature, of which 86,000 hectares is Forest Stewardship Council certified forest land. Since 1998 it has operated as an independent administrative body, rather than a Government agency. This offers scope for greater public participation in forest and landscape management and in decisions about new recreational facilities.

Government policy aims to decentralize wherever possible, allowing local people and local and regional authorities to take greater responsibility for the quality of nature, forest and landscape. Central Government wants more visible participation by the general public, businesses and other interested parties in decisions, action and funding, with a view to building sustainable public support.

Until now the Ministry of Economic Affairs, Agriculture and Innovation has been responsible for forest and nature policy and has been the major client for the National Forest Service's contractual products and services. Facilities created in the managed sites include pathways, picnic sites and hides, as well as excursions and nature education services for young people. In the coming years, provincial authorities will play a more prominent role in determining policy and subsidising the management of nature, woodland and landscape elements. Government subsidies will be available for basic public access, after which the sites provide the basis for delivering very diverse services to the community.

Since its inception in the early twentieth century, the National Forest Service has responded to the needs of society by planting trees on wasteland, producing timber and providing recreational facilities. In today's society, the collective benefit is less prominent, and attention has turned to fulfilling the needs of group interests and individuals. The Service will become a community-focused organization, developing business activities to ensure that forest and nature areas are sustainably managed and that they operate optimally for the benefit of society.

In future the Service's management activities will be more customer-focused and more firmly rooted in society. The metaphor is 'the public estate: of and for the people'. This grounding in society is particularly evident at local level (at home in the district), where people not only take advantage of their local nature reserves, but also take a greater role in decision-making.

Residents and visitors are offered space to connect with trees and nature: people refer to 'their' place, tree or picnic spot as having particular significance for them. The Service's Youth Programme, which has been running since 2009, offers children the space to feel at home in their own environment. The current generation of adults takes this experience for granted, as they grew up with it. But things are different for the current generation of children: many grow up in an urban environment, in families that do not automatically find their way to the natural open spaces.

The Youth Programme puts the needs of young people first, and centres on freedom to discover. The guiding principle of the programme is Howard Gardner's educational theory of multiple intelligences

National Forest Service management

The National Forest Service manages 260,000 hectares of forest land in the Netherlands

Source: National Forest Service 2011

(as described in his book, *Frames of Mind*), with the forms of nature education offered taking account of varying levels of ability and different qualities. The current products were developed in cooperation with new partners, such as youth work organizations, and connect with networks in other fields, such as sports and games. A love of nature is also reflected in the programme. The reasons for giving an extra boost to the target group of young people are that:

- Spending time in nature contributes to child development and helps build self-confidence
- Inviting children and young people to experience nature ensures that they will appreciate nature in future
- Many children have little green space in their surroundings but need the natural environment to stimulate free expression and a sense of adventure.

Balijbos

The National Forest Service decided to create woodlands for unstructured play as close as possible to residential districts, to give children space to range and discover nature. There are now over twenty such woodlands in the Netherlands, with the Forest Service as the major provider. These areas are designed by and for children, who take a major role in their realization – for example, by choosing the theme, considering how to develop the plans and playing a central role as first users at the opening.

The Balijbos nature reserve in Zoetermeer skirts towns in the densely-populated western Netherlands. The municipalities of Zoetermeer, Ypenburg, Delft and Pijnacker, which border the Balijbos, are inhabited by some 300,000 people. The first citizens' initiative in the Netherlands was implemented here. Following a request from a group of residents, a woodland recreation area for young people was created in the existing forest, with cooperation from the National Forest Service and Zoetermeer Council.

A woodland play area is not just a wood; it is a real adventure playground. Nature is enhanced with features that encourage play but are still in keeping with the landscape and surroundings. Children can scramble around on artificial castles, or build huts. They can cross water using rope bridges and there is plenty of scope to run around and mess about. The most striking thing is that although the Balij play area has a lot of visitors, you can still see rare species there, such as hart's tongue ferns and kingfishers.

Because it was so heavily used, the children's wood was extended and officially reopened in 2011. The Council encourages children to play there with its Natuursprong (nature leap) programme. This involves a lot of children who would never normally find themselves in the woods, if at all. For the Council, this in an opportunity to flesh out local policy. A council worker explains:

"Last year the National Forest Service set us off on the trail of Natuursprong. I think it's a unique, fun project. Zoetermeer Council already has a woodland play area in place that can accommodate the project nicely. We want to see broad child development, so we want to continue with Natuursprong. The nice thing about it is that you can approach it from so many different policy angles, such as youth work, nature and environmental education, or sport and recreation."

Since 2008 the Balijbos has been much improved. Residents and users are closely involved and have turned into active campaigners. They play an emphatic role in discussions about the future of the forest. Activities are organized by an active group of management volunteers and local people, as well as the Forest Service. In the autumn, local residents were looking for a place in the forest to celebrate Halloween, and the children's woodland was the perfect meeting point. Another fun option for secondary school children is a placement in a voluntary organization. This involves accompanying less able people on nature walks, acting as personal assistants and nature guides.

In recent years there has been increasing scope to experiment with the different roles of citizens. There are examples of members of the public taking considerable responsibility for nature and landscape in their surroundings, with the National Forest Service in a facilitating role. For example, there is a group of riders who maintain a new bridleway themselves. Thus local involvement has produced an initiative of general interest, enabling rare species in their natural habitats to coexist happily with people making use of woodland and nature reserves.

Westerkwartier

One area where residents and the National Forest Service have long worked well together is the Westerkwartier near Groningen. This is in the north of the Netherlands, one of

Image: Geertemarie de Gelder

Many children have little green space in their surroundings but need the natural environment to stimulate free expression and a sense of adventure

the least urban areas of the country. Crooked ditches, winding roads, open grassland and fields give the area a unique character. Water-filled bog holes hark back to an era of peat cutting, with low-lying peat soils and higher-lying sandy soils alternating with pools, woods and heath to add an extra dimension. Numerous initiatives have been taken in this area because residents take the lead in the design and management of their living environment. Collaborative ventures have led to areas that manage to cope with a high volume of use, but still retain a high nature value. Local people are proud of their region and tell the rangers: "We are not your voluntary staff, you are our paid help."

Collaborative projects

A local group had a dream to reinstate the 'Bos van Pebe' (Pebe's wood) in the Peebos. The wood had disappeared from the map in the previous century. The new wood was planted with cooperation from a Peebos working group, including hundreds of schoolchildren. Following negotiation with private landowners, a continuous walking route was created, opening up a practically inaccessible area for locals and tourists to enjoy.

The Curringherveld is another initiative in which almost fifty volunteers are active in their area on a daily basis. In a few dozen hectares they have recreated the Westerkwartier in miniature, including all the different landscape types. The local residents make their own planning decisions and take on the lion's share of management. The National Forest Service provides advice and support. Every year hundreds of children get to experience the new nature trails.

A village association decided to lay out the first barefoot path in the Netherlands. It was created so that villagers could take a walk into the adjoining meadows, but since then thousands of children 'from outside' have come to enjoy a walk without their shoes. The path connects natural and fun features such as stepping-stones, small bridges and a watchtower. Two residents also started a local business on the back of increasing visitor numbers and they were able to carry out these activities without affecting the area's natural values, or disturbing the meadow birds.

Through the efforts of our forest rangers we have been able to connect people — adults and children — with the nature reserves in their area. In so doing we have laid the basis for new forms of management but, more than that, for public support for the natural environment, now and in successive generations.

With contributions from Marianne van den Boogaart and Rob Busink, Ministry of Economic Affairs, Agriculture and Innovation, Netherlands.

Reading the forest in Iceland

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Over the eleven centuries since settlement first took place in Iceland, unsustainable land use has reduced the country's forest and woodland cover from roughly 30 per cent to less than 1 per cent of land area, making Iceland one of the most severely deforested countries in the world. Several woodland remnants were protected in the early 20th century and afforestation through tree-planting began around 1950, increasing greatly since 1990. In recent years, livestock grazing has been excluded from larger areas than before, resulting in natural expansion of native birchwoods. Together, these developments have resulted in expanded forest and woodland cover during the past 60 years, but at 1.4 per cent it is still the lowest in Europe.

Past types of forest use, for fuel, charcoal and livestock fodder, are no longer important, but the new cultivated forests and returning woodlands provide new opportunities and benefits. Tree-planting mostly takes place close to where people live and many forests, especially those close to urban areas, are much used for outdoor recreation. Health benefits and other social aspects of forests and forestry are already highly valued. It is also essential that Icelanders learn to respect their new forests and utilize their many products and benefits. Since there are few useful forest-related traditions to be passed down from parent to child, schools are the ideal place to introduce these new possibilities.

Creating 'neighbourwoods'

Beginning in 2001, Olafur Oddsson of the Iceland Forest Service initiated a programme called Lesið í Skóginn (LIS), which can either be translated as 'reading the forest' or 'obtaining from the forest', both of which are appropriate. The programme was an offshoot of a series of public mini-courses under the same name emphasizing wood carving and other potential uses of fresh wood from the forest, as well as forest ecology. The LIS programme started as a cooperative effort between the Iceland Forest Service, the Reykjavik Department of Education and six primary schools. The University of Iceland's Education Department quickly became a major partner, as did the Reykjavik City Parks Department. The Iceland Forest Service is a central partner in LIS cooperation but no longer the 'main' partner, since most of the activity takes place in the participating primary schools and at the University.

All Images: Olafur Oddsson

The forest in Iceland is an environment to enhance all types of learning, for both children and adults

LIS is based on two main premises: firstly, the 'neighbourwood' concept — a forest or afforestation area within a short walking distance from the school — and secondly, the importance of using the forest as an outdoor classroom for all subjects, not just to learn about the forest itself (woodworking or science) but also arts, mathematics, languages, history and more. The forest is an environment to enhance all types of learning. Add to this the principle of sustainability, well known to foresters, and it means that the school takes responsibility for the forest and its use of it, with minimal assistance. A representative of the Forest Service is often necessary as a go-between to facilitate initial contracts between schools and forest owners and is on hand to introduce the teachers to the possibilities in their forest, but is only occasionally involved directly with the pupils.

To date, 35 schools have participated in the LIS project, or about 15 per cent of the primary schools in Iceland. Most of these schools are in the city of Reykjavik, but village and rural schools in all parts of Iceland also participate. At first glance it might seem difficult to find 'neighbourwoods' close to schools in the city, or indeed anywhere in a sparsely wooded country such as Iceland. However, they need not be large in area and the trees need not be tall or of any particular species. They do, however, need to provide shelter in windy Iceland. The forests used by LIS schools include groups of trees recently planted in the corner of the schoolyard, private woodlots and plantations, municipal amenity plantations, forest society plantations and parts of two national forests. Depending on the location and ownership of the forest, it is important to promote cooperation between the school and the forest owner or manager. Sometimes permission is needed to plant or cut down trees, and there may be a need for tools or a person to operate a chainsaw. A very good example is the involvement of the City Parks Department of Reykjavik with several city schools.

Teaching the teachers

A basic part of the LIS programme is providing information to teachers about the many possibilities for using the forest in learning. To begin with, the original LIS wood carving course was offered to teachers as continuing education by the University of Iceland's Education Department, taught by Forest Service staff. This developed quickly and was augmented by the experiences of teachers already participating in LIS. The programme is now taught as a masters level course at the University and several students have chosen to write their masters theses on LIS-related subjects. This cooperation between the Forest Service and the University of Iceland has become one of the cornerstones of the LIS programme and is essential for introducing LIS ideas and methods to teachers. The University now has its own 'neighbourwood', where future teachers are doing their learning in a woodland environment.

Developing projects

Another aspect of LIS is the development and sharing of a large number of learning projects, which cover all disciplines and vary appropriately with the age of pupils. Some can be completed during one trip to the forest, while others take months or even years. To begin with, several projects or ideas for projects were put forth by Forest Service staff, but they are increasingly being developed by the teachers. Increasingly, the projects are interdisciplinary in nature, setting goals that require diverse steps or skills to complete. Teachers can modify the learning projects to suit their

LIS promotes and encourages development and sharing of many learning projects covering a range of diciplines and ages

Pupils benefit greatlly from an outdoor learning environment and the diversity in learning that the forest provides

needs and they are encouraged to share their modifications with other teachers, leading to project evolution and proliferation.

For some time, the Forest Service has aimed to post descriptions of these learning projects on a website, making them easily available to a larger number of teachers. This has however proved difficult due to the rapid development and proliferation of projects. A website will hopefully be set up soon, but the difficulty of doing so now is actually a very good sign, as it means that the LIS programme is alive and growing.

LIS in the curriculum

Schools that participate in the LIS programme incorporate outdoor learning in the forest into their curricula, not as a subject, but rather as an interdisciplinary part of the learning process. Many connect it strongly to learning about sustainable development. LIS also helps to achieve many of the goals set in the general curriculum for Icelandic schools by providing diversity in learning. This includes meeting the needs of individuals, improving well-being, providing interdisciplinary learning and promoting equality and inclusiveness.

Just as a growing tree sends branches in all directions, the LIS programme has also developed offshoot projects. A particularly successful one identified pupils (aged 14-15) who showed behavioural problems in the classroom setting and gave them more time and especially more responsibility in the forest. Taking them out of the classroom for two hours per week and letting them work on improvements to the forest under the guidance of a forester or horticulturist improved their attitude in general and even improved their regular school work in some cases.

Preschools are increasingly using forests for outings and some now participate in LIS and have their own 'neighbourwoods'. Among the things children learn is how to climb a tree safely. Senior citizens often volunteer to work with children in preschools and, in some cases, in primary schools. The forest has turned out to be an excellent venue for bridging the generation gap and is beneficial to both young and old.

Ten years young

The LIS programme is now ten years old, but is in rapid development and is still considered a development project by the Iceland Forest Service. Early emphasis on modifying the forest, building shelters and benches to create a teaching environment, has been replaced by an emphasis on the forest as a learning environment and on leaving it the way it was found. Management plans are being made for some of the forests and should be helpful in increasing their potential use in learning. Research is under way to gauge the effects of participation in LIS on important aspects such as academic achievement, pupil and teacher satisfaction, interdisciplinary learning and effectiveness in meeting individual needs.

Feedback from teachers on the success of the LIS programme has been very positive. It is clear that some pupils benefit greatly from an outdoor learning environment and many benefit from the diversity in learning that the forest provides. Baking bread on a stick over a fire is fun and interesting. Learning to build a safe campfire is both exciting and important. Calculating the volume of a tree teaches geometry in a way that is actually satisfying to the pupils' curiosity. Finding out how much carbon a tree has sequestered connects geometry to sustainable development and climate change. The list of ways in which the forest can be used in education is practically endless.

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2 Countries include Benin, Ethiopia, Mali, Mozambique, Rwanda, Uganda, Afghanistan, Burundi, Yemen, Palestian Territories, Sudan, Bangladesh, Ghana and Kenya. Vietnam, Colombia and South Africa are considered as so-called Transition countries.
3 TBI is an international non-governmental organization based in the Netherlands. TBI's mission is to improve tropical forest governance and management for the benefit of people, conservation and sustainable development. TBI currently operates programmes in Colombia, Cameroon, DRC, Ghana, Indonesia, Suriname and Viet Nam and it also participates in projects in Guyana and Bolivia (www.tropenbos.org).
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3 The Vatavriksha or Banyan tree (*Ficus benghalensis*) is popularly called a 'tree of Immortal Refuge' because of its longevity. The Banyan tree also symbolizes all three Hindu gods of the Triad: Lord Vishnu is its bark, Lord Brahma the root and Lord Shiva its branches. This national tree of India symbolizes Hinduism, which branches out in all directions, draws from many roots and spreads shade far and wide, yet stems from one great trunk. It is remarkable for sending down aerial roots from its branches and these roots give rise to more trunks and branches.
4 Kalpavriksha is a mythological, wish-fulfilling divine tree, a giver of everything, i.e. truly multipurpose in nature. Kalpavriksha as a tree of plenty can figuratively refer to a source of bounty, and different trees are referred by this name in different parts of India.
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6 Head and Hughes, 1996, p. 279
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9 Hill et al., 2000; Langton, 1988
10 Bowman 1998; Robinson et al. 1995
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12 Andersen et al., 2003
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17 Hill et al., 2011; Pickerill, 2009
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19 Australian Government, 2005
20 ILC, 2011
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22 Robinson et al., 2011
23 Russell-Smith et al., 2009
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30 According to the approach of Polglase et al., 2008
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2 Caiçaras people are fishermen who inhabit the coast of South and Southeast regions of Brazil.

3 Workers undertaking the traditional activity of rubber extraction (rubber tappers).

4 Fig1. Amazon Rainforest, Parque Nacional Montanhas do Tumucumaque (photo: Zig Koch/MMA). Fig2. Atlantic Rainforest, Reserva Biológica do Arvoredo (photo: João de Deus Medeiros). Fig3. Cerrado, Parque Nacional da Chapada das Mesas (photo: Palê Zuppani/MMA). Fig4. Caatinga, Reserva Particular do Patrimônio Natural Serra das Almas (photo: João de Deus Medeiros). Fig5. Pantanal, Estação Ecológica de Taiamã (photo: Palê Zuppani/MMA).

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