



The role of forests in climate change adaptation and mitigation



Forests play a crucial role in climate change mitigation and adaptation. Under the Kyoto Protocol,¹² forests can contribute to emissions reductions of Annex B countries (which are generally developed countries) to the Kyoto Protocol. Developing countries may participate in afforestation and reforestation activities under the Kyoto Protocol's Clean Development Mechanism (CDM)¹³ to offset global emissions. Further mitigation options related to reducing emissions from deforestation and forest degradation (REDD) and enhancing forest stocks are proposed in a possible future agreement under the UN Framework Convention on Climate Change (UNFCCC). This chapter considers forest-related issues as they relate to countries' efforts to meet their commitments under the Kyoto Protocol, as well as further developments under the UNFCCC.

The use of forests for climate change mitigation also poses a number of unique problems. For instance, the ownership of forest carbon is recognized as an important issue that countries need to address. Concerns have emerged over the long-term financial benefits, and ownership of these benefits by the communities involved in forest mitigation activities. Unclear or inequitable forest carbon ownership or land tenure can constrain the implementation of climate change policies and actions. The latest trends in forest carbon law and policy, and mechanisms for defining carbon ownership and the transfer of carbon rights are presented in this chapter.

Adaptation measures in the forestry sector are essential both to climate change mitigation and for underpinning sustainable development. Without adaptation measures, the impacts of climate change are likely to affect forest dependent people in poorer countries more severely than the populations of developed countries. This chapter also discusses ways in which adaptation measures can – and should – be more closely integrated into climate change policies and actions.

Never before have forests and the forestry sector been so politically prominent. This is a unique moment in time. The forestry sector and the billions of people who depend on forests for their livelihoods have much to gain by using existing political support and emerging financial opportunities to take appropriate action.

Forests in the Kyoto Protocol

The world's forests store an enormous amount of carbon – more than all the carbon present in the atmosphere. The inclusion of forests, and of land use, land-use change and forestry (LULUCF) in the Kyoto Protocol was the subject of intense debate throughout negotiations on the Protocol. Indeed, forests and LULUCF were not definitively addressed until 2001 under the Marrakesh Accords.¹⁴ These forest functions in the carbon balance are addressed by three Kyoto Protocol activities: afforestation/reforestation; deforestation; and forest management. Countries report on the changes to carbon stocks in managed forests that result from these three types of activities.

¹² According to the United Nations Framework Convention on Climate Change (UNFCCC), “the Kyoto Protocol is an international agreement linked to the UNFCCC. The major feature of the Kyoto Protocol is that it sets binding targets for 37 industrialized countries and the European Community for reducing greenhouse gas (GHG) emissions. These amount to an average of five per cent against 1990 levels over the five-year period 2008–2012”. (<http://unfccc.int>)

¹³ According to the UNFCCC, “the Clean Development Mechanism (CDM), defined in Article 12 of the Protocol, allows a country with an emission-reduction or emission-limitation commitment under the Kyoto Protocol (Annex B Party) to implement an emission-reduction project in developing countries. Such projects can earn saleable certified emission reduction (CER) credits, each equivalent to one tonne of CO₂, which can be counted towards meeting Kyoto targets”. (<http://unfccc.int>)

¹⁴ The Marrakesh Accords, according to the UNFCCC, include rules for LULUCF activities consisting of three main elements: “A set of principles to govern LULUCF activities; definitions for Article 3.3 activities (forest sinks) and agreed activities under Article 3.4 (additional human-induced activities); and a four-tier capping system limiting the use of LULUCF activities to meet emission targets”. (<http://unfccc.int>)

In 2010, Annex B Parties of the Kyoto Protocol submitted their annual data on greenhouse gas emissions (GHG) for the year 2008 (Table 40). These data provide a clear indication of the role of forests in the carbon cycle and also of the new financial value that forests have through carbon markets. The data also indicate that forests in the Russian Federation absorb almost half a billion tonnes of CO₂ equivalent per year, primarily through forest management activities. Japan's forests offset over 29 million tonnes of CO₂ equivalent. If all of this could be sold on the market, assuming a price of US\$20 per tonne of CO₂ equivalent, it would be worth a total of US\$600 million per year.

The value of forests in developed countries (Annex B Parties to the Kyoto Protocol) is an indication of the potential magnitude of emissions offsets if all the world's forests were to be included in a new agreement on climate change, a subject under discussion in current UNFCCC negotiations. The new financial value that forests in developed countries have gained within the climate change market has still not been fully accounted for, although this may change depending on the way in which developing countries' forests are considered in climate change projects and processes.

At the global level, the *Fourth Assessment Report* of the Intergovernmental Panel on Climate Change (IPCC, 2007) indicated that global forest vegetation contains 283 Gt of carbon in biomass, 38 Gt in dead wood and 317 Gt in soils (in the top 30 cm) and litter. The total carbon content of forests ecosystems has been estimated at 638 Gt, which exceeds the amount of carbon in the atmosphere. As noted in Chapter 1 on regional trends from the Global Forest Resources Assessment 2010 (FRA 2010), forest biomass has generally increased in all regions, with Europe including the Russian Federation containing the largest amount of biomass.

The role of forest products in carbon storage is not addressed in the Kyoto Protocol. However, the contribution of harvested wood products (HWP) to the global carbon cycle and the possibility of including this in Annex B countries' GHG accounting is being debated in the UNFCCC negotiations on the second commitment period of the Kyoto Protocol. For instance, Table 41 shows estimated emissions and sequestration from the forestry value chain, based on 2006–2007 data.

Table 40. Data on afforestation and reforestation (A/R), deforestation (D) and forest management (FM) activities reported by Annex B Parties under the Kyoto Protocol for the year 2008 (in Gt CO₂ equivalent)

	A/R	D	FM	CO ₂ balance
Australia	-16 948	49 651		32 703
Austria	-2 531	1 224		-1 307
Belgium	-399	468		69
Bulgaria	1 353	275		1 628
Canada	-738	14 643	-11 503	2 403
Czech Republic	-272	160	-6 145	-6 257
Denmark	-70	35	281	247
Estonia	-534	6 600		6 066
Finland	-1 077	2 886	-39 935	-38 126
France	-13 591	11 926	-84 620	-86 285
Germany	-2 615	16 393	-20 441	-6 663
Greece	-351	4	-2 052	-2 399
Hungary	-1 183	44	-3 885	-5 025
Iceland	-102			-102
Ireland	2 763	11		2 774
Italy	-1 736	386	-50 773	-52 122
Japan	-391	2 431	-46 105	-44 065
Latvia	-440	1 674	-23 595	-22 361
Liechtenstein	-11	4		-8
Netherlands	-547	780		233
New Zealand	-17 396	2 910		-14 486
Norway	-104	-93	-30 827	-31 023
Poland	-3 916	263	-46 865	-50 519
Portugal	-4 134	6 877	2 563	-180
Russia	-4 093	26 607	-462 469	-439 455
Slovakia		2 426	-10 324	-7 897
Slovenia	-2 456	2 385	-10 307	-7 851
Spain	-10 276	188	-39 120	-52 279
Sweden	-1 576	2 385	-18 606	-17 797
Switzerland	-35	82	-855	-808
UK	-2 696	452	-10 873	-13 116
Ukraine	-1 759	150	-47 718	-49 327

Source: http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/5270.php

Note: Belarus, Croatia, Lithuania, Luxembourg, Romania and Turkey did not report on the LULUCF sector.

Table 41: Estimated emissions and sequestration in the global forest products industry value chain, 2006–2007

Process	Emissions (million tonnes CO ₂ equivalent/ year)
Direct emissions from manufacturing (Scope 1)	297
Fuel combustion: pulp and paper	207
Fuel combustion: wood products	26
Fuel combustion: converting	39
Methane from manufacturing waste	26
Emissions associated with electricity purchases (Scope 2)	193
Pulp and paper	106
Wood products	49
Converting	39
Wood production	18
Upstream emissions associated with chemicals and fossil fuels	92
Non-fibre inputs: pulp and paper	35
Non-fibre inputs: wood products	22
Fossil fuels: pulp and paper	31
Fossil fuels: wood products	5
Transport	51
Cradle-to-gate	21
Gate-to-consumer	27
Consumer-to-grave	4
Product use	-263
Emissions	0
Effect of additions to carbon stocks in paper products in use	-20
Effect of additions to carbon stocks in wood products in use	-243
End-of-life	77
Burning used products	3
Paper-derived methane	176
Effect of additions to carbon stocks in paper products in landfills	-67
Wood-derived methane	59
Effect of additions to carbon stocks in wood products in landfills	-94

Source: FAO, 2010d

Notes:

Total cradle-to-gate emissions = 622 million tonnes of CO₂ equivalent per year (not considering sequestration)

Total cradle-to-grave emissions = 890 million tonnes of CO₂ equivalent per year (not considering sequestration)

Value chain sequestration = net uptake of 424 million tonnes of CO₂ equivalent per year, based on estimates of the accumulation of carbon stocks in product pools and an assumption that globally, regeneration and regrowth are keeping carbon stocks stable in the forests the industry relies on

Net value chain emissions, cradle-to-grave = 467 million tonnes of CO₂ equivalent per year

As seen in Table 41, there is a potential to increase carbon storage in wood products. Parties to the UNFCCC are currently working on a methodology to account for carbon stored over time in harvested wood products. The role of HWPs in the carbon cycle is, however, minor when compared with other forest activities considered under the UNFCCC. The next section discusses these issues in greater detail.

Progress on forest-related climate change negotiations

UNFCCC negotiations have focused intensely on forests because an estimated 17.4 percent of global GHGs come from the forest sector, in large part from deforestation in developing countries¹⁵ (IPCC, 2007), and because of the perception, made widespread by the Stern Review (Stern, 2006) that curbing deforestation is a highly cost-effective way of reducing GHG emissions. Efforts to provide incentives to developing countries to better realize the mitigation potential of forests have evolved from discussions on avoiding emissions from deforestation to REDD+ (Box 12). In December 2010, the Conference of Parties to the UNFCCC agreed on a framework for an instrument to incentivize REDD+ under a future agreement to the Kyoto Protocol. This mechanism could play a crucial role in combating climate change and enhancing broader sustainable development. REDD+ has drawn the attention of the highest levels of government from around the world. While the political spotlight is on forests in developing countries, the outcome of negotiations underway on LULUCF will also have a bearing on the achievement of emissions reduction commitments and forest management in industrialized countries and countries in economic transition (the so-called Annex B Parties to the Kyoto Protocol).

Two ad hoc, time-bound bodies were established under the UNFCCC to carry out negotiations on REDD+, LULUCF, CDM and adaptation up to the UNFCCC 15th COP in Copenhagen in December 2009. In 2010 the Ad hoc Working Group on Long-term Cooperative Action under the Convention (AWG-LCA) continued to address the building blocks identified in the Bali Action Plan: adaptation, mitigation, financing, technology transfer and capacity building. The Ad hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG-KP) is addressing emissions reduction commitments

¹⁵ These emissions include those from deforestation, decay (decomposition) of aboveground biomass that remains after logging and deforestation, and CO₂ from peat fires and decay of drained peat soils.

Box 12: Evolution of the concept: from avoiding emissions from deforestation to REDD+

The global importance of forests as a carbon sink and of deforestation as a source of GHG emissions have been recognized by UNFCCC since its inception. During the negotiations of the Kyoto Protocol, consideration was given to making “avoiding emissions from deforestation” eligible under the CDM, but the concept was set aside because of uncertainties associated with methodologies and data at the time. The idea resurfaced at the UNFCCC 11th COP in 2005 when a group of countries requested an item on “reducing emissions from deforestation in developing countries (RED): approaches to stimulate action” in the negotiations.

Through work by the SBSTA between COP-11 and COP-13, Parties also agreed to address emissions from forest

degradation, since they were thought to be greater than those from deforestation in many countries. The concept thus was expanded to “reducing emissions from deforestation and degradation in developing countries (REDD)”. At COP-13 in 2007, UNFCCC adopted a decision entitled “Policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation in developing countries, and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries”, which is now known as REDD+. The scope of REDD+ goes beyond deforestation and forest degradation to include the maintenance and enhancement of forest carbon stocks.

of industrialized countries and countries in economic transition, after the first commitment period of the Protocol expires in 2012. Their structure and discussion areas are shown graphically in Figure 28. These ad hoc working groups are tackling difficult, long-standing methodological and political topics, including those related to REDD+, LULUCF and CDM.

While Parties reached a considerable consensus on REDD+ in Copenhagen in December 2009, there was no formal agreement on these matters. The AWG met in June, August and October 2010. In December 2010, in

Cancún, Mexico, it finally agreed on a text to forward for adoption by the UNFCCC COP. The following provides an overview of some of the topical issues discussed.¹⁷

REDD+

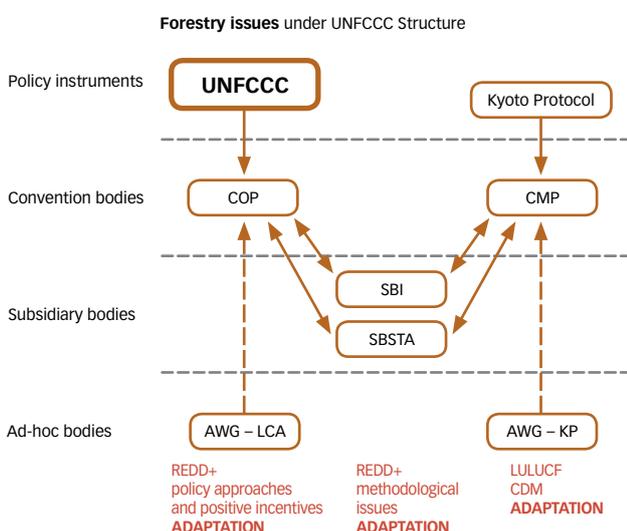
The Conference of the Parties to the UNFCCC adopted a decision on REDD+ in Cancún, Mexico. The text covers the scope, principles and safeguards for REDD+, and outlines a phased approach for implementing REDD+, moving in a step-wise fashion from pilot activities to full-fledged REDD+ implementation. The negotiating text that emerged from COP-16 contained the following activities which define the scope of REDD+:

- reducing emissions from deforestation;
- reducing emissions from forest degradation;
- sustainable management of forest;
- conservation of forest carbon stocks; and
- enhancement of forest carbon stocks.

The decision lists safeguards in order to ensure multiple benefits and avoid negative spill-over effects from REDD+ activities. These safeguards are related to:

- consistency with existing forest programmes and international agreements;
- forest governance;
- rights of indigenous peoples and members of local communities;

Figure 28: Forest issues under the UNFCCC bodies and working groups¹⁶



¹⁶ CMP is the “Conference of Parties serving as the meeting of the parties to the Kyoto Protocol” (<http://unfccc.int>)

¹⁷ The text describes the negotiations as at December 2010.

Box 13: COP Decisions

COP-13 adopted a decision (Decision 2/CP.13) based on work by SBSTA to provide some indicative methodological guidance for the implementation of demonstration projects, and encouraged Parties to mobilize resources and relevant organizations to support developing countries on their activities related to REDD.

COP-15 adopted a decision (Decision 4/CP.15) based on SBSTA's work on methodological guidance for REDD+. The COP decision requested Parties to identify drivers of deforestation and forest degradation; to identify activities that may result in reduced emissions or increased removals; to use the most adopted or encouraged IPCC Guidelines to estimate forest-related GHG emissions and removals; and to establish national forest

monitoring systems based on a combination of remote sensing and ground-based forest carbon inventory. Further work on methodological issues related to monitoring, reporting and verification (MRV) is required before a REDD+ instrument can be operationalized. SBSTA is charged with continued work on MRV for REDD+. The use of any adopted IPCC Guidance has been recommended for relevant monitoring purposes.

Both decisions encouraged Parties and other stakeholders to share information and lessons learnt by using a REDD Web Platform on the UNFCCC web site (<http://unfccc.int>). COP-16 in Cancún adopted a decision on REDD+ as part of the outcome of the work of the AWG-LCA.

- participatory approaches;
- conservation of natural resources and biological diversity;
- permanence of mitigation actions; and
- leakage.

The text recognizes the need for a developing country to establish several important elements: a national forest monitoring system, a national strategy or action plan and a national forest reference (emission) level.

A key issue that remains to be resolved concerns the financing modality for actions performed (market-based, fund-based or a mixture of the two). This issue will be further addressed by the UNFCCC.

SBSTA is addressing the methodological issues related to approaches to the measurement, reporting and setting of reference scenarios. Two decisions were adopted (2/CP.13 and 4/CP.15; see box 13) to provide guidance on those issues. The REDD+ decision adopted in Cancún requests SBSTA to work on certain technical and methodological aspects of REDD+, including on methodologies for monitoring, reporting and verification.

LULUCF and CDM under the Kyoto Protocol
Negotiations in the AWG-KP address the rules and modalities to account for GHG emissions and removals from LULUCF in Annex B Parties under a post-2012 mechanism. Current proposals to simplify the existing accounting rules for the first commitment period of

the Kyoto Protocol are still under discussion. Progress is being made on addressing forest management accounting provisions, including a proposal to rationalize and increase transparency in setting possible reference levels for forest management. The treatment of HWPs and natural disturbances, particularly extreme events, are also under discussion within the context of forest management, as is the voluntary versus mandatory nature of Article 3.4 additional activities, and the possible inclusion of more activities (e.g. wetland management).

AWG-KP is also considering broadening the scope of LULUCF activities that are eligible under the CDM. Currently, among LULUCF activities, only afforestation and reforestation are eligible for CDM projects. Proposals to expand the scope to include REDD, wetlands, sustainable forest management and reforestation of 'forests in exhaustion' are being debated, but Parties converge only on the need for further technical discussion before decisions can be made.

Finance for REDD+

Although the REDD+ decision adopted in Cancún does not address the financing modality, REDD+ pilot activities are being funded. REDD+ has attracted financial commitments at the highest levels, with many presidents, prime ministers and their representatives pledging to take action on REDD+ implementation. Six countries (Australia, France, Japan, Norway, the United Kingdom and the United States of America) collectively agreed to dedicate US\$3.5 billion "as initial public finance towards slowing, halting and eventually reversing deforestation in

the role of the government in relation to the recognition of communities' customary rights over public lands are important aspects of sharing the benefits generated by carbon sequestered by forests, but are often difficult to assure.

In this context, how can carbon rights be established? To answer this question, consideration must be given to whether the property law system in question considers land and trees, including ecosystem services, as fundamentally belonging to the state or as wholly belonging to private land owners. With regard to REDD+, formal recognition of customary land tenure rights becomes an issue, in particular if the legal frameworks of most African, Latin American and Asian countries are taken into consideration.

A brief review of existing legal frameworks related to carbon shows how some countries are working to ensure the benefits of carbon offsets are shared equitably. A series of examples is also presented to illustrate current trends and practices in common law and civil law systems. These cases demonstrate that progress in securing carbon rights has been slow to date and many obstacles must be overcome before the benefits of carbon offsets can be equitably shared in all countries participating in REDD and REDD+ schemes.

Key legal issues related to forest carbon rights as a new property

Usually, forest ownership is associated with land ownership (Romano and Reeb, 2006). However, because of its unique and immovable nature, land is frequently subject to simultaneous uses. Therefore, identification of land ownership is not always sufficient to ensure ownership over the carbon stock in a forest (Christy, Di Leva and Lindsay, 2007). When referring to forest carbon rights, laws and contracts may distinguish between sequestered carbon, carbon sinks, carbon stocks and carbon credits. A comparative analysis of legal frameworks related to forest carbon rights, summarized below, shows the latest developments on this front. In particular, the trend in some common law countries is to use the category of usufruct rights¹⁸ to regulate carbon rights on forests, distinguishing between forestry covenants, easements,¹⁹ leases and *profits à prendre* or 'right of

taking' as proprietary interests in forest lands. As shown in the regional examples from Asia and the Pacific below, legislation has been enacted to transfer carbon rights to the appropriate owners.

Australia

Australian states have introduced legislation recognizing the right to own carbon sequestered from trees, known as Carbon Sequestration Rights (CSRs).²⁰ New South Wales was the first Australian state to develop a legislative scheme for proprietary validation of forestry carbon sequestration rights (Hepburn, 2008). The Australian State of New South Wales has addressed the security and transferability of carbon rights by enacting legislation that explicitly establishes property rights in carbon and grants the holders of these rights a guarantee of access to the land and the right to obtain injunctions to block land uses that may affect sinks and forest carbon stores (e.g. New South Wales, *Conveyancing Act* of 1919, section 87A & 88AB). The legislation provides a model that goes beyond a simple statement of ownership to establish a more sophisticated legal framework for carbon sequestration (Rosenbaum, Schoene and Mekouar, 2004).

New Zealand

In New Zealand, the Forest (Permanent Forest Sink) Regulations of 2007 enable the creation of 'covenants' for the total amount of carbon stored in a forest sink. The Ministry of Agriculture and Forestry may enter into a forest sink covenant with a landowner if certain conditions are met. Additionally, the Forestry Rights Registration Act of 1983 no. 42 (September 2006) regulates forestry rights that may be created by the proprietor of the land.

Vanuatu

Vanuatu's Forestry Rights Registration and Timber Harvest Guarantee Act 2000 (s.6) guides rights over carbon sequestered based on constitutional and legal provisions, with different land property rights as well as usufruct rights pertaining to the land above and below the ground. The 1980 Constitution of the Republic of Vanuatu confers ownership and use of the land on "indigenous custom owners and their descendants" (Art. 73 & 74). Customary owners of the land are considered to be the owners of carbon rights and are entitled to assign these rights to third

¹⁸ Usufruct rights "comprise the range of legal rights and agreements allowing the use of property that belongs to another". Most national legislation distinguishes between four different types of usufruct rights: easement, lease, profits à prendre and covenants (www.lawcom.gov.uk).

¹⁹ An easement is 'a right enjoyed by one landowner over the land of another'. (<http://www.lawcom.gov.uk>)

²⁰ Each State uses a different term to describe a CSR. In Victoria and South Australia the term used is 'Forest Property Agreement'; in Queensland they are identified as 'Natural Resource Products'; Western Australia utilizes the term 'Carbon Right'; and Tasmania uses the term 'Forestry Right'.

parties. The enforceable title would facilitate a transfer of rights and risks related to carbon sequestration activities in forests (Holt, O’Sullivan, and Weaver, 2007).

Ownership of property rights in carbon: a separate land interest?

The need to secure carbon sequestration rights raises the question of whether such rights constitute a new property separate from the land or whether those rights are associated with the land. This question raises two major issues. The first concerns the legitimacy of claiming ownership when carbon is sequestered by forests, and compensation for the services provided by afforestation or reforestation activities. The second relates to the adoption of specific measures that define duties and liabilities linked to transferable forest carbon rights.

On the one hand, in countries where the government owns all carbon sequestration potential and there are no transactions, the state will presumably bear the risks and losses. On the other hand, if forest carbon sequestration rights are freely traded on the market, contracting parties may need to specify who is liable for the contract obligations. As an additional concern, it has been noted that separating land tenure rights from carbon rights could be used as an excuse not to make reforms to land tenure (Angelsen *et al.*, 2009). While the cases below explain ways to differentiate carbon rights from land rights, the long-term implications of these laws and policies need further consideration.

Australia

The legislative scheme in Australia is one of the first specifically to formalize the separate proprietary existence of carbon rights within the context of forestry legislation. Once registered with the appropriate authorities, the carbon right becomes a separate interest in the land. The owner of the carbon right acquires the legal and commercial benefits and risks arising from carbon sequestration on the specified land area. Nevertheless, questions remain concerning the responsibilities and liabilities that may arise as a result of the intangible nature of carbon property rights. For example, if the owner of the land sells the subsidiary right to carbon sequestered in trees on the land, how is the landowner held responsible for ensuring that activities carried out on the land will not cause a loss or reduction of the carbon right?

The Australian Property Institute (New South Wales and Queensland Divisions) is of the opinion that: “Even

if in some Australian States, there has been partial crystallization of legal rights in carbon distinguishable from the elemental land property right, these rights in carbon remain part of the land based property right” (Australian Property Institute, 2007). Victoria recognizes carbon sequestration rights and enables separate ownership of these rights (set out in the Forestry Rights Act 1996 of Victoria and 2001 amendments). Greater legal guidance may be needed if there are different owners of land and carbon, given the different laws on land-based property rights in different Australian states.

Vanuatu

Vanuatu’s Forestry Rights Registration and Timber Harvest Guarantee Act (2000) links a “forestry right” in relation to land with a “carbon sequestration right in respect of the land”. It specifies that a “carbon sequestration right ... in relation to land, means a right conferred by agreement or otherwise to the legal, commercial or other benefit (whether present or future) of carbon sequestration by any existing or future tree or forest on the land”. These rights rest with the customary owners of the land and with individuals who hold leases over land. The Act provides for forestry rights to be granted through their registration under the Land Leases Act (Chapter 163). Once granted, the forestry right must be registered with the Land Records Department. If the rights are transferred by a lease, they revert to the original land owners once the lease expires.

Who may own property rights in carbon: government or private parties?

A legal framework, consisting of constitutional provisions, laws, regulations, acts and contracts must clearly establish the entities permitted to own forest carbon rights. Control over the trade of carbon rights must be guaranteed in both regulatory and voluntary carbon markets. In some countries, only national or subnational governments may own certain forms of property, particularly in relation to state lands. Elsewhere, private property rights are more widely legally protected.

Clarification of ownership is crucial for determining the parties involved in contracting carbon rights derived from forests and the beneficiaries of forest carbon investments. This is especially true in many developing countries where forest areas are managed under customary forms of tenure, but exceed the area of community and indigenous lands acknowledged by statutory tenure law. In those cases, legal debate may need to focus on defining the forms of carbon rights that

are recognized as communal property (Takacs, 2009). A related aspect would be to assess the government's capacity to implement and enforce such rights.

Community forest management agreements (Guyana) and contracts recognizing indigenous property rights as a kind of usufruct right (Brazil) are clear examples of ways in which community rights can be recognized in spite of the state's ownership over the land.

Guyana

In Guyana, the Forest Bill of 2008 (enacted on 22 January 2009), states that: "All forest produce on, or originating from, public land is the property of the State until the rights to the forest produce have been specifically disposed in accordance with this Act or any other written law" (para. no. 73).²¹ However, under paragraph 11, the Guyana Forestry Commission (GFC) may, on application by any community group, enter into a legally binding community forest management agreement with the group concerned, which would authorize that group to occupy a specified area of state forest and manage it in accordance with the agreement. This option is also extended to afforestation agreements with individuals. Additionally, a forest concession agreement may be granted to carry out forest conservation operations in an area, even for commercial uses. These operations include the preservation of forests for the purpose of carbon sequestration, although there are no provisions addressing carbon sequestration rights. Some provisions may nevertheless

be interpreted extensively in order to include rights derived from carbon sequestration activities under forest conservation management agreements.

Brazil

Brazil is implementing the National Plan on Climate Change (launched on 1 December 2008), which aims to reduce illegal deforestation, and established the Amazon Fund to encourage reforestation, monitoring and enforcement of forest laws. Brazil allows a wide array of entities to own land, while indigenous property rights are a type of usufruct right (or a legal right to derive profit from property) recognized by the Brazilian Constitution of 1988 (Arts. 231–232) (Box 14). While the federal government maintains expropriation rights for all subsurface oil or minerals, it is presumed (but not legally explicit) that whoever owns the rights to use the land above ground – including private parties and indigenous groups – also has rights to the carbon.

Once a group is recognized through a formal process regulated by the *Fundação Nacional do Índio* (FUNAI, part of the Ministry of Justice), its members have exclusive right to use all the goods on the land, even though the land itself continues to belong to the state. The Amazonas State Climate Change, Conservation and Sustainable Development Policy (no. 3135 of 2007) states that the property rights over forest carbon on state lands are held by the *Fundação Amazonas Sustentável* (FAS) – a new organization created by the state for this purpose. Brazil does not have a national

Box 14: Brazil – an example of land rights in the Amazon

The current Brazilian Constitution was promulgated on 5 October 1988 and the latest Constitutional Amendment (64) made on 4 February 2010. The Constitution sets out that:

Art. 231: Para. no. 1: Lands traditionally occupied by indigenous peoples are those on which they live on a permanent basis, those used for their productive activities, those indispensable to the preservation of the environmental resources necessary for their well-being and for their physical and cultural reproduction, according to their uses, customs and traditions.

Para. no. 2 - The lands traditionally occupied by indigenous peoples are intended for their permanent possession and they shall have the exclusive usufruct of the riches of the soil, the rivers and the lakes existing therein.

Para. no. 4 - The lands referred to in this article are inalienable and indisposible and the rights thereto are not subject to limitation.

Art. 232: The indigenous peoples, their communities and organizations have standing under the law to defend their rights and interests, the Public Prosecution intervening in all the procedural acts.

²¹ In Guyana, approximately 76 percent of the total land area is forested and the Guyana Forestry Commission (GFC) is responsible for the management of about 62 percent of the forest classified as State Forest Estate.

law that specifically addresses the legal ownership of carbon rights. It is nevertheless expected that the implementation of the Brazilian Climate Change Policy, which promotes the development of an organized carbon market and is overseen by the Brazilian Securities and Exchange Commission, will encourage further clarifications of the nature of carbon rights (Chiagas, 2010).

Costa Rica

The Forest Law 7575 of 1996 provides the legal basis for environmental service payments, which are clearly defined in the Forest Law as “those services provided by forest and forest plantations to protect and improve the environment”. Costa Rica’s legal system does not address carbon property rights explicitly. Instead, property rights in natural entities are inferred from elements of the civil code. The owner of the land also owns the trees or forest that grows on the land and the carbon sequestered. The owner can negotiate the right to sell or manage carbon and can in return reap the resulting benefits. Article 22 of the Law allows FONAFIFO (National Fund for Forestry Financing) to issue forest landowner certificates for forest conservation (CCBs) which represent payments for ecosystem services (Costenbader, 2009).

Under FONAFIFO’s auspices, the government may sign a contract with individual land property owners who are responsible for managing carbon sequestration. The property owner gives the government the right to sell carbon. The government may then bundle the sequestered carbon into attractive packages for international investors. Property owners must show proof of identity, ownership and tax payment with their application, and provide a sustainable forest management plan. FONAFIFO checks eligibility requirements through databases in other government departments, thus streamlining the process. Groups of property owners can apply collectively and jointly manage their land for maximum carbon sequestration. If any pre-existing usufruct property right exists on a given parcel of land, the land cannot be included in a new contract. By signing these contracts, the government implicitly recognizes that the carbon belongs to the private owner. The government will own the right to sell the carbon and the right to define the terms under which the property owner manages carbon sequestration for the length of the contract. Private landowners are also free to negotiate their own deals with foreign investors, as the government does not maintain exclusive rights to market carbon. Foreigners are able to

own land in Costa Rica and can market their own carbon. Easements are also possible but only where clear land title exists (Takacs, 2009).

Mexico

Most of the forest land in Mexico is communal land (or ‘*ejido*’ in Spanish). The *ejido* system is a process, strengthened by the reform of the Mexican Constitution, whereby the government promotes the use of land by communities. The land is divided into communal land and ‘parcelled land’ owned by the community members. Therefore, in order to be effective, any forestry project has to consider local communities’ needs. The national legal framework does not contemplate forest carbon rights specifically. Nevertheless, private contracts could be considered as an alternative way to regulate the interests of the parties. To stipulate a contract, the federal civil code requires only an agreement between the contracting parties and the definition of the object. Contracts could be stipulated between local land owners and buyers of carbon sequestration rights. To reduce transaction costs, potential buyers of carbon rights would presumably be encouraged to invest in projects covering an extended forest area, implying cooperation agreements among local land owners.

In this case, a contract of sale could be used. The civil code states that the object of the contract must “exist in nature”, have a discernable form and have the ability to be commercialized. Carbon dioxide exists in the atmosphere and it can be quantified using an agreed technology, while the intention of the parties to conclude the agreement is expressed by the contract itself. Private contracts have the advantage that any stakeholder can take part in the agreement even if they cannot solve the technical challenge of establishing the necessary methodologies to adequately measure the stock of carbon sequestered (CEMDA, 2010).

Formal recognition of customary law: communities’ rights and land

Under international law, and specifically the Indigenous and Tribal Peoples Convention of 1989, traditional land ownership is considered as a human right, with an autonomous existence rooted in indigenous peoples’ customary tenure systems and norms. States have corresponding obligations to regularize and secure these traditional ownership rights.

It is now widely recognized that clear tenure rights are central to achieving social and economic development. Clarification of tenure rights is also a crucial component of

forest-based approaches to combating climate change and defining related carbon rights. Today most communities seek formal legitimacy or protection to secure their customary rights. In recent decades, there has been a trend towards decentralization of national governments and devolution of natural resource management to local communities, thus encouraging tenure reforms. Nevertheless, there remains a question of enforceability and the ability of communities to exercise their rights, even when a law is in place (Angelsen *et al.*, 2009).

So far, most countries have only handed over low value and degraded forests for subsistence use by local people. However, a few countries where community-based forest management has been implemented for some years, such as Bhutan, Brazil, the Gambia and the United Republic of Tanzania, have begun to allow the commercialization of NWFPs and timber. Data from FRA 2010 indicate that a large percentage of public forests in South America were transferred to community ownership between 1990 and 2005. As seen in Figure 30, South America also continued to have the largest proportion of public forests managed by communities, yet the overall percentage of community-managed forests is small when compared to other types of management on a subregional basis.

So how can local people effectively participate in, and benefit from climate change policies and REDD+ activities? Who owns the carbon sequestered in trees and forest soils when formal and secure tenure rights are not enforced? The leading approach to involving forest land managers is to establish a system of compensation financed through carbon trading or international funds that takes into account their human and customary rights.

Madagascar

The systems recognizing property rights in carbon are defined in a participatory way and recognize customary systems of ownership and management rights over ecosystem services (Suderlin, Hatcher and Liddle, 2008). For example, Law 2006-31 formalizes the legal regime for non-titled property rights of traditional users. To enforce the law, the government has adopted a formal, detailed decree specifying the operation of the new certificate titling system.

Democratic Republic of the Congo

The 2002 Forest Code has introduced a number of innovative aspects related to forest management, although it does not specifically refer to carbon rights. More recently, climate change issues have been

Figure 30: Management of public forests by subregion, 2005



Source: FAO, 2010a

included in the 2009 Decree adopted by the Ministry of Environment, Nature Conservation and Tourism, which regulates institutional aspects of REDD implementation.

Related to this, the creation of national and provincial registers can be considered as a first step to facilitate the control of transactions of land tenure rights, which is essential for the implementation and sustainability of any REDD initiative. In addition, the existing legal framework covers forest rehabilitation measures through the implementation of reforestation and natural forest programmes (articles 77–80) that are aligned with the principles of REDD and REDD+. However, so far, forest community rights do not specifically refer to payments for environmental services such as carbon sequestration.

United Republic of Tanzania

In the United Republic of Tanzania, the Land Act of 1999 and the Village Land Act of 1999 establish that land is the property of the state and can only be leased from the government for a specific period of time and activity.

However, according to the Ministry of Lands and Human Settlements Development, land areas can be sold under a 99-year lease agreement. Under the Land Policy and Land Act, the payment of compensation

by the state to the landowner extinguishes customary rights to the land, legally passing the right to lease the land to the state and its derived rights to the new land owner. The Land Act of 1999 states that “where a granted right of occupancy exists in any transferred land or a part thereof, a transferred land shall, unless the instrument of transfer provides otherwise, operate ‘as a compulsory acquisition of that right of occupancy’ and compensation on it shall be payable”. Conditions attached by the government include: development conditions and rights, which include payment of land rent, development of the area by reforestation, protection of the boundary, and sustainable use of the land according to cross-sectoral laws associated with land management. All of these properties and crops are detailed in the title deed transfer, including the amount paid.

Brazil

A legal analysis on tribal land ownership was requested by Forest Trends (a Washington DC-based forest conservation group) on behalf of the Surui tribe in Rondônia. A new legal opinion emerging from this analysis, which was released in December 2009, states that the Surui tribe own the carbon-trading rights associated with the forests in which the tribe is located. This opinion demonstrates that there is an opportunity for indigenous groups to participate in emerging markets for carbon trading and could set a precedent in other countries as well. It also highlights that the Surui tribe needs to secure financial returns for carbon sequestered as an environmental service, and to provide transparent competitive prices for the commercialization of carbon credits, which would be in alignment with Brazil’s overall national sovereign interest.

Guyana

Guyana’s legal framework for forests does not contain specific provisions on forest carbon rights. However, as forest areas are traditionally occupied and used by Guyana’s indigenous people, customary tenure systems are crucial in determining land ownership.²² Between 2004 and 2007, 17 communities received titles while six communities secured extensions to their titled lands, increasing the total number of communities with legally recognized lands from 74 to 91 and the percentage of

Guyana’s territory owned by Amerindian communities from approximately 7 percent to about 14 percent. Before titles were to be granted communities were requested to submit a description of the area and in-depth consultations were held.

However, several communities still remain without legally recognized lands, although many of them have requested titles. To guarantee land ownership to local communities, the Constitution of 1980 (as reformed in 1996) states that land is for social use and must go to the cultivator of the land (or ‘tiller’ as stated in the Constitution).

The historical stewardship role of indigenous peoples in protecting Guyana’s forest on their traditional land has recently been recognized and rewarded through support for community conserved territories. Based on stable and inclusive laws such as these, Guyana has been able to attract finance from donors, most notably through its Memorandum of Understanding with Norway (Box 15).

Indonesia

The 1945 Constitution of the Republic of Indonesia recognizes the rights of *adat* communities “as customary communities”. Article 28I(c) states that the “cultural identity and traditional rights of *adat* communities are respected and protected by the State as human rights”.²³ In particular, article 18B(2) of the Constitution sets out that: “The State recognizes and respects customary law communities along with their traditional rights”; however, it limits these rights according to a broad notion of “societal development”. These articles have been interpreted as providing the state with a broad right of control over all land in Indonesia, allowing the state to subordinate *adat* rights to the national interest.

Legislation related to carbon rights has been enacted that authorizes provincial and district governments to issue permits for the utilization of environmental services, called Izin Usaha Pemanfaatan Jasa Lingkungan (IUPJL). The IUPJLs are granted for a term of 30 years and entitle permit holders to store and absorb carbon in both production and protection forests. Ministry of Forestry Decision 36/2009 establishes procedures for granting IUPJLs (Box 16). Although there is no clear statement in the regulations to the effect that an IUPJL for carbon storage entitles the holder to all carbon

²² Amerindians in Guyana number about 55 000 or 7 percent of the population. However, because 90 percent of the Guyanese population lives along the narrow coastal strip, Amerindians represent the majority population in the country’s interior.

²³ Indonesian language refers to *masyarakat adat*, which is translated variously as ‘customary communities’, ‘traditional communities’, or ‘indigenous peoples’. It is estimated that as many as 300 distinct *adat* legal systems exist throughout Indonesia.

Box 15: Guyana – the Low Carbon Development Strategy

On 9 November 2009, President Jagdeo of Guyana and Norway's Minister of the Environment and International Development, Mr Erik Solheim, signed a Memorandum of Understanding, agreeing that Norway would provide Guyana with results-based payments for forest climate services of up to US\$250 million by 2015. The Governments of Norway and Guyana believe that this can provide the world with a working example of how REDD+ might operate for a High-Forest Low Deforestation (HFLD) country. The Low Carbon Development Strategy (LCDS) provides the broad framework for Guyana's response to climate change and hinges mainly on Guyana's use of its forests to mitigate global climate change. The LCDS builds on the launch in December 2008 of Guyana's Position on Avoided Deforestation, which essentially serves as the model for the Strategy's development. The key focus areas of the LCDS

are investment in low-carbon economic infrastructure and in high potential low carbon sectors; expansion of access to services; new economic opportunities for indigenous and forest communities and the transformation of the village economy; improved social services and economic opportunities for the wider Guyanese population; and investment in climate change adaptation infrastructure. The third draft of the LCDS, *Transforming Guyana's Economy while Combating Climate Change*, was launched in May 2010 and identifies eight priorities that will be the initial focus of LCDS implementation 2010 and 2011. This version incorporates further feedback from national stakeholders and input based on the outcomes of UNFCCC COP-15 in Copenhagen and other international processes.

Source: Guyana's Low Carbon Development Strategy website (<http://www.lcds.gov.gy/>)

rights, it is generally accepted that the permit refers to carbon ownership rights. While these regulations add some clarity over carbon rights in protective and productive forests, outside these areas the situation is unclear (Dunlop, 2009). Nevertheless, communities were able to successfully influence the outcome of these developments, in large part as a result of their visibility in the international REDD+ process and the UNFCCC negotiations.

Options to integrate carbon rights in a national legal framework

As discussed in this section, one approach for allocating forest carbon ownership is to assign these rights to the owner of the forest. In cases where there are unclear land tenure property rights, as is the case in many developing countries in Africa, Latin America and Asia, the implementation of REDD programmes may be seriously limited (Rosenbaum, Schoene and Mekouar, 2004).

As noted in Angelsen *et al.* (2009), stable land tenure arrangements will assist in advancing REDD+ implementation, but other key forest governance issues (e.g. accountability, corruption and transparency) also need to be addressed. Improved information and public consultation are necessary, and funding is likely to be conditional on good governance (an approach already used by UN-REDD and FCPF, among others) to encourage devolution of greater rights to communities and land owners. International policies and guidelines can also assist in informing these processes; for instance

the concept of 'free prior informed consent' should be considered when dealing with specific groups such as indigenous people.

Under an alternative approach, carbon stock is subject to a separate, alienable property right, independent of ownership of the forest, which would allow the owner to sell that right without conveying forest ownership. This may occur through the sale of a right to profit from the land or 'right of taking', governed under land ownership laws or general property rules, as in the case of CSRs created by Australian states. Carbon credits separated from land ownership would facilitate transactions on the market. Property rights registered on the land title would grant right holders with remedies against any inconsistent land uses.

Under a different scheme, CSRs may be considered as a publicly-owned asset, regardless of forest and land ownership (as in Brazil, Costa Rica, Guyana and Indonesia). Even where forests are largely privately owned, the state could manage carbon sequestration capacity as a public asset or environmental service, and distribute the benefits to the forest owners or users (as, for example, in Mexico). National governments may own the carbon under various different schemes, but in all cases there are questions about the share of benefits that need to be returned to forest owners (Costenbader, 2009). National regulatory frameworks as well as private contracts represent legal options through which to negotiate payment for environmental services transactions linked to carbon sequestration.

Box 16: Indonesia's national laws related to REDD

In 2008–2009, Indonesia established the world's first national laws relating to REDD. These laws are necessary to clarify the legal and policy framework needed to attract REDD investment. Currently three Ministry of Forestry (MoF) regulations and decisions refer directly to REDD:

- MoF Regulation 68/2008 on REDD Demonstration Activities;
- MoF Regulation 30/2009 on Procedures for REDD;
- MoF Decision 36/2009 on Procedures for the Granting of Utilization of Carbon Sequestration or Sinks in Production Forest and Protected Forest.

However, in most developing countries, national legal provisions could be strengthened and effectively enforced to guarantee benefit sharing from the international to national and subnational levels.

Governments will need to develop capacities and mechanisms to attract private investors. In order to ensure that benefits reach local land owners – in particular those lacking access to justice – processes for distributing benefits should be participatory. Provisions should also guarantee that smallholders and indigenous communities have access to public information explaining how to reduce transaction costs (Costenbader, 2009).

As discussed in the analysis of the Mexican legislation, private contracts can provide the mechanism for parties to buy and sell CSRs. In general terms, regulatory schemes for REDD should clearly determine who owns the right to the carbon sequestered in forests. However, carbon ownership may either be a separate proprietary interest, or a proprietary interest linked to forest or land ownership. There are limitations to both approaches and further development of legal frameworks at the national level is necessary to ensure sustainable implementation of REDD+ schemes.

Strengthening the role of adaptation in climate change policies

Managing forest carbon for climate change mitigation should be seen as part of a larger agenda of adapting forests, forestry and forest dependant communities to climate change. Societies have always adapted to climate variability, built dams or levees for irrigation or flood control, or developed coping mechanisms for climate extremes. However, these short-term, often mitigative approaches cannot ensure environmental sustainability in the long term. Ignoring adaptation in climate change policies will therefore undermine mitigation efforts,

especially in sectors such as forestry that rely on services from biological systems. This section examines the current treatment of forests in the adaptation dialogue, policies and actions, and identifies the challenges of integrating adaptation further into the climate change agenda.

Links to the global talks on mitigation

To date, international instruments for addressing climate change have had only a modest global impact on adaptation capacity, in part because of their understandably heavy focus on mitigation (Glück *et al.*, 2009). The Nairobi Work Programme (2005–2010) was set up by UNFCCC to assist all Parties – and especially developing countries – to improve capacities for vulnerability and impact assessments, and adaptation actions. However, substantial funding for adaptation activities in general, and forest-related adaptation activities in particular, is still not available. This may change with the recent organization of the Adaptation Fund of the UNFCCC. There is a general sense that separating adaptation from mitigation will further weaken adaptation capacity (Aldy and Stavins, 2008), and that priority should be given to activities that can fulfil both objectives. Although this is a logical goal, mitigation and adaptation activities have different underpinnings and warrant distinct support and funding processes. The design of mitigation policies that explicitly recognize and support adaptation would offer some middle ground.

An important first step in incorporating adaptation into mitigation policies is to avoid policies that generate maladaptation. For example, although conservation of regulating services provided by forests (e.g. regulation of floods, erosion and climate) is essential for adaptation, enforced conservation measures could deprive local populations in developing countries of their provisioning services or ecosystem goods (e.g. food, fodder and livelihoods). Adaptation needs are local and policies

must be designed to ensure that communities are supported in their capacity to manage local resources for adaptation purposes (Phelps, Webb and Agrawal, 2010). The maintenance of forests is essential if they are to be part of communities' adaptation responses. Policies that make non-forest land uses more financially attractive than forest-based activities or environmental services will increase deforestation pressure and reduce forest-based adaptation capacity.

Adaptation in national programmes

An analysis of recent National Communications (NCs) and National Adaptation Programmes of Action (NAPAs) by the International Union of Forest Research Organizations (IUFRO) Global Forest Expert Panel on Adaptation of Forests to Climate Change (Roberts, Parrotta and Wreford, 2009) reveals that forests are already seen as an important component of the adaptation response to climate change. Most developed and developing countries advocate the use of sustainable forest management (SFM) as an adaptation measure, and the concept is often included in national laws. However, forests generally play a minor role in adaptation policies compared with other sectors such as agriculture. In developing countries, notable exceptions are coastal afforestation in Bangladesh, forest fire prevention in Samoa and catchment reforestation in Haiti (Locatelli *et al.*, 2008).

There is also a general recognition that adaptation of forests to climate change is necessary, with many specific actions proposed in NCs and NAPAs. In developed countries, these include measures to increase

landscape connectivity, to enhance ecosystem stability and resilience, and to manage extreme disturbances (Roberts, Parrotta and Wreford, 2009). Developing countries, by contrast, generally have not included the adaptation of forests to climate change in their NAPAs (Locatelli *et al.*, 2008).

In developing countries, forest-based policies and activities related to SFM can provide a strong foundation for adaptation while meeting REDD+ goals, but in practice their translation into national policies remains weak. Locatelli *et al.* (2008) identify three major challenges that need to be addressed in order to move forward on this issue. The first is the strengthening of national institutions that are responsible for the implementation and monitoring of SFM. For example, ITTO reported that, while improvements in implementation of SFM were underway, less than 5 percent of the forest domain under management in its member states clearly fulfilled the requirements of SFM (ITTO, 2006).

The second challenge for mainstreaming forest-based adaptation policies is the establishment of linkages between adaptation processes and other political processes relevant to forest management. The issues involved in the relevant processes vary according to national circumstances, but in developing countries may include land tenure, property rights, access to natural resources, and in some countries, the resettlement of communities (Box 17). Proper resolution of such related issues is a prerequisite for the effective implementation of forest-based adaptation measures.

Box 17: Resettlement affects adaptive capacity

A study of the resettlement of Adigoshu, Globel, Idris and Menakeya communities to the fringes of Kafta-Sheraro Forest Reserve in Ethiopia investigated the ways in which the increased population impacted the management objectives of the reserve. Traditional uses by the local population involve 23 forest plant species, 14 of which are harvested as livestock fodder and 10 for timber.

Key observations from the study were:

- The influx of the resettled population resulted in a rapid increase in forest resource exploitation and destruction, including increased poaching of large mammalian wildlife species.

- Escalating demand for grazing land among other needs brings with it higher risks of conflict, food shortages, habitat destruction and susceptibility to climate change impacts.
- Overall, illegal occupation, overgrazing, poaching, bush fires, and woodfuel and timber harvesting posed increasing threats to forest conservation.

These findings highlight the risks inherent in unplanned internal displacement of populations for climate change adaptation measures, and call for an integrated people and environment approach for future policy and planning to enable communities to increase forest stocks while securing livelihoods.

Source: adapted from Eniang, Mengistu and Yidego, 2008.

The final, related challenge for developed and developing countries alike is the need for coordination among institutions that are involved in the design and implementation of adaptation or development policies. Policies aimed at other land-based sectors such as agriculture and transportation may impact forests by making alternative uses of forest lands more financially attractive. Proper communication and planning among sectors is therefore necessary to enhance the effectiveness of adaptation and mitigation efforts with respect to their impact on both international objectives and the local needs of the population.

Tools for policy development

A number of approaches have been proposed for developing adaptation plans and policies. However, uncertainties in projections of future climate and the complexity of interactions between forests and climate preclude a deterministic approach to adaptation. In order to be effective, policies should be flexible and encourage experimentation. As an example, CIFOR has proposed the Adaptive Collaborative Management process for moving forward with adaptive management decisions, while taking into account both the uncertainties inherent in the adaptation process and the societal dimension of decision-making (CIFOR, 2008a). By definition, adaptive management involves trial and error, and is designed to learn from the occasional failures. As a corollary to this approach, policies that punish failures could be counterproductive in the design of adaptation measures.

In broader terms, conceptual frameworks are needed for scoping out climate change-related issues and determining adaptation objectives. The Adaptation Policy Framework (APF) of the United Nations Development Programme (UNDP) is an example of such a conceptual framework through which users can clarify their own priority issues and implement adaptation strategies, policies and measures from the local to the national levels. The APF is based on four broad principles:

- Adaptation to short-term climate variability and extreme events is used as a basis for reducing vulnerability to longer-term climate change.
- Adaptation policy and measures are assessed in the context of development.
- Adaptation occurs at different levels in society, including the local level.
- Both the strategy and the process by which adaptation is implemented are equally important.

The APF also links climate change adaptation to sustainable development and global environmental issues, and can be used to add adaptation to other types of projects. It progresses along five steps from the scoping of the project to monitoring and evaluation of actions.

One of the steps included in all adaptation frameworks is the assessment of climate change vulnerability. Over the past few years, the Tropical Forest and Climate Change Adaptation Project (TroFCCA) of CIFOR and the Center for Investigation and Teaching of Tropical Agronomy (CATIE) has been developing and applying an assessment methodology that could be used within a framework such as the APF (see Box 18). The TroFCCA framework is broad so that it can serve as a guide for discussion during its application to specific cases. It has been applied by TroFCCA to a number of communities and projects in the tropics around the world.

In short, frameworks and methodologies exist for systematically assessing and developing adaptation policies and plans for action, for doing so at local to national scales, and for linking such plans and policies with other development policies and programmes. The financial resources for adaptation are not unlimited, and efficiency will build confidence among donor and recipient communities alike, promoting further investments and adaptation measures.

Monitoring will be critical at all scales in efforts to address climate change adaptation. In forestry, remote sensing is increasingly proposed as a means of filling some of the monitoring gaps, and methods are being actively refined, especially as they relate to changes in forest cover properties (e.g. Hansen, Stehman and Potapov, 2010). Field inventories will nevertheless always be needed to assess carbon values and establish land-use change.

The way forward

It is impossible to prescribe a proper mechanism for developing forest-based adaptation policies, given the variability in local human circumstances and their interactions with forests. However, past experience highlights points around which consensus exists.

At the local level, policy-makers can benefit from the contribution of local populations to the design of adaptation measures through their intimate knowledge of the biogeography of their landscapes, and of their local social capacities. In developed and developing countries

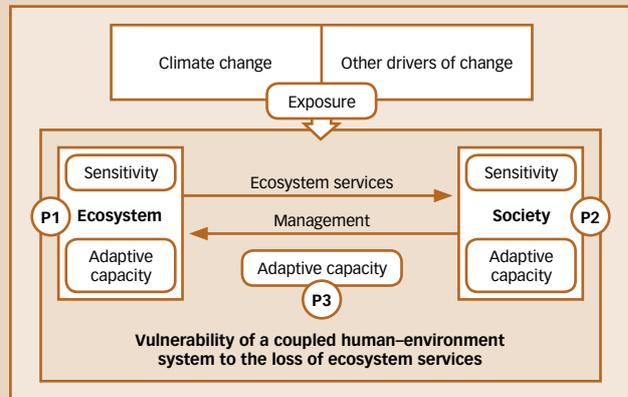
Box 18: Assessing vulnerability to climate change

The TroFCCA's climate change vulnerability assessment framework emphasises the role of ecosystem services for society through its three main principles: (P1) the vulnerability of ecosystem services; (P2) the vulnerability of the human system to the loss of ecosystem services; and (P3) the adaptive capacity of the system as a whole.

The first principle (P1) deals with the exposure and sensitivity of ecosystem services to climate change or variability and other threats, and with ecosystem adaptive capacity. The second principle (P2) deals with the human system (e.g. villages, communities and provinces), its dependence on ecosystem services such as clean water, and its capacity to adapt, for example, through substitutes for lost ecosystem services. The third principle (P3) considers the adaptive capacity of the system as a whole and refers to the capacity of the human systems to reduce the loss of ecosystem services through changes in practices and implementation of adaptation measures.

Source: adapted from Locatelli *et al.* (2008)

Figure A: Principles of TroFCCA's climate change vulnerability assessment framework



alike, local governments may be essential players in the mainstreaming of forest-based climate change adaptation into policies, laws and regulations. At the international level, adaptation to climate change must be supported distinctly from mitigation, although synergies must be sought wherever possible. For example, adaptation could be integrated across the full range of development-related assistance through measures such as mandatory climate risk assessments for projects financed with bilateral or multilateral support.

More importantly, however, there has been a notable shift in UNFCCC decisions towards recognition of adaptation as being equal in importance to mitigation, finance and technology, largely in response to three factors. The first is that impacts of climate change are being felt faster and more strongly than anticipated. The second is that containing future climate change within a 2°C limit appears increasingly difficult to achieve. Finally, and crucially, there is recognition that adaptation is no longer solely a local or national issue, but that lack of adaptation may have impacts across national boundaries. As stated by Burton (2008): "Adaptation has to be understood as a strategic and security issue that transcends national boundaries", a statement that applies to developed and developing countries alike. The local nature of forests and forest dependent communities may appear to limit the international implications of non-adaptation. However,

resilient and productive ecosystems enhance the stability of communities, which in turn decreases the pressure for internal and cross-border migration. Preparing national adaptation plans in consultation with nearby countries, increasing financial flows to adaptation at the local and national levels, and rethinking development goals and objectives through the analysis of climate change impacts on local economies and populations are measures proposed by Burton (2008) to enhance the effectiveness of adaptation.

The current draft AWG-LCA text calls for the establishment of "regional centres or platforms" to support country activities in climate change adaptation in all sectors. The forestry sector has extensive experience in regional cooperation and has well developed technical networks at regional and subregional levels. Strengthening existing institutions and networks before establishing new ones is key in order to avoid duplication of efforts, and ensure the sound use of resources and coherence with other policies.

These networks could be mobilized and supplemented, as necessary, by other regional programmes to support adaptation needs. Forestry networks or capacity support mechanisms could link with regional centres or platforms eventually established under UNFCCC, helping avoid duplication of effort.

There are strong synergies in the forestry sector between adaptation and mitigation. Support for mitigation activities, could, under many circumstances, simultaneously support adaptation efforts, and vice versa. Countries' climate change strategies should seek to capture these synergies. With the world rapidly changing around us, there is neither time nor resources to waste in the race to adapt.

Summary and conclusions

The political visibility of forests is at an all-time high. The forestry sector can capitalize on this to help attract political and financial support for activities in climate change adaptation and mitigation. It is crucial that climate change resources, including funds for REDD+, LULUCF and adaptation are used to build the foundation for SFM, which can contribute to climate change adaptation and mitigation, as well as the continued delivery of the full range of goods and ecosystem services over the long term. It will be essential to ensure that the flow of funds to developing countries is commensurate with their absorptive capacity, and building capacities and readiness activities should be a part of these efforts.

Negotiations under the UNFCCC have helped raise the profile of forests and forests' contribution to offsetting GHG emissions. Although forest management activities have a high potential to help developed countries meet their commitments under the Kyoto Protocol, there is a potentially greater role for developing countries under new activities such as REDD+. REDD+ is designed not only to enable developing countries to contribute to a reduction in emissions under future arrangements to the UNFCCC, but also to strengthen SFM at local and national levels. Consensus has formed around the concept of REDD+ and pilot activities are now underway; however, outstanding issues on adaptation, CDM, LULUCF, REDD+

methodologies and harvested wood products are still under discussion in the negotiations.

REDD+ has attracted many interest groups, leading to increasingly complex demands. Nevertheless, the economic, social and environmental sustainability of REDD and REDD+ hinges on a number of factors, including the issuance of forest carbon rights and the sharing of benefits from REDD-related activities. Different legal approaches exist to guarantee forest carbon tenure, as shown in the examples presented in this chapter. These include transferring rights directly to the forest owner, selling carbon rights but not forest rights, managing forest carbon as a public asset and issuing private contracts.

All countries are faced with the challenges of addressing vulnerabilities to and impacts of climate change on their forests and tree resources and on forest-dependent people. Adopting an adaptive management approach is one way to facilitate countries' efforts in climate change adaptation. A great deal of adaptation and mitigation can be achieved through full implementation of existing forest policies, strategies and legislation, and the application of best practices in forest management. This includes incorporating climate change into existing national forest programmes, which serve as the overarching policy framework for SFM. This is likely to require some adjustments at policy and field level, and additional investments.

Climate change clearly poses a new set of challenges for the forestry sector, but at the same time creates opportunities. International efforts over the past two decades to build a common understanding, a policy framework and a range of tools for sustainable forest management provide a sound basis for policy-makers and forest managers to address climate change effectively.