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**DEVELOPMENTS IN UNFCCC/IPCC DISCUSSIONS REGARDING
REDUCING EMISSIONS FROM DEFORESTATION AND FOREST DEGRADATION IN
DEVELOPING COUNTRIES AND IMPLICATIONS FOR TROPICAL FORESTS AND TROPICAL
TIMBER PRODUCERS**

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The views expressed in this report do not necessarily reflect those of ITTO or its country members. The authors want to express their gratitude to María Gutiérrez for her valuable comments and support.

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**DEVELOPMENTS IN UNFCCC/IPCC DISCUSSIONS REGARDING
REDUCING EMISSIONS FROM FOREST DEGRADATION AND DEFORESTATION
AND IMPLICATIONS FOR TROPICAL FORESTS AND TROPICAL TIMBER PRODUCERS**

1 Introduction: ITTO's mandate and its relation to the climate change agenda

Tropical forests, covering close to 2 billion hectares of the earth's surface, have enormous potential to contribute to climate change mitigation and adaptation. Deforestation and forest degradation are responsible for about 18% of current global greenhouse gas emissions. Virtually all these emissions originate in developing countries, most of which are ITTO members. In 2001–2005, 15 of ITTO's 33 producing member countries accounted for over 70% of total tropical deforestation, which averaged more than 11 million hectares per year. In addition, in practically all ITTO producing member countries forest degradation, through unsustainable timber and firewood extraction, is another main source loss of carbon stocks and GHG emissions. With a mandate to promote the sustainable management of tropical forests, ITTO has a special responsibility to address the issue of climate change as it relates to tropical forests and to assist its member countries to meet the challenges and opportunities posed by it. The importance of climate change for tropical forests and trade in tropical timber is thus widely recognized by the ITTO.

The 1994 International Tropical Timber Agreement (ITTA) refers to the United Nations Framework Convention on Climate Change (UNFCCC) in its preamble. Further, three objectives set out in Article 1 of the ITTA include elements related to the role of forestry in mitigation of, and adaptation to, climate change. These are: forest values other than timber; new and additional financial resources; and reforestation, forest management and rehabilitation of degraded land (see box 1).

Box 1: ITTA 1994: objectives related to climate change and the UNFCCC

Objective f. To promote and support research and development with a view to improving forest management and efficiency of wood utilisation as well as increasing the capacity to conserve and enhance other forest values in timber producing tropical countries;

Objective g. To develop and contribute towards mechanisms for the provision of new and additional financial resources and expertise needed to enhance the capacity of producing members to attain the objectives of this Agreement;

Objective i. To encourage members to support and develop tropical timber reforestation and forest management activities as well as rehabilitation of degraded forest land, with due regard for the interests of local communities dependent on forest resources.

The ITTA 1994, actually in vigour, explicitly allowed the implementation of activities impacting on/related to/relevant to climate change, particularly those concerned with SFM, forest land restoration and rehabilitation of degraded forests. The preamble includes a reminder of the Rio Declaration on Environment and Development, the Non-Legally Binding Authoritative Statement of Principles for a Global Consensus on the Management, Conservation and Sustainable Development of all Types of Forests, and the relevant Chapters of Agenda 21 as adopted by the United Nations Conference on Environment and Development in June 1992, in Rio de Janeiro; the United Nations Framework Convention on Climate Change; and the Convention on Biological Diversity. It recognises Principle 10 of the Non-Legally Binding Authoritative Statement of Principles for a Global Consensus on the Management, Conservation and Sustainable Development of all Types of Forests, which states that new and additional financial resources should be provided to developing countries to enable them to sustainably manage, conserve and develop their forests, including through afforestation, reforestation and combating deforestation and forest and land degradation.

The ITTA 2006, not yet in force, builds on the foundations of the previous agreements, focusing on the world tropical timber economy and the sustainable management of the resource base, simultaneously encouraging the timber trade and the improved management of the forests. In addition, it contains provisions for information sharing, including non-tropical timber trade data, and allows for the consideration of non-tropical timber issues as they relate to tropical timber. In this regard, the new Agreement has taken up **emerging issues**, reflecting the experiences and work of the Organization in the past, especially its most recent years. At the same time it is forward-looking enough to cope with future challenges. In its preamble, the Agreement recalls, among other things, the United Nations Framework Convention on Climate Change, the United Nations Convention on Biological Diversity and the United Nations Convention to Combat Desertification (para c). It recognizes the importance of the multiple economic, environmental and social

benefits provided by forests, including timber and non-timber forest products and environmental services, in the context of sustainable forest management, at local, national and global levels and the contribution of sustainable forest management to sustainable development and poverty alleviation and the achievement of internationally agreed development goals, including those contained in the Millennium Declaration (para f).

The effort to reflect the experiences and work of ITTO in the past enabled the Agreement to widen the Organization's scope towards new fields such as trade in non-wood forest products and considerations in respect to the valuation and trade of tropical forest service functions, but also with regard to illegal logging and related trade. Thus it can now play an even more important role as a platform for the exchange of experiences, and feed into other ongoing processes. The examples of fields in this wider scope, as found in **Article 1 of the New Agreement** are listed beneath and illustrated with an example from the viewpoint of the climate change debate:

- Para (e) Promoting improved understanding of the structural conditions in international markets, including long-term trends in consumption and production, factors affecting market access, consumer preferences and prices, and conditions leading to prices which reflect the costs of sustainable forest management.
 - ✓ International forest carbon markets are evolving and have effects of SFM
- Para (f): Promoting and supporting research and development with a view to improving forest management and efficiency of wood utilization and the competitiveness of wood products relative to other materials, as well as increasing the capacity to conserve and enhance other forest values in timber producing tropical forests;
 - ✓ Harvested wood products have a relevance from the carbon substitution angle
- Para (g): Developing and contributing towards mechanisms for the provision of new and additional financial resources with a view to promoting the adequacy and predictability of funding and expertise needed to enhance the capacity of producer members to attain the objectives of this Agreement;
 - ✓ There are various mechanisms in place or debated in the climate change negotiations that are linked with the provision of new and additional financial resources for SFM, including A/R CDM (existing); REDD (in developing countries) and Forest Management (in countries that signed the Kyoto protocol).
- Para (j): Encouraging members to support and develop tropical timber reforestation, as well as rehabilitation and restoration of degraded forest land, with due regard for the interests of local communities dependent on forest resources;
 - ✓ Reforestation and afforestation, and in particular forest restoration are very important means to sequester carbon dioxide from the atmosphere; tree planting has many collateral effects at the level of local development level
- Para (m) Encouraging members to develop national policies aimed at sustainable utilization and conservation of timber producing forests, and maintaining ecological balance, in the context of the tropical timber trade;
 - ✓ Tropical forests are not only a means for timber and other forest products, but an important store of terrestrial carbon; national forest policies are increasingly faced to address climate change and related issues
- Para (n) Strengthening the capacity of members to improve forest law enforcement and governance, and address illegal logging and related trade in tropical timber;
 - ✓ A climate change approach that includes tropical forests is closely linked with a secured and long-term carbon base. Illegal logging and insufficient sector governance are thus also considered as main drivers of carbon loss and GHG emissions.
- Para (q) Promoting better understanding of the contribution of non-timber forest products and environmental services to the sustainable management of tropical forests with the aim of enhancing the capacity of members to develop strategies to strengthen such contributions in the context of sustainable forest management, and cooperating with relevant institutions and processes to this end;
 - ✓ The maintenance and management of ecosystem service functions of tropical forests are essential to cope with the negative effects of climate change

(adaptation); carbon is one of the tradable environmental service functions and thus and integrative part of SFM

- Para (r) Encouraging members to recognize the role of forest-dependent indigenous and local communities in achieving sustainable forest management and develop strategies to enhance the capacity of these communities to sustainably manage tropical timber producing forests;
 - ✓ Financial means created through the climate change adaptation and mitigation strategies and brought to the level of those who live in and from forest resources will help to conserve and sustainably manage remote
- Para (s) Identifying and addressing relevant new and emerging issues.
 - ✓ The forest-related climate change agenda for the post-2012 negotiations is the most relevant new and emerging issue that affects management of the resource base of tropical timber to great extent.

ITTO thus is challenged to address the issue of tropical forests and climate change with urgency. In order to promote knowledge exchange and to debate ways and means on how ITTO should tackle the emerging issues posed by the threat of accelerating global warming, the ITTO convened an International Expert Meeting in Yokohama on “*Addressing Climate Change Through Sustainable Management of Tropical Forests*” in May 2008 (see www.itto.or.jp) Supported by the Governments of Switzerland, Japan, Norway and the City of Yokohama, the International Expert Meeting was convened with the aim of promoting the role of tropical forests and their sustainable management in climate change mitigation and adaptation. The Expert Meeting discussed and illustrated the role of ITTO in climate change adaptation and mitigation in relation to tropical forests. The expert meeting also explored ways and means on how to assist ITTO members in formulating and implementing an integrated forest-sector response to climate change. A particular focus of the Expert Meeting was given to integrating REDD and carbon sequestration as an additional criterion within the context of sustainable forest management. The Expert Meeting, that brought together more than 120 forestry and climate change specialists from 22 ITTO member countries developed a set of recommendations addressed to ITTO, to national governments and to recommendations for members of the Collaborative Partnership on Forests (CPF) and other relevant organizations. The conclusions and recommendations of this workshop need to be carefully considered by Council in its decision on how the ITTO as an organization deals with the wider question of sustainable tropical forest management and climate change. They have been integrated in the recommendation chapter of this report (see chapter 6).

The present report gives an overview on how forests - and in particular tropical forests - are considered in the framework the climate change negotiation, including their prospects in relation to financing and carbon markets. It also makes a number of proposals on how ITTO could address the emerging issues in respect to SFM of tropical forests and climate change.

2 Tropical Forest and Climate Change: an Overview

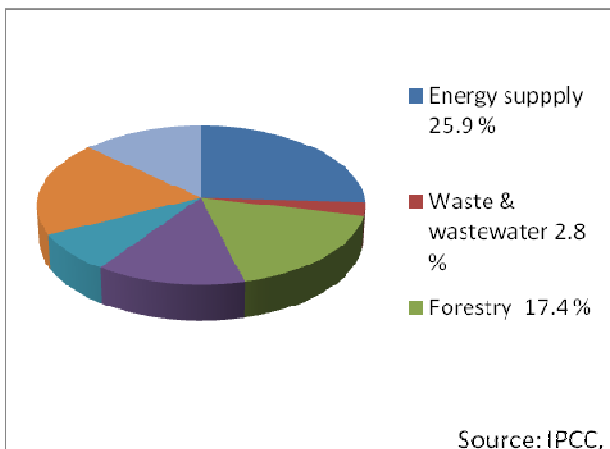
Climate change is considered to be one of the major threats to sustainable development as a result of its impacts on health, infrastructure, settlements, agriculture and food security, and forest ecosystems.

According to the IPCC, unprecedented changes in the climate system have taken place during the 20th century. These changes can be observed through three variables: increments in average temperatures, changes in rainfall patterns, and an increase in the intensity and frequency of extreme events. It is now widely accepted that these changes in the climate system are closely related to increased human-induced emissions of greenhouse gases (GHG), especially during the last 150 years.

The burning of fossil fuels is the most important source of GHG. The second source of GHG emissions is from activities related to land use, primarily tropical deforestation, forest degradation and forest fires. According to the last assessment of the Intergovernmental Panel on Climate Change (IPCC)¹ emissions from forestry alone are over 17% of the global figure. When adding all emissions from the agriculture sector the figure goes over 30% of global anthropogenic GHG emissions (see figure 1).

GHG resulting from deforestation are mostly carbon dioxide with lesser amounts of methane and carbon monoxide. Besides its impacts on the climate system, deforestation is one of the most critical environmental problems facing many developing countries today in terms of its long-term negative impact on biodiversity, loss of economic opportunities and increased social disparity.

Figure 1: Global anthropogenic GHG emissions



Tropical forests can contribute to address climate change. The role of forests in carbon sequestration as a result of photosynthesis is well known. Because trees have a much longer lifespan than agricultural crops, they act as long-term reservoirs, which lock up the carbon for decades, even centuries, in the form of cellulose and lignin. Therefore, enhancing carbon sinks and reducing deforestation can contribute substantially to mitigating climate change and increasing adaptive capacity of ecological and social systems.

IPCC Fourth Assessment Report [Synthesis Report, Figure 2.1 (page 36)]

2.1 Mitigation options

According to the Intergovernmental Panel on Climate Change² (IPCC), a sustainable forest management strategy aimed at maintaining or increasing forest carbon stocks in the long term, while producing an annual sustained yield of timber, fiber or energy from the forest, will generate the largest sustained mitigation benefits (IPCC, 2007c, Chapter 9, page 543).

There are three mitigation options; reducing GHG emissions, enhancing carbon sequestration and promoting carbon substitution. Forestry offers the possibility of reducing emissions from deforestation and forest degradation, enhancing carbon sinks through enhancing the sequestration rate in existing and new forests, and promoting substitution of fossil fuels and more energy-intensive materials. There are five types of management practices associated with these groups of mitigation activities: afforestation and reforestation, plantations for bio-fuel production and/or substitution effects through harvested wood products, reducing

¹ The role of the IPCC is to assess on a comprehensive, objective, open and transparent manner the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts and options for adaptation and mitigation.

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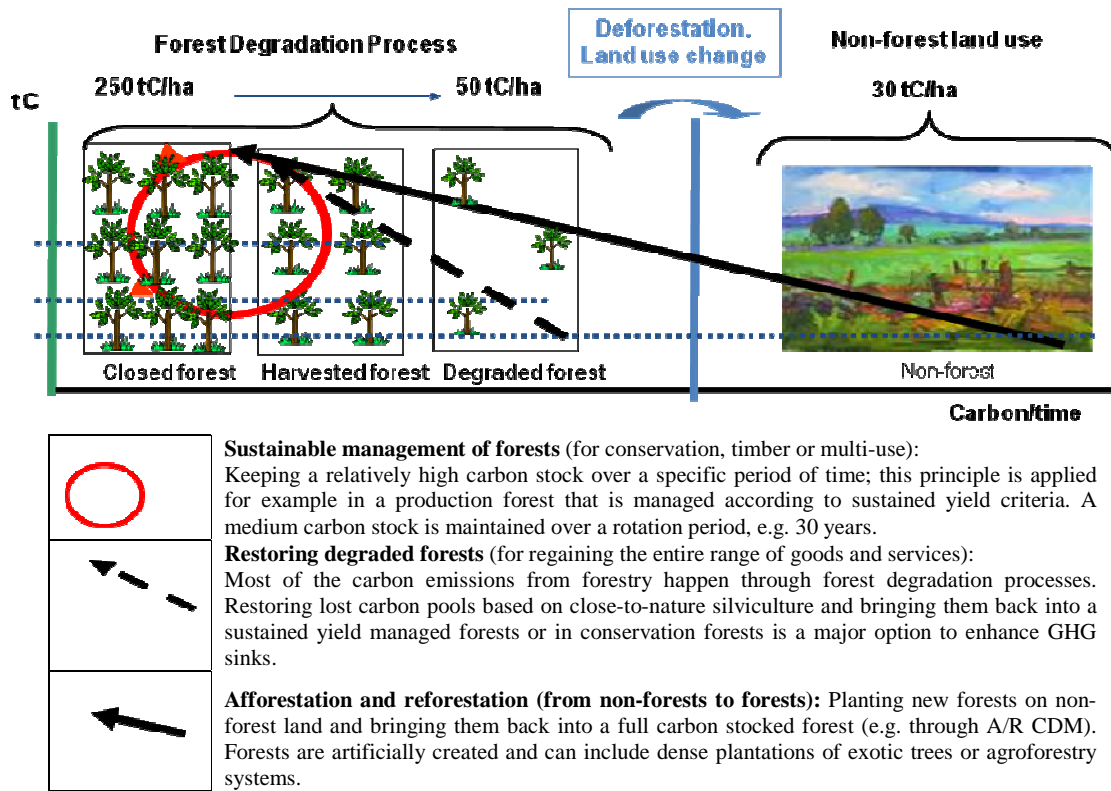
emissions from deforestation and forest degradation, improving management and forest restoration. These are listed in Table 1.

Table 1: Mitigation options in forestry

Mitigation options (general)	Mitigation options in the UNFCCC or its KP (LULUCF)	Forest Management Options
Reduction of GHG emissions	Reducing emissions from deforestation and forest degradation in developing countries (REDD)	Sustainable management of (natural) forests Committing forests for REDD, including conservation
Carbon sequestration	Afforestation	Plantation, agroforestry, agro-sylvo-pastoral systems
	Reforestation	
	Enhancement of sinks through forest restoration (not yet clearly defined)	In forested areas: enrichment, planting, guided natural regeneration
Carbon substitution	Substitution through harvested wood products: using forest products for electricity and fuel	Forest Biofuel plantations, sustainable use of wood production

Figure 2 illustrates the link between these different forest management options. Note that the forest degradation process is defined as the loss of existing carbon stocks through unsustainable use of forest resources. Degraded forests are still considered as forest area and not submitted to any land use change. Nevertheless, most of the existing carbon stock is lost within forested areas through overharvesting of timber, fuelwood and other forest products. Reversing forest degradation through enhancement of sinks is here defined as forest restoration.

Figure 2: Illustrative overview of mitigation options in forest management



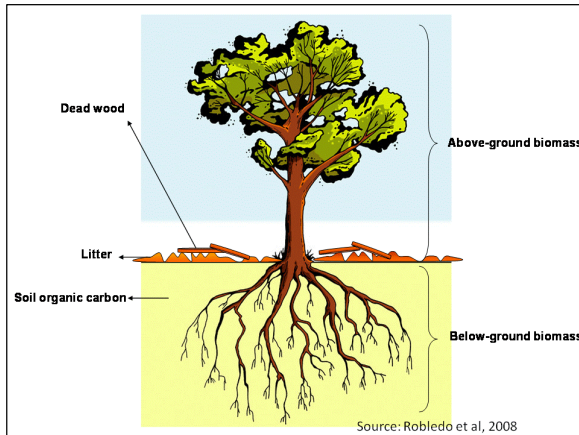
Source: Robledo and Blaser, UNDP 2008

Carbon can be found and measured in five so-called “pools” or “reservoirs”: below-ground biomass (BGB), above-ground biomass (AGB), litter, dead wood, and soil organic carbon (SOC) (see Figure 3).

Ideally, one should collect data of changes in carbon stocks in all five pools, but doing so in an accurate and cost effective manner remains a major challenge. In order to facilitate the calculation of such changes, models and algorithms have been developed, especially for the two first pools. However, basis information

on carbon stocks and stock change in each pool remains scarce and/or inaccurate, particularly in developing countries. Hence, Parties to the Kyoto Protocol have agreed that CDM A/R project participants may choose not to account for one or more carbon pools, as long as the excluded pool is not a net GHG emitter (Decision 19/CP.9, later adopted by the Parties to the Kyoto Protocol as Decision 5/CMP.1).

Figure 3: Carbon pools in forests



The assessment of the potential of any of these forest mitigation options should include the policy framework of the sector. Especial important is the analysis of the impact of using mitigation options on the availability and quality of forest goods and services and the overall development goals of a given country. Forest policies, both international and national, need to be carefully considered.

International processes and agreements such as the non-legally binding instrument on all types of forest of the United Nations Forum on Forest (UNFF) or the 2006 International Tropical Timber Agreement can have profound impacts on the future use of forests resources. Regional and national legislation and programs such as those coming out of the Forest Law and Enforcement & Governance (FLEG) or resulting from the National Forest Program Facility (NFP) define goals and strategies for managing forests over decades and are, therefore, essential when considering the role LULUCF can play in future mitigation agreements. Other national initiatives like the decentralization in the management of natural resources can affect the potential of the LULUCF sector in mitigating climate change.

In this chapter the mitigation potential of tropical forestry will be presented, as well as the key methodological challenges in accounting reductions in GHG emissions and increments in carbon sinks. Current agreements and negotiation processes within the UNFCCC aimed at using this potential are discussed in chapter 3.

2.1.1 Reducing emissions from deforestation and forest degradation

Deforestation, as defined in the framework of the UNFCCC, is the direct human-induced conversion of forested land to non-forested land. There is yet no agreed definition on forest degradation under the UNFCCC³. According to the FAO, the rate of deforestation during the 1990s was 12.9 million hectares yearly, corresponding to emissions of 5.8 GtCO₂/yr (FAO, 2006 and IPCC, 2007c). Over 85% of the current GHG emissions from deforestation and forest degradation (DD) take place in the tropics, making LULUCF the single most important source in these countries (Stern, 2007; FAO, 2005).

Deforestation causes significant GHG emissions – an estimated 7.6 billion tones of CO₂ per year in 2000, about 15 to 20% of all GHG emissions (ICPP, 2007; Baumert et al., 2005). Tropical deforestation very likely makes the largest part of it. Estimates on the share of the total global anthropogenic emissions from these countries differ according to the source and the type of activity included (Schlamadinger et al., 2007).

Houghton (2005a) estimates that forest conversion, forest degradation and shifting cultivation altogether were responsible for carbon emissions equivalent to 15 – 35% of fossil fuel emissions in the 1990s. While

³ See also Annex 3 on definitions of forest degradation.

these figures have a large degree of uncertainty, they stress the relevance of including efforts to combat deforestation in climate negotiations. Table 2 summarizes existing data on carbon loss from deforestation.

Table 2: Estimates of carbon loss from forests attributed to deforestation
(from different authors; carbon loss to the atmosphere in GtC/yr (GtCO₂/yr))

Region	Fearnside (2000) 1981-1990	Malhi and Grace (2000) 1980-1995	Houghton (2003) 1990s	DeFries et al. (2002) 1990s	Achard et al. (2004) 1990s
America	0.94 (3.45)	0.94 (3.45)	0.75 (2.75)	0.43 (1.58)	0.44 (1.61)
Africa	0.42 (1.54)	0.36 (1.32)	0.35 (1.28)	0.12 (0.44)	0.16 (0.59)
Asia	0.66 (2.42)	1.08 (3.96)	1.09 (4.00)	0.35 (1.28)	0.39 (1.43)
Total	2 (7.33)	2.4 (8.8)	2.2 (8.06)	0.91 (3.33)	0.99 (3.63)

Source: Adapted from UNFCCC, 2007b

Figures on the GHG emissions from forests degradation are not yet as detailed as from deforestation. ITTO (2002) estimates the extent of degraded forest in the tropics to about 850 million ha, corresponding to 40% of the entire forested area in the tropics.

Drivers for deforestation and forest degradation differ greatly by activities, regions, system boundaries and time horizons. A report prepared for the UNFCCC Secretariat quantified the mitigation potential of REDD based on an analysis of the opportunity costs of different use alternatives (Blaser & Robledo, 2007). This analysis considered a simplified approach to characterize the following direct drivers of deforestation and forest degradation:

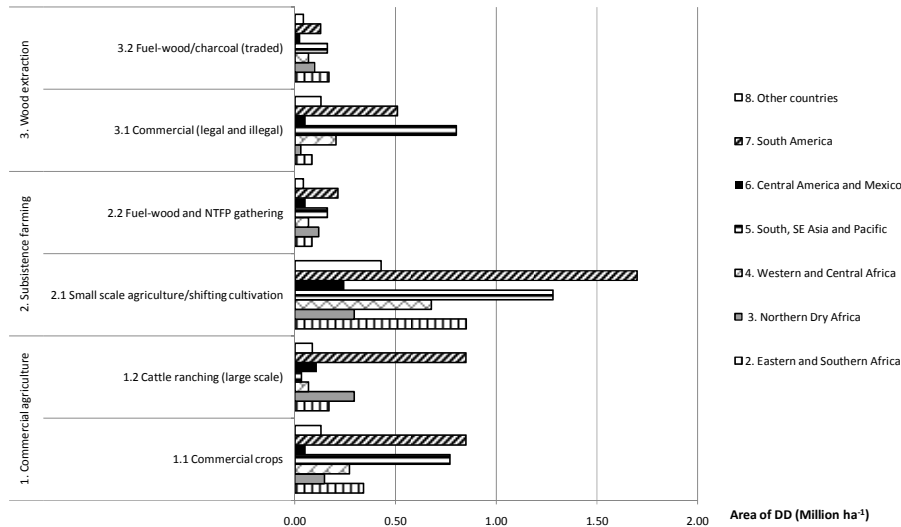
- Commercial agriculture (national and international markets)
 - Commercial crops
 - Cattle ranching (large scale)
- Subsistence farming
 - Small scale agriculture/shifting cultivation/slash and burn agriculture
 - Fuelwood and NTFP gathering for local use, mostly family-based
- Wood extraction
 - Commercial timber (legal and illegal) for national and international markets
 - Traded fuelwood (commercial at sub-national and national level).

According to this study the regions with the highest emissions from deforestation and forest degradation are situated in the humid and semi-humid tropics, in particular in Africa, Asia and Latin America (see figure 4). In the majority of countries in temperate areas and boreal climatic zones forest areas are stable or increasing.

It can be observed in figure 2 that in terms of direct drivers of deforestation small scale agriculture, mainly related to poor communities without appropriate management skills and assets play an important role followed by commercial agriculture and timber production (see figure 4 and table 3).

Currently the distribution of emissions among these categories is changing rapidly due to the increasing demands for biofuels, especially from palm oil (see section 2.1.3). In absolute terms these data shows the importance of promoting sustainable forest management for reducing GHG emissions while ensuring other forest functions.

Figure 4: Share of deforestation and forests degradation per direct driver and region



Source: Author's calculations based on UNFCCC 2007 and 2007a; and Blaser and Robledo 2007
DD: Deforestation and Forest Degradation, Database used: FAO-FRA 2000 and 2005

In some circumstances, deforestation and degradation can either be delayed or reduced through the complete protection of forests (Soares-Filho et al., 2006), through sustainable forest management practices, or by providing economic returns from non-timber forest products and forest uses not involving tree removal. As protecting forests from all harvests can in the short term reduce the wood supply to meet other societal needs it is necessary that REDD activities in the future include the promotion of complementary measures such as more efficient production practices in the wood chain.

Table 3: Deforestation and forest degradation (DD) according to direct drivers in the 90s

Main direct drivers	DD (% of total)	Area of DD (Million ha ⁻¹)
1. Commercial agriculture		
1.1 Commercial crops	20	2,6
1.2 Cattle ranching (large scale)	12	1,6
2. Subsistence farming		
2.1 Small scale agriculture/shifting cultivation	42	5,5
2.2 Fuel-wood and NTFP gathering	6	0,75
3. Wood extraction		
3.1 Commercial timber (legal and illegal)	14	1,8
3.2 Fuel-wood/charcoal (traded)	5	0,7
Total	100	12,9

Source: Based on UNFCCC 2007 and 2007a; and Blaser and Robledo 2007
DD: Deforestation and Forest Degradation, Database used: FAO-FRA 2000 and 2005

Reducing deforestation and degradation is the forest mitigation option with the largest and most immediate carbon stock impact in the short term per hectare and year globally. The opportunity costs of reduced deforestation depend on the causes of deforestation (commercial agriculture, subsistence farming, wood extraction), the associated returns from the non-forest land use and the returns from potential alternative forest uses.

Based on the opportunity cost of direct drivers as a basis, Blaser and Robledo (2007) calculated that if emissions from deforestation and forest degradation were to be reduced to zero by 2030, a minimum investment of \$12.2 billion⁴ per year would be necessary to compensate the opportunity costs of deforestation and forest degradation (UNFCCC 2007a). According to this calculation, an average price of \$2.80/tCO₂ will cover the opportunity cost of deforestation and forest degradation of 8.5 million of hectares yearly. This

⁴ \$1 Billion = \$1'000 Million

would represent an emission reduction of ~GtC 3.76 tCO₂/year (65% of the emissions). For this scenario, the price of \$2.80/tCO₂ will also improve livelihood conditions in many regions, as this price is higher than the opportunity cost of the poverty-driven deforestation and forest degradation. However, such an improvement would depend on various factors, especially on the administration and transaction costs of REDD activities and the specific conditions of each region (socio-economic, institutional, access to infrastructure, etc.) (UNFCCC 2007a).

When the highest marginal cost to completely stop deforestation – the “choke price” – is applied to the projected deforestation to estimate the cost of reduced deforestation prices vary between \$11 to 77 per tCO₂ (excluding transaction costs) (Sathaye et al. 2007). Applying those prices (to the projected emissions due to the loss of primary forest in each region) yields a cost of \$25 to 185 billion per year to stop deforestation (UNFCCC 2007a and Trines 2007).

However calculations of the mitigation cost need to go beyond opportunity costs and also include the cost of the measures required to change deforestation and degradation patterns. These include *inter alia* capacity building, changes in ownership, clarification of rights to carbon pools access to sustainable products, implementation of sustainable use practices, etc. Further, the costs of estimating and monitoring emission reductions will have a great impact on the cost of REDD and on the minimum payment or compensation required for its success. Lack of clarity on the latest leaves many negotiators and also scientists wondering about the feasibility of implementing REDD when the data are so scattered and weak. However, techniques are today rapidly improving, for example, through considerable efforts of technology transfer programs such as the World Bank’s Forest Carbon Partnership Facility (FCPF), UN-REDD and the work in improving remote sensing forest monitoring promoted *inter alia* by various members of the Collaborative Partnership on Forests.

2.1.2 *Carbon sequestration*

Sequestration has been defined by the IPCC as the increment of carbon storage in terrestrial or marine reservoirs. Biological sequestration includes direct removal of CO₂ from the atmosphere through land-use change, afforestation, reforestation, carbon storage in landfills and practices that enhance soil carbon in agriculture. Forestry activities that increase sequestration in forest ecosystems are plantations, forest restoration and forest management.

2.1.2.1 *Afforestation and reforestation*

There are some differences in the definitions of “afforestation” and “reforestation” between classical forestry science and the way these terms are used in the climate change convention⁵. Under the UNFCCC, in the LULUCF context, these two terms refer to planting trees on *land that is defined as non-forests*. Afforestation and reforestation are the direct-human induced conversion of non-forested land to forested land through planting, seeding, and/or the human induced promotion or natural seed sources. The two terms are distinguished mainly by how long the non-forest condition has prevailed. Afforestation and reforestation activities lead to increases in the carbon pools. Afforestation and reforestation are currently the only forestry project activities eligible for credits under the Clean Development Mechanism (CDM). This means that under the current mitigation regime of the Kyoto Protocol these are the only two activities for which tropical countries/project partners can be rewarded.

In general terms, afforestation and reforestation initiatives have been driven mainly by the private sector for undertakings such as commercial plantation forestry, or by governments, particularly for soil and watershed protection. The drivers that influence afforestation and reforestation vary according to region and often even within a country.

Within the framework of the Kyoto Protocol a particular form of afforestation or reforestation is the use of agroforestry. Agroforestry refers to the planting of trees among or around crops or on pasture land as a means of preserving or enhancing the productivity of the land. These systems can sequester large amounts of carbon which are retained in the biosphere over time. While the individual systems may be of limited size, on a per area basis smallholder systems accumulate significant amounts of carbon, equal or beyond the amount of carbon stored in degraded forests.

⁵ The European Environmental Agency recently defined forest plantations as forest stands established by planting or/and seeding in the process of afforestation or reforestation. They are either: a) of introduced species (all planted stands), or b) intensively managed stands of indigenous species which meet all the following criteria: one or two species at plantation, even age class and regular spacing. It excludes stands which are established as plantations but which have been without intense management for a significant period of time; these should be considered semi-natural.

(http://glossary.eea.europa.eu/EEAGlossary/P/plantation_forest)

Sathaye *et al.* (2005) projected the potential land area that could be planted and the potential removals by sinks (including planting forests and agroforestry systems) across a number of scenarios relative up to 2100 and compared them to a reference scenario. For 2050 the range of land area that could be planted was calculated to be between 52 and 192 million ha., whereas the carbon benefits were estimated to range between from 18 to 94 million tons of CO₂.

According to the same authors, the forest establishment costs would range from between US\$ 654 per ha. to US\$ 1,580 per ha. (ORNL 1995). Using this range, the initial investment required for mitigation equivalent to 18–94 million t/CO₂ through afforestation/reforestation on 52–192 million hectares of land would be US\$ 34–303 billion.

The IPCC AR4 estimate of the mitigation potential of afforestation by 2030, i.e. 1,618 to 4,045 Mt CO₂/year, is substantially lower than the estimate of Sathaye *et al.* (2005) (IPCC, 2007). Using a similar ratio between carbon sequestered and hectares planted, the IPCC AR4 estimates would require 4.6–8.2 million ha. At establishment costs of US\$ 654–1,580 per ha. that would be US\$ 3–12.9 billion or US\$ 0.1–0.5 billion per year over 25 years.

2.1.2.2 *Forest restoration*

In general terms, a degraded forest delivers a reduced supply of goods and services (including carbon) and maintains only limited biological diversity. It has lost the structure, function, species composition and/or productivity and carbon stocks normally associated with the natural forest type expected at that site.

Degraded and secondary forests include all those forests and forest lands that have been altered beyond the normal range of natural variation through unsustainable use. ITTO developed guidelines on Forest Restoration in 2002 (ITTO 2002). Three broad conditions with particular characteristics are distinguished in the ITTO guidelines: degraded primary forest, secondary forest and degraded forest land⁶.

Forest restoration aims to enhance and accelerate natural processes of forest regeneration (including carbon stocks) in order to regain the desired species composition and growing capacity of the forest ecosystem (Figure 2).

In terms of mitigating climate change, forest restoration becomes complementary to reducing emissions from degradation. One could increase carbon stocks by restoring those degraded forests where, for any reason, degradation has already taken place. Under the current conditions there is a huge area of degraded forest that could be restored while improving overall livelihood conditions (including biodiversity, long-term income and health).

It should be noted that drawing clear distinctions between different conditions of forest degradation is an artificial simplification of what is always a much more complex reality on the ground. Degraded primary forests, secondary forests and degraded forestlands usually exist in complex mosaics that are constantly changing.

Indeed, intermediate stages and/or combinations of conditions will exist in close proximity and it is often difficult to distinguish between them. Therefore a detailed quantification of carbon benefits should be based on a landscape mosaic.

Interrelated forces acting at a broader landscape level often cause the formation and subsequent dynamics of degraded and secondary forests. The forces that lead to forest degradation exist across a continuum of forest use intensity (see Table 4).

Thus, 850 million ha of restored forests would amount to 57 GtC (67t x 850 m). Hence the estimated sequestration potential to restore carbon stocks from forest restoration activities would amount to 32 GtC until the year 2030 (~117 GtCO₂e).

Table 4. Use patterns that lead to a continuum of degraded and secondary forests and their approximate occurrence throughout the tropics

Extensive Use Stage of forests	Intensive Exploitation Stage	Forest Depleted Stage
--------------------------------	------------------------------	-----------------------

⁶ The guidelines may also find application in the restoration of sites degraded by such extreme « natural » processes as storms, hurricanes, wildfires, landslides, etc.

C+++	C++	C+
Slow decline of forest ecosystem through selective logging	Rapid decline of forest ecosystems through logging, extraction of other forest products and/or shifting cultivation	Only fragmented forests left in an open rural landscape
Limited areas of secondary (fallow) forests Mosaic of intact forest landscapes	Large tracts of degraded primary forests, and secondary forests Rapid increase of degraded and secondary forests	Forests remain mainly on marginal land Agricultural landscape predominant
Remote areas of SE Asia and tropical America, and the Congo Basin in tropical Africa, where population pressure and economic pressure are still insignificant.	Tropical timber producing countries in SE Asia, in some West African countries, and in Central America (secondary forest)	Densely populated areas in South Asia, medium altitude areas, and semi-humid areas of Latin America and Africa

Source Blaser and Robledo, 2007

There are yet no estimates on the forest restoration potential of tropical forests from the mitigation perspective. Aimed at clarifying potential and financial flows of forestry options the UNFCCC Secretariat commissioned two studies in forestry (Trienes, 2007 and Blaser & Robledo, 2007). A rough estimate was calculated based on the following assumptions:

- An average carbon stock of a “medium” degraded tropical forest of 30 t C/ha in living carbon pools (above and below ground biomass).
- 850 million ha of total degraded forests in the tropics as basis, with an average carbon stock in degraded forest landscapes of 25 Gt of carbon (30 Ton x 850 m).
- An average carbon stock of a “medium” fully stocked tropical forest (without distinction of the ecosystem) is conservatively estimated to 67 tC/ha

Forest restoration was not included as an eligible mitigation option for the first commitment period of the Kyoto Protocol, but is considered under the discussions for a post-2012 regime (see chapter 3).

2.1.2.3 Forest management⁷

Unsustainable forest management degrades living biomass and reduces the carbon stocks in forests. Sustainable forest management (SFM) keeps carbon stocks at an optimal level and uses at an optimum the elastic capacity of a given forest ecosystem. The elastic capacity describes the dynamic forest processes within a range of changing vertical forest structure, species composition, biodiversity, carbon stocks and productivity normally associated with the natural forest type expected at a given site.

Under managed forests we understand here that a natural forest that is managed for sustainable timber and non-wood harvesting (e.g. through integrated harvesting and silvicultural treatments), wildlife management and other uses have resulted in changes of forest structure and species composition. All major goods and service functions, including the maintenance of carbon stocks, are maintained intact.

Accordingly, additional carbon sequestration can be reached through sustainable forest management through planned silvicultural management based on optimization of yield and increase of faster growing, light demanding species. In addition, forest management can reduce GHG emissions through reduced impact logging and other measures, including improvements in transport.

According to Blaser and Robledo (2007), the sequestration potential that comes from the optimization of the elastic capacity of a given forest ecosystem in tropical countries from forest management in 2030 is between 1.1 and 1.5 GtC.⁸⁹ Table 5 shows calculations using a more conservative approach, including figures from

⁷ This chapter is fully based on Blaser and Robledo, 2007

⁸ The first figure is based on ITTO for highly productive tropical forests; the second figure is based on FAO for the entire tropical region.

ITTO. This is closer to reality in tropical countries. Indeed, the area includes only classified production forest areas that potentially are or will be used for forest management. The total carbon sequestration potential of forest management in non-tropical developing countries and countries in transition until 2030 is 0.3 GtC.

Table 5: Sequestration potential of forest management

using figures of production forests (only natural forests) from ITTO (ITTO 2006)**

	Total area of production forests (only natural forests) (‘000 ha)	Area with Forest Management Plans (‘000 ha)	Additional costs to bring the production forest under SFM by 2030* (‘000 USD)	tC of additional sequestration of C through SFM (tC per year)	C additional sequestration potential in the year 2030 (Gt C in 2030)
Africa	70.461	10.016	845.000	2.9	0.20
Asia and Pacific	97.377	55.060	1.169.000	3.5	0.34
Tropical America	184.727	31.174	2.217.000	2.875	0.53
TOTAL	352.565	96.250	4.232.000		1.08

* Based on US\$12 per ha (ITTO Expert Panel report 1995, in today’s value)

** 33 tropical timber producing countries, covering about 90% of the humid tropical forest area

2.1.3 Substitution

Substitution of products with a high upstream emissions level by products with lower upstream emissions is the third option for mitigating climate change. The substitution potential in the forest sector offers two main options:

- Substitution effect through harvested wood products and
- Substitution effect through non-timber products, especially for bio-fuels production

Forestry activities aimed at promoting substitution have a positive carbon balance, when (a) forest products are produced sustainably, i.e. carbon stocks are renewed in the forest; and (b) emissions from transformation of raw materials (e.g. raw wood for construction material or non-timber forest products (NTFP) into biofuels) are equal to or less than the products they substitute, allowing the annual harvest to be equal or below the annual forest increment, thus allowing carbon stocks to be maintained or to increase while providing an annual carbon management to meet society’s needs for fibre, timber and energy (IPCC, 2007c).

According to the IPCC biomass from forestry can contribute 12-74 EJ/yr to energy consumption, with a mitigation potential roughly equal to 0.4-4.4 GtCO₂/yr depending on the assumption of whether biomass replaces coal or gas in power plants (IPCC 2007 AR4, WG III).

2.1.3.1 Substitution effect through harvested wood products

Harvested wood products (HWP) are defined as wood-based materials harvested from forests, which are used for products such as furniture, plywood, and paper and paper-like products, or for energy (UNFCCC, 2003). HWP exclude, however, logging residues that are left at harvest sites. HWP form an integral part of the carbon cycle. They have an effect on the carbon cycle because, on the one hand, the CO₂ pool of long-lived wood products can stay at the same level, increase or decrease (by decay or combustion) within the accounting framework (Grêt-Regamey et al. 2008). Harvested wood products (HWP) can contribute to climate change mitigation in two ways; as substitute for more energy intensive materials or to reduce fossil fuel use by substituting woody biomass. From a mitigation point of view, a combination of these two substitution effects should be aimed at wood products, which should ideally first be used as building materials, where they store carbon and substitute for more energy intensive material, and then at the end of the wood product lifecycle to generate energy as a substitute for fossil fuel.

⁹ Basis is an increased growth (in m³) of timber per region. Each forest ecosystem has its own growth characteristics. Estimates per region are based on silvicultural experiences in natural forest management. Sources are different ITTO documents, in particular ITTO (2006) and Yield prediction tables of FAO (FAO-For-STAT). The estimate assumes 1tC = 2 m³ of wood.

Under the current agreements for the first commitment period of the Kyoto Protocol the only substitution effect in energy that can be accounted for by using wood is as a biofuel. Tropical countries may use this potential through CDM projects.

2.1.3.2 Substitution effect through non-timber products, especially for bio-diesel production

Forest biofuel refers either to energy carriers derived from processed or unprocessed plants biomass, such as the plantation of *Jatropha* and other forest trees and shrubs or to so-called second generation biofuels -that is deriving biofuels from cellulosic material, in particular from wood. Bioethanol and biodiesel are the most common forms of biofuels. For the forestry sector, wood substitution, ethanol from wood (second generation biofuels) and biodiesel from vegetable oils from trees and bushes (e.g. palm oil or *Jatropha*-oil) are the most important options. In this sub-section focus on biodiesel from vegetable oils.

Recently, the commercial use of biomass for bioenergy has received a boost as a consequence of a) the increasing high oil prices and b) the perception that biofuels are more environmental friendly than fossil fuels. Consequently over the past few years, the areas under biofuel plantations have increased dramatically around the world, particularly of soybeans and oil palm. Malaysia and Indonesia account for 85% of the palm oil produced worldwide (Carrere 2006).

There is a lot of discussion on the real potential of biofuels and the potential environmental and social negative impacts. To understand this discussion it is important to recognize that tree crops have a considerable potential for producing biofuels. However, the following aspects need to be taken into account when assessing the overall mitigation benefits and impacts on sustainable development:

1. Potential impacts on deforestation

Because plantations for biofuels crops are often established after natural forests have been logged and then burned to clear the land for planting, the increasing area under bio fuel plantations may seriously threaten the remaining tropical forests in some developing countries. Additionally, in some cases such biofuels plantations take place on peatlands, initially covered by rainforests. Rainforest peatlands are rapidly being destroyed through deforestation and drainage for plantations (mainly oil palm and pulp wood). This implies an increment in GHG emissions that eliminates any mitigation effect of such biofuels. This is especial important in South East Asia. In other regions (e.g. Latin America), forests are being cleared to extend the area under soybean cultivation. While the market for soybeans has traditionally been for food and animal fodder, there is an increasing interest in using this crop to produce bio-diesel.

2. Potential impacts on food security

There are considerable concerns on the impacts of biofuel production on food prices and hence global food security. This concern is based on the fact that producing crops for biofuels increases competition for available land and food production. Since available land is a limited good, the market price and changes in demand of a given forest product has a great impact on decisions regarding which crop should be produced and/or brought to which market (Peskett et al., 2007).

If, for example, demand for *Jatropha* seeds increases due to a boom in the biodiesel market, *Jatropha* plantations, which are normally done on “waste land” will become competitive for agricultural land (Von Braun and Pachauri, 2006). The impact on the global food market has already been felt during the first semester of 2008. Further stress to the food market will increase social discomfort and augment social disparity worldwide.

3. Integrated environmental impacts of biofuels

Besides the GHG balance, other environmental impacts need to be carefully understood when discussing the possibility of using biofuel. Impacts on soil degradation, resource depletion, biodiversity loss, ecotoxicity, air pollution and water contamination have been included in a research study using the Life Cycle Analysis framework (LCA) by Zah et al. (2007). According to this report, to date almost all biofuels are beyond the environmental benchmark for fossil fuels. If the environmental integrity of the UNFCCC is to be maintained, a better understanding of the real potential impacts of biofuels needs to be ensured before promoting large biofuel programmes for mitigation.

2.1.4 Methodological challenges of accounting carbon stock changes as mitigation options in the forest sector

This section explains the challenges of accounting changes in C stocks in forestry activities. These challenges have hampered the full inclusion of forest mitigation options in the first commitment period of the Kyoto Protocol. Although a lot of experience has been gained since then, there are still some open questions that need to be addressed in the current negotiation process.

2.1.4.1 *Establishment of baseline/reference scenarios.*

A baseline scenario is a term defined for project-based activities under the Clean Development Mechanism and Joint Implementation. It relates to the sum of the changes in carbon stocks in the carbon pools within a given area that would have occurred in the absence of a LULUCF project activity. The major challenge in estimating a baseline is that one has to make a guess on the circumstances that would alter C changes in the future if the proposed forestry activity had not taken place. Depending on the accuracy and conservancy of the assumptions, the baseline can result in very different figures.

Within the ongoing discussion on REDD, a new term appears: reference scenario. This scenario should be considered as the basis for accounting for any emission reduction from deforestation and/or forest degradation. However, there is not yet an agreed definition of reference scenario.

For this discussion it is important to bear in mind three main elements:

- ***The scale can be local, regional or national.*** Local and regional *baselines* are linked to project activities, while national baselines are based on the possibility of using mainly national policies to reduce GHG emissions. It is possible to foresee a combination between these approaches where national baselines could be used as a reference for emission reductions in project activities at the local level. Regardless of whether a baseline is developed at national or project level, it will be important that the methods used are consistent across countries and rather conservative in their assumptions and outcomes, given the broad uncertainties that prevail in the assessments.
- ***With regard to the time period, there are two approaches: to consider only past trends or to consider past and future trends.*** The first approach is more favourable to countries with high rates of deforestation in the past, as these countries would have the greatest potential for claiming emission reductions in the future (e.g. in the Congo Basin in Africa). The second approach would be more favourable for countries that had a low rate of deforestation in the past but are threatened by a high future deforestation rate.
- ***Appropriateness of regional baselines/reference scenarios:*** Some authors argue that a regional baseline could contribute to increased transparency and accuracy in the estimations as well as to reducing transaction costs (Sathaye and Andrasko, 2007a). Most of the current analysis on regional baselines refers to avoiding deforestation activities; there is virtually no experience available for reducing forest degradation, respectively forest restoration activities.

2.1.4.2 *Leakage*

In the A/R CDM, leakage has been defined as the increase in GHG emissions by sources that occurs outside the boundary of the A/R CDM in the project area, which is measurable and attributable to the particular activities envisaged (Decision 5/CMP.1). A/R CDM approved methodologies have dealt with leakages by identifying the potential displacement of people or products due to the proposed project activity. Based on such analysis the methodologies propose a leakage management area where the potential displacement of people or activities is addressed.¹⁰ Specific tools for estimating leakage according to this approach have been developed by the Afforestation/Reforestation Working Group of the CDM Executive Board (ARWG).

In the discussion on REDD, some are referring to “displacement of emissions” when referring to leakages. As displacement of emissions has not been defined yet in any of the existing decisions, there is a lack of clarity about the differences between “displacement of emissions” and “leakages”.

The main discussion on leakage revolves around differences on how to deal with it, depending on whether the national and/or the sub-national approach is to be used. In general terms, the discussion on leakage tends to accept that if an accurate national baseline/reference scenario and monitoring system can be set at the national level, risks of unaccounted leakage would disappear. This affirmation is based on the idea that if any displacement of activities or communities due to a REDD activity takes place, national inventories will reflect it. Therefore emissions resulting from displacement would not need to be considered separately in the calculation of the net emission amount for the sector in a country.

for questions common to both A/R CDM and REDD, one key aspect in the discussion on leakage is how to define what “outside the boundary” means. Is it meant to consider any displacement of GHG emissions within the region, the country or also at the international level?

There is some literature analysing potential international leakage in the forest sector. According to some authors, the international wood trade/wood exploitation can be heavily affected by activities aimed to

¹⁰ For A/R CDM approved methodologies see http://cdm.unfccc.int/methodologies/ARmethodologies/approved_ar.html.

mitigating climate change (Sathaye and Andrasco, 2007a). This concern has increased after 2005 when the discussion on REDD started, as for some the risk for international leakages due to REDD activities can be so high that emissions reduced in a country could be replaced by emissions in another one.

International leakage has not been considered for any other sector under mitigation yet, even though international leakage in sectors such as energy or transportation could be even higher than in the forestry sector. There are different reasons for it, but perhaps one of the most important is that quantifying and moreover monitoring international leakage would have strong technical and legal implications, e.g. on international liabilities, and therefore it is very difficult to implement.

2.1.4.3 *Permanence*

The issue of permanence is related to the possibility that carbon in reservoirs can be emitted at any time, making emission reductions non-permanent; i.e. permanence relates to the period of time that carbon remains in the biosphere. Due to different risks, including fires and pests, carbon can be released into the atmosphere, thereby reducing the climate change mitigation effect of a project. The IPCC has clarified that a short-term reduction in emissions has a positive [short-term] impact in mitigating climate change. However, it is important to promote a permanent effect on the atmosphere.

Proposals for dealing with non-permanence in the LULUCF in the future include (a) using temporary credits;¹¹ (b) banking credits and debits from one commitment period to the next ; (c) reducing future financial incentives to take into account emissions from deforestation above the agreed level; and (d) by mandatory setting aside of a share of the emission reductions. Furthermore, some Parties consider sustainable forest management as a means to promote the permanence of emission reductions.

The treatment of permanence is especially relevant if Parties agree on a market mechanism for REDD. In the case of A/R CDM, the question of permanence added to the transaction costs; the experience has also shown that temporary credits are cheaper than permanent credits. Thus, in REDD, the options for addressing permanence issues is linked to whether the approach to financing is fund- or market-based.

2.1.4.4 *Additionality*

Additionality¹² refers to the result of the GHG emissions reduced by the project (project scenario) minus those emissions that would occur in the absence of the project (baseline), minus the leakage caused by the project. It is a term used within the CDM. Currently, additionality is estimated and monitored using the approved A/R CDM methodologies. The main difficulty in estimating additionality is that it is fully based on the accuracy of the baseline. As the additionality determines the mitigation potential of any activity it plays a key role in defining the feasibility of a given mitigation project in forestry.

In the ongoing negotiations on REDD the question as to whether activities in REDD have to be additional or not is open.

2.1.5 *Governance concerns regarding mitigation options in forestry*

Besides the methodological challenges of accounting for changes in carbon stocks in (tropical) forests, a major concern on how to promote the maximum use of mitigation options in forestry in the context of sustainable development remains the impact of governance related to any mitigation option. Parties participating in the UNFCCC need a regulatory system that promotes or at least allows the implementation of mitigation options in coordination with other developments in the forest sector.

A key issue in this respect is the need to clarify tenure and use rights not only of the land but of the five carbon pools. There is plenty of literature on forest land tenure and use rights (RRI, 2007). The fact that forest owners and users are in many cases not the same has implications on forest management. Even more important is the fact that hundreds of millions of people living in or near forests and making use of forest lands and resources have no or few secure rights nor tenure over these lands and resources. In many cases, the lack of rights and tenure is directly related to their poverty and to the destruction and degradation of those resources.

With respect to **mitigation**, the main question is who owns the changes in carbon stocks and the related credits, certificates and/or other benefits that result from reducing GHG emissions or enhancing carbon

¹¹ Temporary CERs expire at the end of the commitment period subsequent to the commitment period for which they were issued; long-term CERs are valid until the end of the project's crediting period up to maximum of 60 years.

¹² The definition of additionality, as in Decision 17/CP.7, para. 43: A CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.

sequestration through forestry activities. To understand the question, we need again to differentiate between the agreements valid for the first commitment period and the possibilities in a post-2012 regime, currently under negotiation (see chapter 3).

For the first commitment period, the regulations on A/R CDM require that “changes in circumstances within the project boundary that affect legal title to the land or rights of access to the carbon pools” be clarified and be subject to monitoring and verification (Dec. 19/CP.9). In cases where the ownership of the pools is not clear or when different carbon pools have different owners, it is extremely difficult to determine who owns the carbon credits (in the form of CERs¹³). If there is no clarity on the ownership of the CERs, any market transaction can be questioned, bringing many difficulties for both credit sellers and buyers. This difficulty can be solved at the level of national legislation or by using specific and clear agreements and contracts between the owners of carbon pools in a given project¹⁴. It must be said that clarifying ownership of carbon credits can become the major burden for any mitigation scheme in the forest sector that is based on a market mechanism.

For a post 2012 regime the concerns related to the CDM will remain and new concerns related to REDD and ownership of forest land will gain importance. The key question remains: who owns the emission reductions and therefore who should be compensated for emission reductions? This question opens the door to many other considerations:

- If there is a payment scheme (market or non-market mechanism) how are these payments to be distributed between owners and users?
- When forest conversion and degradation are the result of illegal practices, which will own the reduction of the emissions? Does a forest owner (e.g. a community) need to negotiate stopping degradation with the illegal users? Which would be an appropriate mechanism for sharing compensation among stakeholders conducting illegal or non-regulated practices that produce GHG emissions? If sharing benefits is not an alternative, which mechanisms will be needed to reduce GHG emissions resulting from forest conversion and degradation due to illegal or non-regulated practices? Are these mechanisms going to boost social conflicts? This circumstance is equal difficult if the forest is public, private or community owned.
- Which social groups will get empowered under a given international REDD scheme?

2.2 Vulnerability of tropical forests and adaptation options

Climate change is likely to affect all forest landscapes. Indeed, predicted changes in climate variables will place severe pressure on forests' ability to maintain the current level of diversity and productivity. With rising temperatures, changes in water availability and the expected doubling of carbon dioxide levels, it is anticipated that forests will change at two levels: physiology and metabolism; and ecosystem functioning. These changes will have significant impacts on the availability and quality of forest goods and services including the capacity of forests to sequester carbon from the atmosphere.

The Fourth Assessment report of the IPCC¹⁵ (IPCC 2007b) indicates that, although there is still uncertainty on predictions, negative climate change impacts may be stronger than previously projected and positive impacts are being over-estimated. Also, the projected potential positive effect of climate change as well as the estimated carbon sink in mature forests, may be substantially threatened by changes in the regime or increased occurrence of disturbances in forests such as fire, pests, drought and heat waves, affecting forestry production, including timber and non timber forest products, as well as forest ecosystem services (both environmental and social). Global climate change can also affect the mitigation potential of the forestry sector by either increasing or decreasing the potential for carbon sequestration.

¹³ Certified Emission Reductions (CERs) are the carbon credits coming from CDM projects. 1 CER corresponds to 1 tCO₂e

¹⁴ see ENCOFOR tool for institutional issues at http://www.joanneum.at/encofor/tools/tool_demonstration/Tools.htm

¹⁵ The Intergovernmental Panel on Climate Change (IPCC) was created in 1988. It is open to all members of the UN and WMO. The role of the IPCC is to assess on a comprehensive, objective, open and transparent basis the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts and options for adaptation and mitigation.

2.2.1 *Impacts on forestry and forest-dependent people*

- The socioeconomic impacts of climate-induced changes in forests have not yet been quantified. However, it is clear that they affect all forestry activities including those within the formal and the informal sector of the economy and as well as livelihood related forest activities not considered to be part of any economy (e.g. subsistence agriculture or forest products gathering for home consumption). Some of the most important foreseeable impacts of climate change in forestry are:
 - Decrease in timber production as a result of increased extreme events such as forest fires, hurricanes, flooding and droughts
 - Decrease in timber production due to changes in ecosystems and increased pests;
 - Changes in the quality of timber
 - Changes in the regional distribution of timber and non-timber species;
 - Impacts on the ability of some species designed for productive plantations to maintain growth rates and wood quality over the next 30 - 50 years;
 - Indirect impacts on the timber chain due to changes in quantity and quality of offered timber;
 - Changes in the availability, in terms of quantity and quality, of all non-timber forest products including food, medicinal plants, fibre, etc;
 - Changes in the production chain and markets (formal and informal) of non-timber forests products;
 - Changes in biodiversity;
 - Impacts on the availability and quality of forest ecosystem services;
 - Changes in land use due to an increasing demand for new agricultural land. Conversely some agricultural land can be abandoned and could revert to shrub.

Impacts on forest dependent livelihoods cover a wide range of possibilities including direct impacts from extreme events (e.g. loss of housing), impacts on health and welfare, loss or reduction of income, loss of employment or changes in working conditions, reduction in availability of food, impacts on health and loss or changes of cultural habitat (IPCC 2007 b, c; Robledo and Forner, 2005; Robledo, Kanninen and Pedroni, 2005, Klein et al., 2007).

These will increase the already existing vulnerability of poor communities that are directly or indirectly dependent of forest ecosystems. Currently, many of these communities are already suffering disproportionately from the ongoing impacts of climate change. Their livelihoods are extremely vulnerable to any stress. Changes in the climatic conditions very often become a burden with which such communities cannot cope. Worsening living conditions and increases in conflicts are some of the consequences.

Despite the negative impacts, climate change can also open opportunities for forest dependent people. This possibility is often forgotten in the analysis of impacts of climate change. Indeed, there is little written on new opportunities resulting from climate change. This lack of research and analysis increases the vulnerability of the forest sector especially of poor people. In contrast, understanding the new opportunities brought about by climate change can bring market and non-market benefits to such communities, e.g. the following:

- Recognition of local knowledge in coping with climate variability;
- Promotion of native species that cope better to climate variability;
- Diversification of forest use so that the impact of each activity is reduced and therefore also the overall vulnerability;
- Promotion of sustainable forest management as a means for reducing vulnerability;
- Development of new market opportunities for traditional forest products that are highly resilient to climate change;
- Sustainable forest management as a means for reducing GHG emissions, and enhancing sinks.

The challenge in this case is how to reduce climate change-related impacts on forest dependent people and economic activities while increasing the ability to create new business opportunities.

There are different ways in which the forest sector can reduce vulnerability to climate change. Reducing the vulnerability and improving the adaptation capacity of forests provides benefits beyond the sector. A good documented example from Bolivia is how forest ecosystems can reduce the vulnerability of mountain agricultural land and settlements while ensuring water availability (Robledo et al. 2004). Research undertaken in Mali, Tanzania, Bangladesh, Nicaragua and Sri Lanka on how local communities cope with increasing climate hazards demonstrated the important role of forests (Crystal tool, see footnote). Forests play a key role during extreme events because they provide food during droughts, they reduce the impacts of

cyclones in coastal areas, and they reduce the risk of landslides during storms in mountain regions. Furthermore, forests provide food and shelter when climate-related risks have reduced agricultural and livestock yields and overall production or when extreme events have destroyed houses and infrastructure.¹⁶

The function of forests in adaptation needs to be highlighted as those responsible for managing the forest are hardly recognized for their role in reducing the vulnerability of other sectors. Lack of recognition includes lack of participation in benefits (monetary and non-monetary) and lack of secure access and tenure rights to forest land.

Social services provided by forest ecosystems, such as conservation of cultural habitat or scenic views are also to be considered. Social services are closely bound to the value that certain social groups give to these forest ecosystems. Understanding the importance of these social services is critical since it significantly influences the motivation of social groups to manage forest ecosystems in a sustainable way.

Although it is true that the importance of forest services (social and environmental) has gained recognition for their role in reducing vulnerability to climate change, quantifying these services and establishing their value is a major constraint to promoting corresponding management activities as instruments for adaptation to climate change.

Quantifying the impacts of climate change on the forest sector and/or the potential that the sector has in mitigating it presents many difficulties. These include the following:

- Although there is some quantitative information regarding the potential impacts of climate change on boreal and temperate forest, far less is known on the vulnerability of tropical ecosystems to climate change and its implications on the whole sector.
- The likely indirect or incremental impacts of climate change on the forest sector (e.g. impacts on the production chain or on employment) have not yet been evaluated.
- Since many forest dependent communities operate outside the formal economy, real loss in terms of GDP for example does not provide a complete picture.
- The mitigation potential of the forest sector is highly dependent of numerous variables. Relatively simple measures, such as technology transfer, are not the only limitation for fully utilising its mitigation potential; by far the greater constraints are the complex set of socio-economic and institutional issues.

The resilience¹⁷ of many forest ecosystems will be exceeded as a consequence of the impacts of climate change and another global drivers (e.g. pressure for changing land use). Increments in greenhouse gases in the atmosphere will also have an additional impact on forests. If global mean temperature exceeds a warming of 2 to 3°C, a high number of plant and animal species is likely to be at an increased extinction risk and changes in structure and functioning of terrestrial ecosystems are very likely to occur (IPCC 2007b). Changes in temperature, exposure to sunlight and availability of water will have different impacts on forest ecosystems depending of the specific region. Only less than 7% of forests are in strongly water-limited systems (Biosvenue and Running, 2006).

Biosvenue and Running (2006) elaborated a global analysis of the impacts of climate change on natural primary production (NPP)¹⁸ based on the review of scientific literature. With regard to tropical forest, their results can be summarized as follows:

- Tropical forest regions show temperature increases averaging 0.26 - 0.5 °C since the mid-1970s and a strong variation in long-term rain trends. Overall precipitation appears to have declined in tropical rainforest regions at a rate of 0.8 -1.0 ? (Po0.05) per decade since 1960.
- Until recently, the prevailing view has been that mature tropical forests are likely to have been acting as a substantial carbon sink over the recent decades, increasing their net primary production. There is currently much debate about the productivity of tropical forests, and existing data are insufficient to support any firm conclusion. Data from a few eddy covariance (tower-based) studies of whole-forest CO₂ exchange have been interpreted as evidence that mature tropical rainforests are currently acting as moderate to very strong net carbon sinks (e.g. Malhi & Grace, 2000).

¹⁶ For more information on the CRiSTAL tool (Community-based Risk Screening Tool – Adaptation & Livelihoods) and the reports of the test cases see http://www.iisd.org/security/es/resilience/climate_phase2.asp

¹⁷ Resilience understood as the ability to adapt naturally.

¹⁸ The IPCC (2003) defines NPP as the rate of carbon accumulation in plants after losses from plant respiration and other metabolic processes (necessary to maintain the plant's living systems) are taken into account. It can be calculated as gross primary production (GPP) minus autotrophic respiration.

- Changes in tree growth in Central America have been related to annual changes in temperatures and El Niño South Oscillation – ENSO - (Clark, 2004).
- Changes in net biomass increase were found in the Amazon region, where an analysis of 50 long-term monitoring plots across spanning from 1971 to 2002 showed increases in tree and stand over this time period (Lewis et al., 2004b). The carbon fluxes in and out of these pools and gains consistently exceeded mortality losses. The authors conclude that this implied a continent-wide increase in resource availability, which is increasing NPP and altering forest dynamics (Lewis et al., 2004b).
- Field observations of mortality rates during 1982–1985 and 1985–1990 in Barro Colorado Island in Panama showed that canopy trees have the highest mortality of three group types studied during a dry 1982–1985 period, whereas small trees and shrubs showed no difference between the periods (Condit et al., 1995). During drought years, forest-wide mortality rates were 2% more in the larger size class. Tropical forest plot data from both the neotropics and the palaeotropics show large increases in forest-wide tree mortality associated with the very strong ENSO events of 1982/1983 and 1997/1998 (Clark, 2004) and localized species-specific effects (Williamson et al., 2001). Higher mortality rates, which increased with tree size, were also seen in trees of unburned rainforest in East Kalimantan during the 1982/1983 ENSO, with 37% of trees 460 cm in diameter found dead on ridge tops and 71% on slope plots (Leighton & Wirawan, 1986). Clark (2004) states that tropical forests have already experienced notable shifts in floristic composition and in tree size structure owing to these selective mortality patterns of single strong ENSO. Clark (2004) interpreted the general finding of a sharp increase in tree mortality in the strong ENSO events of recent decades to mean that, generally in the tropics, these old-grown primary forests are already being strongly negatively affected by current levels of temperature and drought stress.

According to the IPCC 4AR, globally, commercial forestry productivity rises modestly with climate change in the short and medium term, with large regional variability around the global trend.

3 International Institutional Setting

Evidence of human interference with the climate first emerged in 1979 at the First World Climate Conference. Increased scientific evidence, coupled with growing public concern over global environmental issues began to push climate change onto the political agenda in the mid-1980s. Recognizing the needs of policymakers for authoritative and up-to-date scientific information, the World Meteorological Organization (WMO) and the UN Environmental Programme (UNEP) established the Intergovernmental Panel on Climate Change (IPCC) in 1988¹⁹.

In 1990, the IPCC issued its First Assessment Report, confirming that climate change is a threat and calling for a global policy to tackle the problem. This call was echoed by the Ministerial Declaration of the Second World Climate Conference, held in Geneva at the end of 1990. Based on this Declaration, the UN General Assembly formally launched negotiations on a framework convention on climate change. After 15 months of intergovernmental negotiation, governments adopted the United Nations Framework Convention on Climate Change (UNFCCC) in May 1992. The Convention was opened to signature in June 1992 during the UN Conference on Environment and Development (UNCED) held in Rio de Janeiro and came into force in March 1994. Today, 186 countries have signed and ratified the Convention.

The Convention's goal is "to stabilise atmospheric concentrations of GHG at a level that would prevent human-induced actions from leading to "dangerous interference" with the global climate system" (Art. 2 of the Convention). The UNFCCC acknowledges that countries have "common but differentiated responsibilities" and different capabilities to address climate change. Under such premises, developed countries committed themselves to taking a leading role in achieving the Convention's goal, and to provide new and additional funds to assist developing countries in mitigation and adaptation activities. Mitigation and adaptation activities must be consistent with and supportive of sustainable development objectives. Scientific uncertainties that might still remain cannot be used as an argument to postpone action (the so-called "precautionary principle").

Members meet once a year as the Conference of the Parties (COP) to monitor implementation of the UNFCCC and to continue negotiations on how best to tackle climate change.

There are two main ways to address climate change: adaptation and mitigation. These strategies are complementary and non-exclusive.

Adaptation to climate change refers to adjustments in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderate, harm or exploit beneficial opportunities. Various types of adaptation can be distinguished, including anticipatory and reactive adaptation, private or public adaptation and autonomous or planned adaptation. In 2006 the UNFCCC adopted the Nairobi Work Programme on Adaptation, which includes a wide spectrum of possibilities for promoting adaptation to climate change.

Mitigation refers to an anthropogenic intervention to reduce the emission of GHG at the source or to enhance sinks (IPCC, 2001). At the third COP, held in Kyoto in 1997, the Parties to the Convention adopted a protocol aimed at paving the way for emission reduction in Annex I countries until 2012²⁰ (see figure 4). This instrument is known as the Kyoto Protocol (see figure 5). The Kyoto Protocol is a legally binding agreement under which industrialised countries committed to reduce their emissions to minus 5.2% in average compared to the base year 1990. Countries with specific reduction commitments are known as Annex I countries (see Annex 1 of this report).

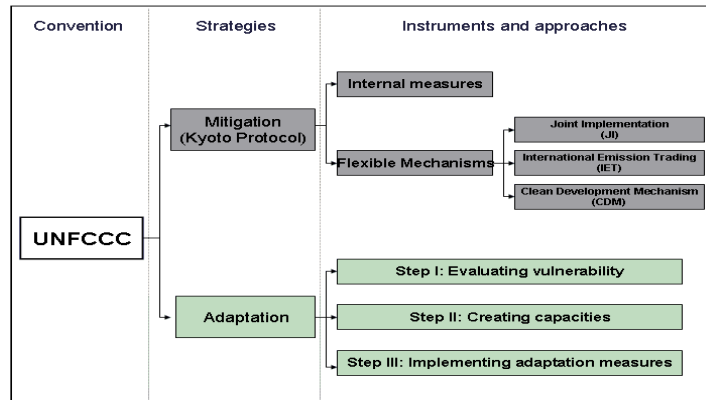
Countries with reduction commitments have two options: to reduce emissions within the country (internal measures) or to use the Kyoto Protocol's so-called "flexible mechanisms." These mechanism allow Annex I countries to "buy" part of their reductions commitments in other countries. There are three such flexible mechanisms: International Emissions Trading, Joint Implementation and the Clean Development Mechanism²¹ (see Figure 5).

¹⁹ Until now the IPCC has produced three assessment reports, a special report on Land Use, Land Use Change and Forestry and several specific guidelines concerned with climate change and natural resources.

²⁰ Annex I countries are Parties that have emission reduction commitments (mainly industrialized countries). A list of Annex I countries is provided in the annex to this publication.

²¹ **Joint Implementation** (Art. 6): "Any Party included in Annex I may transfer to, or acquire from, any other such Party emission reduction units resulting from projects aimed at reducing anthropogenic emissions by sources or enhancing anthropogenic removals by sinks of greenhouse gases in any sector of the economy..."

Figure 5: Strategies, Instruments and Approaches to tackle Climate Change



3.1 Current situation

During the run up to the Kyoto Protocol many countries highlighted the importance of including sinks and emissions from LULUCF in accounting for countries' reduction commitments, subject to concerns about definitions, timing and scope. However, LULUCF was considered as too complex and lack of scientific evidence increased the difficulties during the negotiation.²² As a consequence, possible LULUCF activities were included in two different sub-paragraphs of Article 3 of the Kyoto Protocol, with different methodological and reporting treatments (see Box 1). Article 3.3 refers to afforestation, reforestation and deforestation (ARD); these are mandatory for all Annex I Parties. Article 3.4 refers to additional voluntary activities related to changes in GHG emissions by sources and removals by sinks in agricultural soils and land-use change and forestry. These additional activities are forest management, cropland management, grazing land management, and re-vegetation. By the end of 2006, Parties with commitments under the Protocol had to decide which of these activities under Article 3.4 they would account towards their mitigation commitments.

Box 1: The legal framework for LULUCF activities under the Kyoto Protocol

Article 3.3 of the Kyoto Protocol

The net changes in greenhouse gas emissions by sources and removals by sinks resulting from direct human-induced land-use change and forestry activities, limited to afforestation, reforestation and deforestation since 1990, measured as verifiable changes in carbon stocks in each commitment period, shall be used to meet the commitments under this Article of each Party included in Annex I. The greenhouse gas emissions by sources and removals by sinks associated with those activities shall be reported in a transparent and verifiable manner and reviewed in accordance with Articles 7 and 8.

Article 3.4 of the Kyoto Protocol

Prior to the first session of the Conference of the Parties serving as the meeting of the Parties to this Protocol, each Party included in Annex I shall provide, for consideration by the Subsidiary Body for Scientific and Technological Advice, data to establish its level of carbon stocks in 1990 and to enable an estimate to be made of its changes in carbon stocks in subsequent years. The Conference of the Parties serving as the

Clean Development Mechanism (Art. 12): "The purpose of the clean development mechanism shall be to assist Parties not included in Annex I in achieving sustainable development and in contributing to the ultimate objective of the Convention, and to assist Parties included in Annex I in achieving compliance with their quantified emission limitation and reduction commitments under Article 3."

International Emission Trading (Art. 17): "The Parties included in Annex B (~Annex I of the UNFCCC) may participate in emissions trading for the purposes of fulfilling their commitments under Article 3. Any such trading shall be supplemental to domestic actions for the purpose of meeting quantified emission limitation and reduction commitments under that Article."

²² Considering the need to deal with uncertainties, in 1998 the UNFCCC Subsidiary Body for Scientific and Technical Advice (SBSTA) requested the IPCC to prepare a report examining the scientific and technical implications of carbon sequestration related to LULUCF. This IPCC Special Report on LULUCF examines how carbon flows between the atmosphere and the five different "pools" and how carbon stocks change over time (see IPCC 2000). Although the IPCC Special Report on LULUCF clarified many issues, uncertainties regarding the real mitigation potential and limitations of activities under Article 3.4 were still significant. It should be mentioned that reasons for special treatment under 3.4 were not only scientific uncertainty.

meeting of the Parties to this Protocol shall, at its first session or as soon as practicable thereafter, decide upon modalities, rules and guidelines as to how, and which, additional human-induced activities related to changes in greenhouse gas emissions by sources and removals by sinks in the agricultural soils and the land-use change and forestry categories shall be added to, or subtracted from, the assigned amounts for Parties included in Annex I, taking into account uncertainties, transparency in reporting, verifiability, the methodological work of the Intergovernmental Panel on Climate Change, the advice provided by the Subsidiary Body for Scientific and Technological Advice (SBSTA) in accordance with Article 5 and the decisions of the Conference of the Parties. Such a decision shall apply in the second and subsequent commitment periods. A Party may choose to apply such a decision on these additional human-induced activities for its first commitment period, provided that these activities have taken place since 1990.

The *Marrakesh Accords, agreed at COP 7* in 2001, defined a number of terms and reporting requirements specific to Annex I Parties. One significant requirement regarding LULUCF activities is that the Accords provide a forest definition with range thresholds (see Box 2). Each Party is asked to define the national thresholds to be used during the first commitment period (2008 – 2012). This decision, to be made internally by each party, has a great impact on the mitigation potential of each country. While there may be different forest ecosystems within a country, the definition for the Kyoto Protocol has to be a single one for the entire country. As an example, think about a country with two main ecosystems –for instance savannas and humid forest-, with a certain level of forest degradation that initiated before 1990. The definition of the forest thresholds (forest cover, tree height and minimum area) will define how much land is eligible for potential A/R CDM project activities. This and other similar requirements agreed in the Marrakesh Accords represented over the years a challenge for decision makers in all Parties)²³

Box 2: Key definitions of the UNFCCC relevant to LULUCF (FCCC/CP/2001/13)

Forest is a minimum area of land of 0.05-1.0 hectares with tree crown cover (or equivalent stocking level) of more than 10-30 per cent with trees with the potential to reach a minimum height of 2-5 meters at maturity *in situ*. A forest may consist either of closed forest formations where trees of various storeys and undergrowth cover a high proportion of the ground or open forest. Young natural stands and all plantations which have yet to reach a crown density of 10-30 per cent or tree height of 2-5 meters are included under forest, as are areas normally forming part of the forest area which are temporarily unstocked as a result of human intervention such as harvesting or natural causes but which are expected to revert to forest;

Afforestation is the direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land through planting, seeding and/or the human-induced promotion of natural seed sources;

Reforestation is the direct human-induced conversion of non-forested land to forested land through planting, seeding and/or the human-induced promotion of natural seed sources, on land that was forested but that has been converted to non-forested land. For the first commitment period, reforestation activities will be limited to reforestation occurring on those lands that did not contain forest on 31 December 1989.

Additionally, Parties agreed at Marrakesh to limit eligible LULUCF activities in the Clean Development Mechanism (CDM) to afforestation and reforestation²⁴. The total number of credits that an Annex I Party may claim from A/R project activities under the CDM is limited to 1% of the Party's total emissions in 1990 multiplied by five.²⁵ These agreements apply to the first commitment period of the Kyoto Protocol (2008 – 2012). (For a clearer understanding of forestry terms used in the Kyoto Protocol see Box 2.)

²³ Other important requirements of importance for Non-Annex I (NAI) are the need of creating a Designated National Authority, and the request for defining how to deal with proving sustainable development in/for the CDM.

²⁴ The Clean Development Mechanism (CDM) is one of the three so called Flexible Mechanisms of the Kyoto Protocol (Art. 12 of the KP). It allows to develop project activities in NAI countries (host Parties) that promote sustainable development while the emission reductions will be accounted for fulfilling Annex I commitments. For this aim, a CDM project can sell its Certified Emission Reductions (CER) to those who have reduction commitments. Afforestation and reforestation (as defined in Box 2) refer to the enhancement of sinks through the planting of trees on non-forest land and are eligible activities in the CDM (A/R CDM). A/R CDM is ruled in respect to eligibility, modalities and procedures by a number of decisions as outlined in the annex (Decisional pathway for A/R CDM and REDD).

²⁵ Even though a cap for A/R CDM project activities has been introduced, to date only a few projects have been submitted and the cap of 1% will most probably not be reached until the end of the first commitment period.

3.1.1 LULUCF Activities in Non-Annex I Parties

According to Article 4 of the Convention, not only Annex 1 parties, but all Parties, including NAI countries have to report their LULUCF emissions as part of their *national communications*. Information is to be provided using common report formats and in accordance with guidance given by the IPCC.

Providing LULUCF information in the national communications is not an easy task for many NAI parties. The lack of consistent information is a major concern. Other concerns relate to: a) the fact that the flexibility provided by the IPCC guidance allows Parties to use different methods and tiers which lead to different results; b) Parties do not always provide equivalent information due to the different methods used; c) the information provided and the methods used are not always transparent (this is especially relevant when recalculating inventories over time); and d) given that reporting is obligatory on three GHGs only (CO₂, CH₄ and N₂O), information on the three other relevant GHG emissions (HFC, PFC and SF₆) is insufficient.

With regard to the mitigation strategy, the *CDM* is the only flexible mechanism that allows NAI countries to assist²⁶ Annex I Parties in their efforts to achieve their GHG emission reduction targets under the Kyoto Protocol. LULUCF activities included in the CDM are afforestation and reforestation (A/R CDM) as defined in Box 2. While CDM procedures for the other 5 sectors were already agreed upon between before 2003, rules and procedures that govern A/R CDM for the first commitment period were only finally decided in 2004 (see list of relevant decisions in Annex 8.3). Hence, it is only since the year 2005 that forest sector stakeholders in NAI countries can undertake A/R CDM projects according to defined rules. This partly explains the “delay” that LULUCF project have compared with projects in the other sector eligible in CDM.

The most important elements of the rules and procedures related to A/R CDM are the following:

- The market size for A/R projects is limited during the first commitment period (2008-2012) to one per cent of the emissions of each Annex I country in 1990, multiplied by five;²⁷
- Eligible activities in the LULUCF sector until 2012 are restricted to afforestation and reforestation. Activities in bioenergy are also eligible until 2012 as long as these are undertaken using an approved methodology and considering all other clarifications made by the Executive Board of the CDM in this regard. Forest management and reduced emissions from deforestation are not eligible forestry activities under the CDM;
- [Agreement on the modalities and procedures for CDM projects in forestry and the process for proposing and getting approved corresponding methodologies
- Small-scale projects, subject to simplified methodology are defined as those that.....; and
- Baseline and monitoring methodologies for the CDM are to be presented by project developers and approved by the Executive Board of the CDM.

Considering the limited experience with A/R CDM compared to CDM projects in other sectors, it is too early to make an accurate evaluation of the impacts of A/R CDM on poverty alleviation or in terms of its net contribution to the global mitigation portfolio.²⁸ Even if the carbon market is active, its real development started only in 2008 with the beginning of the first commitment period. Still, some early observations are worth mentioning:²⁹

- A/R CDM is a well regulated system that creates additional costs compared to traditionally designed forest plantations. For example, to assess a project's carbon potential, new and often complex methodologies need to be developed in the design stage of the project and the project cycle must include many actors and steps that are not yet well known locally. A/R CDM projects require, at least at the beginning, a high level of knowledge of the internationally-agreed modalities, procedures and methodologies. Since such knowledge is at present barely available in many developing countries, there is often a need to engage international expertise, which further increases the project preparation costs. Most of these costs have to be paid before CDM payments are received. Because of this, many developing countries have not been in a position to use the A/R CDM even if they consider it an attractive option.³⁰

²⁶ The term “assist” the Annex I Parties is the exact wording in the article 12 of the Kyoto Protocol

²⁷ “For the first commitment period, the total additions to a Party’s assigned amount resulting from eligible LULUCF project activities under Article 12 shall not exceed one per cent of base year emissions of that Party, times five” (FCCC/CP/2001/13, Marrakesh Accords, Decision 11/CP.7).

²⁸ The reason for this is mainly the lack of overall agreement by Parties on how to deal with LULUCF.

²⁹ These observations are based on the authors’ experience with the A/R CDM in Latin America, Asia and Africa

³⁰ Some bi- and multilateral development agencies have reacted to this fact and are funding capacity building for the preparation of A/R CDM projects, mainly through workshops, tools development and model project development.

- A/R CDM has stimulated new interest in planting trees, especially in seriously degraded areas. This can be indeed a new opportunity for the forest sector, as it can open the possibility to promote long-term activities such as restoration of forest land or tree plantations. Nonetheless, the forest sector in many countries is reacting very slowly to the opportunities provided by the CDM, and often A/R CDM activities are proposed without consideration of existing forest strategies. A/R CDM, especially of the small-scale variety, offers the possibility for poor people to get involved, particularly through the promotion of community forestry, which could have an important developmental impact in rural areas. However, for the time being, small-scale A/R projects have proven to be largely out of reach for local communities, given the complexity in the design of the projects, the legal requirements with respect to property rights on land, carbon pools and carbon credits, and the transaction costs involved in project preparation. Thus, to date, almost all existing A/R CDM projects have targeted either publicly-owned reforestation areas or plantations promoted on privately owned land.

The fact that carbon certificates from A/R CDM projects are excluded from the EU Emissions Trading Scheme (EU ETS) also implies a considerable constraint in market opportunities for mitigation activities from the forestry sector in developing countries.

In conclusion, mitigation activities in the forestry sector under the CDM have been limited to date. Opportunities to increase these activities include simplifying procedures, developing certainty over future commitments, reducing transaction costs, and building confidence and capacity among potential buyers, investors and project participants (Robledo et al. 2008).

3.2 UNFCCC negotiation until 2012

Currently there are three major negotiation processes under the UNFCCC: the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG-KP), the Ad Hoc Working Group on Long-term Cooperative Action under the Convention (AWG-LCA) and the ongoing discussions under SBSTA. At COP 15 to be held in Copenhagen in 2009 these discussions should converge on a consistent agreement for a post-2012 mitigation regime (see Winkler 2008).

In this section we will first present the way LULUCF issues are considered in these ongoing negotiation processes. After that, some more detailed analysis of the policy options on REDD as well as other mitigation options in forestry will be presented.

3.2.1 *Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG-KP)*³¹,

Article 3.9 of the Kyoto Protocol establishes the need to consider future commitments for Annex I Parties at least seven years before the end of the first commitment period. The *Ad Hoc* Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG-KP) was created for pursuing this aim. Results should be ready to be adopted by the COP/MOP at the earliest possible time to ensure that there is no gap between the first and second commitment period of the Kyoto Protocol.

In this negotiation there is a specific agenda item on LULUCF, where all activities included in Article 3 of the Protocol are under discussion. The following are the issues under consideration:

- a) The activity-based approach based on Article 3.3 and 3.4 of the Kyoto Protocol (see Box 1)
- b) The land-based approach based on reporting under the Convention
- c) Harvested wood products (HWP)

Besides, potential new activities such as wetland management, restoration and degradation and forest degradation are included in the discussions. Key elements in the discussion include the possibility or need for using discounting factors limiting the magnitude of LULUCF for Annex I Parties' compliance and many legal aspects. Conclusions and decisions of this process are bound to have impacts on monitoring and reporting requirements for LULUCF in Annex I countries (see figure 6).

Figure 6: Diagram representing options and issues for consideration (AWG-KP)

³¹ Bear in mind that only Parties that have already ratified the Kyoto Protocol participate in this negotiation -that is the Conference of the Parties serving as the Meeting of the Parties to the KP (CMP).

<p>Crosscutting issues: Consistency, continuity with the current rules; factoring out, including age structure and indirect climate change effects; inter-annual variability; natural disturbances; and symmetry in the accounting of emissions and removals; SFM, and co-benefits; others.</p>			
<p>Other Key Elements</p> <ul style="list-style-type: none"> • Additional and all activities to be mandatory • Land use flexibility • Temporary removal from the accounting of areas subjected to natural disturbances. • Treatment of harvested wood products • Additional Article 3.4 activities: Wetland management, restoration and degradation; De-vegetation; Forest degradation; Others. • Discounting factors • Limiting magnitude of LULUCF for Annex I compliance • National circumstances. 	<p>Activity based approach (Articles 3.3 and 3.4)</p>		<p>Land Use based Approach</p>
	<p>Fewer changes</p>	<ul style="list-style-type: none"> • Legally required – ASSESSED AS “Current rules maintained” 	
	<p>More changes</p>	<ul style="list-style-type: none"> • Legally required; and • Article 3.4 Forest Management: <ul style="list-style-type: none"> - Moving to net-net and including emissions and removals from forest management in the base year; - Moving to net-net and estimating base year emissions and removals using a base period; - Moving to net-net and applying forward-looking baselines; - Remaining gross-net and applying discount factor; - Others 	<ul style="list-style-type: none"> • Current rules and modalities changed aiming at full geographical coverage and inclusion of all GHG emissions and removals and Include emissions and removals from all land use, land-use changes in the base year
	<p>Many changes</p>	<ul style="list-style-type: none"> • Legally required; and • Article 3.4 Forest Management (options as above); and • Other activities under Article 3.4 <ul style="list-style-type: none"> - Estimating base year emissions and removals using a base period; - Applying forward-looking baselines; • Merging Article 3.3 and Article 3.4 	
<p>Harvested Wood Products</p>			
<p>Mechanisms: Article 6 and Article 12</p>			
<p>Issues that may need some consideration as a consequence of different options: Definitions, reporting and reviewing, others.</p>			

Source: UNFCCC Secretariat

3.2.2 Ad Hoc Working Group on Long-term Cooperative Action under the Convention (AWG-LCA)³²

The AWG-LCA was created to conduct the comprehensive process to enable the full, effective and sustained implementation of the Convention through long-term cooperative action, now, up to and beyond 2012 (as agreed in the Bali Action Plan (BAP), Decision 1/CP.13).

Regarding forests, the BAP includes in its numeral 1(b)(iii):

Policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries;

In the great majority of the submissions for the first meeting of the AWG-LCA LULUCF is mentioned as an important option for mitigating climate change (documents in the series FCCC/AWGLCA/2008³³). The major issues for discussion are:

- a) Which activities to include. In the submissions, the following activities were mentioned when discussing mitigation options in developing countries: REDD, forest conservation, sustainable forest management and enhancements of sinks. Some Parties also mentioned afforestation and reforestation as well as forest management
- b) Consequences on reporting measurable and verifiable emission reductions and enhancements in stocks.
- c) Need for consistency with the ongoing work in the AWG-KP.

3.2.3 Ongoing discussion in the SBSTA with regard to REDD

In accordance to Decision 2/CP.13, the SBSTA started a program of work on methodological issues related to a range of policy approaches and positive incentives for REDD. Parties have been asked to provide and discuss their views on outstanding methodological issues, including: assessments of changes in forest cover and associated carbon stocks and GHG emissions; incremental changes due to sustainable forest management; demonstration of reductions in emissions from forest degradation; implications of national and

³² All parties to the Convention participate in this negotiation (this process distinguish between developed and developing countries)

³³ These documents can be downloaded under <http://unfccc.int/documentation/documents/items/3595.php#beg>

sub-national approaches, including displacement of emissions; options for assessing the effectiveness of actions [paragraphs 1, 2, 3 and 5 of the Decision 2/CP.13] There is a clear link between this process and the work of the AWG-LCA. It is, therefore, of key importance that policy makers keep consistency in their positions when participating in these two processes.

Submissions made by Parties point to priorities for discussion (see Table 6).

*Table 6: Issues under current discussion*³⁴

The issues	The discussion
Activities to be considered	Some parties would like to concentrate on deforestation and forest degradation as they consider that other potential activities bring many uncertainties to the discussion. Others also want to consider conservation, sustainable forest management and/or enhancements of sinks.
Definitions	The definition of forest has a great impact on REDD as well as on the potential for all other mitigation options in forestry. It is imperative to clarify which definition should be used. Some Parties highlight the need of having a definition that addresses different national circumstances and different ecosystems types within a country. The definition of other terms such as degradation, sustainable forest management and conservation also needs to be clarified in the context of mitigating climate change.
National and sub-national approaches	Some Parties favor national approaches, while other Parties highlight the need to include also subnational approaches with a certain level of flexibility. Issues for argumentation are treatment of emissions displacement, monitoring requirements, accuracy and treatment of uncertainties.
Reference scenario or baseline	The reference scenario seems to be linked to historical data while the baseline seems to include also future trends. For those countries with a high deforestation rate in the past, the reference scenario appears to be a more adequate option while for those countries with potential increments in deforestation rates in the future the possibility to build up a baseline considering these future trends looks more adequate.
Measurable, Reportable and Verifiable (MRV) requirements	In general, this issue is discussed under the monitoring requirements. The discussion in the submissions is how far satellite imagery is enough (in terms of adequacy of the technology and installed capacities in developing countries) and/or how other monitoring tools and existing information can be used (e.g. inventories, ground check, etc).
Funding mechanism	This concerns the possibility of having a market mechanism or of creating a fund for REDD compensation. In both cases, it is assumed that some kind of payment needs to be considered as a key incentive for REDD (see Table 9 for a detailed information on the mechanisms that have been discussed).
Effectiveness of support given by Annex I countries	In the submissions, Parties refer to the need to have clarity about the criteria for support, the amount of resources invested and a way for assessing its effectiveness.

According to the decision 2/CP.13 requested the secretariat organized a workshop on methodological issues in Tokyo Japan in August, 2008. This workshop was part of a programme of work on methodological issues related to a range of policy approaches and positive incentives for reducing emissions from deforestation and forest degradation in developing countries undertaken by the SBSTA.

³⁴ The text under “the discussion” is based on the author’s observation of the different ongoing processes.

The workshop gave the opportunity to discuss the submission on views and information on how to address outstanding methodological issues, including, inter alia, assessments of changes in forest cover and associated carbon stocks and greenhouse gas emissions, incremental changes due to sustainable management of the forest, demonstration of reductions in emissions from deforestation, including reference emissions levels, estimation and demonstration of reduction in emissions from forest degradation, implications of national and subnational approaches including displacement of emissions, options for assessing the effectiveness of actions and criteria for evaluating actions. These submissions are compiled into document FCCC/SBSTA/2008/MISC.4, Add.1, Add.2 and Add.3. The main issues under discussion are summarized in table 6. The conclusions of the workshop are presented in box 4.

Box 4: Conclusions of the REDD workshop in Tokyo

UNFCCC Workshop on Methodological Issues relating to Reducing Emissions from Deforestation and Forest Degradation in Developing Countries

Main conclusions regarding methodological issues:

Need for **robust and cost-effective methodologies** to estimate and monitor changes in forest cover and associated carbon stocks and greenhouse gas emissions, incremental changes due to sustainable management of forest, and, reduction of emissions from deforestation and forest degradation (a combination of remote sensing and ground-based assessments could be a suitable approach)

IPCC guidelines and good practice guidance provide methodologies that can form the basis for estimate and monitor emission reductions from deforestation and forest degradation and the changes in forest carbon stocks in developing countries

Need to increase **technical capacities** in developing countries to undertake forest carbon inventories. There is also a need to build and strengthen capacities in policy and **institutional frameworks**

Need for further consideration of methodologies to estimate and monitor emissions and changes in carbon stocks from **forest degradation**

Main conclusions regarding policy approaches and positive incentives

Robust methodologies are important to ensure delivery of transparent and verifiable information on the effectiveness of REDD activities, leading to an enabling environment to ensure the provision of necessary resources by stakeholders, governments and organizations;

Discussions on policy approaches and positive incentives could be initiated with the present knowledge of methodological issues. However, the needs and implications of different approaches will need further exploration.

Sufficient resources need to be made available as soon as possible to enable developing countries to start implementing actions at the national level. Promoting sustainable forest management practices can ensure effective actions.

Source: Maria José Sanz-Sánchez, UNFCCC Secretariat, Presentation in St. Petesburg, October 2008

3.3 Funding mechanisms

3.3.1 Mitigation

Considering the various mitigation options of forests in the climate change agenda, important new funding mechanisms have been developed over the past 2 years, at bilateral and multilateral level, all of them with the overall intention to further explore and develop forest mitigation option in a post-2012 climate regime. At the multilateral level there have been essentially three funding mechanisms initiated over the past 2 years, which are supported by a considerable number of donor countries:

- (i) The World Bank's Forest Carbon Partnership Facility (FCPF)
- (ii) The UN-REDD Programme
- (iii) The Forest Investment Program (FIP) under the Climate Investment Fund.

While FCPF and the UN-REDD focus to a certain extent on REDD, the now emerging FIP has a more holistic approach in addressing forest mitigation options.

Forest Carbon Partnership Facility (FCPF).

For more than 10 years, the World Bank Group has supported carbon markets through a number of different funds. with carbon investments increasing since 2000 (from US\$ 145 million/year in 2000, to US\$ 415 million in 2004: and on to a total of US\$ 1932 million in 2006). There are two funds that particularly address forest related issues: the Biocarbon Fund, which has provided funding for LULUCF -including A/R CDM-projects since 2000 (see details under www.worldbank.org/biocarbonfund), and a new instrument, the Forest Carbon Partnership Facility (www.carbonfinance.org/fcpf). The FCPF, launched at COP-13 in Bali and operational since July 2008, assists developing countries in their efforts on REDD. Nine donor countries have

so far committed funds to the FCPF and the total secured budget reaches US\$ 100 million. The FCPF has the dual objectives of building capacity for REDD in developing countries, and testing a program of performance-based incentive payments in some pilot countries. Two separate mechanisms have been set up to support FCPF objectives:

- **Readiness Mechanism:** the Facility helps a considerable number of countries (20 – 25) to arrive at a credible estimate of their national forest carbon stocks and sources of forest emissions, as well as assist the country in defining their reference scenario based on past emission rates for future emissions estimates. The Readiness Mechanism offers these countries technical assistance in calculating opportunity costs of possible REDD interventions, and designing an adapted REDD strategy that takes into account country priorities and constraints. Interested countries submit a so-called Project Idea Note (PIN) and those that got their PIN approved will receive an amount of up to 200,000 US\$ to prepare a so-called Readiness Plan that defines a work program of an implementation phase over two to three years with a budget of up to 2-3 million US\$ per country. Fourteen countries were selected in July 2008 into the Readiness Mechanism. They are: Bolivia, Costa Rica, the Democratic Republic of Congo, Gabon, Ghana, Guyana, Kenya, Lao PDR, Liberia, Madagascar, Mexico, Nepal, Panama and Vietnam. A number of additional countries will be selected at the FCPF fall meeting that will be held on Oct 20-22 in Washington DC
- **Carbon Finance Mechanism:** a number of countries will be selected after 2009 to participate in this mechanism through which the Facility would implement and evaluate pilot incentive programs for REDD based on a system of compensated reductions. The structure of these incentive payments would build on the options for REDD that are currently being discussed within the United Nations Framework Convention on Climate Change (UNFCCC) process, with payments made to help address the causes of deforestation and degradation. Within the Carbon Finance Mechanism, payments would only be made to countries that achieve measurable and verifiable emission reductions.

UN-REDD:

UN-REDD is a collaborative programme launched jointly by FAO, UNDP and UNEP. It has two components: (i) assisting developing countries to prepare and implement national REDD strategies and mechanisms; and (ii) supporting the development of normative solutions and standardized approaches based on sound science for a REDD instrument linked with the UNFCCC. The programme will help empower countries to manage their REDD processes and will facilitate access to financial and technical assistance tailored to the specific needs of the countries. In September 2008, the UN-REDD was officially launched with the aim at creating a global incentive mechanism to manage, protect forests and to create new forests. In its initial phase the programme will assist nine developing countries, including the ITTO members Bolivia and Indonesia, in establishing systems to monitor, assess and report forest cover. Norway, which is looking for ways to offset carbon dioxide emissions from its growing natural gas export business, donated US\$35 million to finance the initial phase of UN-REDD and other bilateral donors are interested to contribute.

Climate Investment Funds.

A new Climate Investment Funds (CIF) was launched in July 2008 by the World Bank Group. The objectives are (i) scaling up investments in low-carbon technology (Clean Technology Fund) and (ii) supporting various programs to test innovative approaches to climate action (through the so-called **Strategic Climate Fund**). The Strategic Climate Fund also implies the elaboration of a Forest Investment Program (FIP) as one of the targeted programs. The CIFs combine significant concessional financing with international financial institutions, public and private sector flows, the Global Environment Facility (GEF) and other climate financing (such as carbon finance).

Forest Investment Program (FIP):

A 2007 UNFCCC study³⁵ and the recent mapping study on forest financing sources³⁶ have shown that the current financial flows into the forest sector are grossly inadequate for meeting the investment needs to address climate change through forest measures. Current REDD programs such as the Forest Carbon Partnership Facility as well as the UN-REDD are not designed to cover transformational investments necessary to achieve emission reductions. These challenges are recognized by the Forest Investment Program (FIP) as one of the targeted programs. FIP is a very new initiative. The so-called FIP Design Meeting has been held on 15-18 of October 2008 in Washington DC. The FIP should be established by the end of 2008 with a view with to mobilizing significantly increased funds (in the order of magnitude of US\$1000 million) to accelerate efforts in developing countries to reduce deforestation and degradation, and to promote improved sustainable forest management, including forest restoration as a means to reducing carbon emissions and the protection of carbon reservoirs.

³⁵ UNFCCC. 2007. Investment and Financial Flows to Address Climate Change. Bonn.

³⁶ PROFOR. 2008. Mapping of Existing and Emerging Sources of Forest Financing

Bilateral Cooperation

Cooperation agencies from donor countries include programs that facilitate CDM activities and trade of CERs, inter alia: Austria, Australia, Belgium, Denmark, Finland, France, Germany, Italy, Japan, Luxembourg, The Netherlands, Portugal, Spain, Sweden and the United Kingdom (see annex 10.6 for more detailed information)

Forestry activities are included in different ways in all these programs.

3.3.2 Adaptation

According to the OECD, from an economic perspective, adaptation should be evaluated in terms of whether, and by how much, the benefits of such actions exceed the costs incurred (Agrawala & Fankhauser, 2008). However, this approach to funding adaptation faces two major difficulties. The first is how to quantify the cost and benefits given the high uncertainty associated to the local manifestations of climate change. The second relates to the difficulty of allocating these benefits and costs when focusing on a specific sector.

Funding adaptation activities could be pursued, at least partially, in a similar way as funding for other sustainable development and environmental goals. Like other development projects, adaptation projects do not necessarily produce direct and tangible income for the investors -at least not in the short term.

This chapter examines the current international funding mechanisms for adaptation and some possibilities for additional funding within the national context. We present three main types:

- Funding mechanisms under the UNFCCC and its KP
- Other multilateral and bilateral options
- Domestic funds for financing adaptation

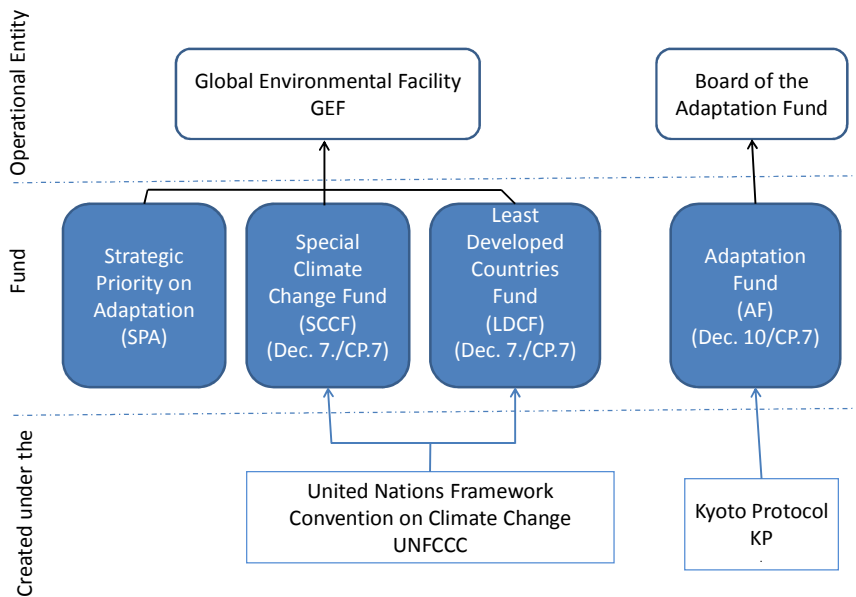
3.3.2.1 Funding mechanisms under the Convention and its Kyoto Protocol:

Three funds were created as part of the Marrakesh Accords that consider adaptation to climate change. Two of them were created under the Convention (Dec. 7/CP.7): the Special Climate Change Fund (SCCF) and the Least Developed Countries Fund (LDCF). A third mechanism, the Adaptation Fund, was created under the Kyoto Protocol (Dec. 10/CP.7).

The operation of the two Convention funds has been assigned to the Global Environmental Facility (GEF). Further, the GEF has established the Strategic Priority on Adaptation (SPA) as part of its Trust Fund.

At its third session, the Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol (CMP) decided to establish an Adaptation Fund Board to serve as the operating entity in charge of the Adaptation Fund. The Adaptation Fund Board is composed of 16 members and 16 alternates, and meets at least twice a year in the country hosting the UNFCCC secretariat. The CMP also invited the GEF to provide secretariat services and the World Bank to serve as the trustee of the Adaptation Fund on an interim basis (see figure 7).

Figure 7 Funding mechanisms for adaptation under the Convention and its Kyoto Protocol



The Special Climate Change Fund

The SCCF under the Convention was established to finance projects in NAI countries relating to adaptation; technology transfer and capacity building; energy, transport, industry, agriculture, forestry and waste management; and economic diversification. There are currently 10 priority areas: water, land management, agriculture, health, infrastructure development, fragile ecosystems, integrated coastal zone management, disaster risk management and prevention.

The Least Developed Countries Fund

The LDCF supports the implementation of National Adaptation Plans of Action (NAPAs) which identify 'urgent and immediate adaptation needs' in the least developed countries (LDCs). The LDCF has so far supported the preparation of NAPAs in 47 LDCs and will also support implementation of priority actions identified in completed NAPAs. Although NAPAs have a common template and methodology developed by the LDC Expert Group, they are elaborated in-country with no interference from the LDCF or the GEF.

The Strategic Priority on Adaptation (SPA)

The GEF's Strategic Priority on Adaptation, part of the GEF's Trust Fund, is aimed at showing how adaptation planning and assessment can be practically translated into projects that provide real benefits. SPA Projects should primarily target Global Environmental Benefits under the GEF focal areas, whereas the other GEF administered funds have development and poverty alleviation as their primary focus.

Adaptation Fund:

The Adaptation Fund was established under the Kyoto Protocol to finance concrete adaptation projects to help developing countries cope with the effects of climate change. Currently, the Adaptation Fund is filled by means of a 2% levy on projects under the CDM and is worth about 37 million Euros. Considering the number of CDM projects in the pipeline, this figure will rapidly increase to an estimated 80-300 million USD in the period 2008-2012. The Adaptation Fund Board will serve as the operational entity managing the Fund. This Board will ensure that the guidelines and procedures for accessing the Fund are established. As the guidelines are not yet defined it is premature to analyze the role of coping strategies related to forest.

<i>Financing options at the international level</i>	<i>Pledges/</i>
Special Climate Change Fund (SCCF)	\$90 million
Least Developed Countries Fund (LDCF)	\$180 million
Strategic Priority on Adaptation (SPA) (GEF Trust Fund)	\$50 million
Adaptation Fund	~\$80 – 300 million

3.3.2.2 Other Multilateral and Bilateral Funding Options

In addition to the funds mentioned above, there are other multilateral and bilateral organizations that offer funding opportunities for adaptation to climate change. Multilateral institutions such as the Caribbean Development Bank (CDB), the European Commission (EC) or the European Commission Development (ECD) offers such opportunities. The inclusion of forest ecosystems and the participation forest dependent people in programs and projects funded by these organizations varies.

Many bilateral cooperation organizations are also increasingly including adaptation to climate change in their portfolios. Some examples are the cooperation agencies from Switzerland, Holland or the USA. With respect to bilateral cooperation funds going to adaptation to climate change it is especially important to include the efforts undertaken under the OECD in mainstreaming adaptation to climate change into development cooperation. Currently the OECD is preparing a Guidance on Integrating Adaptation into Development Cooperation. It is formally targeted at members of the OECD Development Assistance Committee (DAC) and is in line with the *Paris Declaration on Aid Effectiveness*. The Guidance seeks to *align* donor support with the strategies, institutions and procedures of partner countries. The guidance is scheduled for completion in late 2008 and for approval by the DAC in mid 2009.

3.3.2.3 Domestic Financing Alternatives

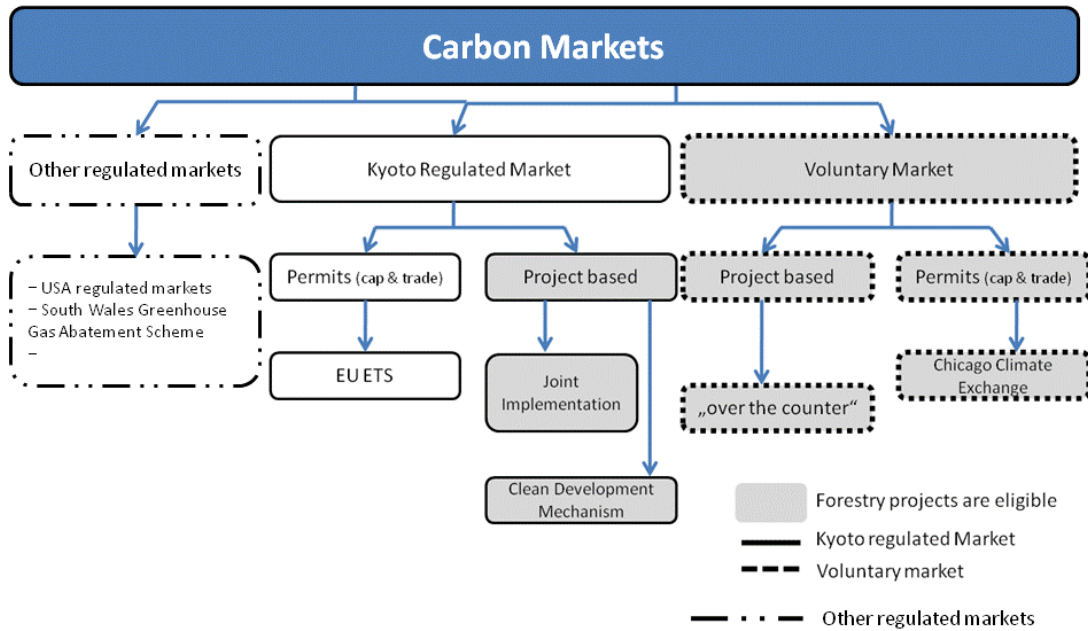
Financing alternatives can be found in the national context. Sources can include:

- **National budget:** Public resources that are allocated under a government policy or program. The establishment of an (forest) adaptation policy (at the regional or local level) should imply the creation of institutional arrangements in favour of financing adaptation, including allocation of national funds and, for donor nations, the maintenance of international funds.
- **Fees/taxes:** The establishment of financial tools such as fees or taxes (i.e., from gasoline, real estate, bank transfers) is a way to generate resources for environmental investment. Although this alternative can be seen as a way to share costs, it is possible that climate change will also affect taxpayers.
- **Funds:** More than a financing alternative, the funds are a tool to channel financial resources. The fund specifies the type of activities that will be financed (eligibility criteria), the requirements to obtain financing, maximum amounts, financial conditions, and responsibilities of the participants in the project. An unavoidable inconvenience in this case is the administration and operation costs, which may be high.
- An unavoidable inconvenience in this case is the administration and operation costs, which may be high.

4 Carbon Markets

One can distinguish between three carbon markets: those aimed at fulfilling commitments under the Kyoto Protocol (Kyoto regulated market) those regulated markets outside the Kyoto Protocol, and those trading voluntary emission reductions (voluntary markets) (see figure 6). In both markets there are two modalities of trading options: permits or allowance trading, and project.

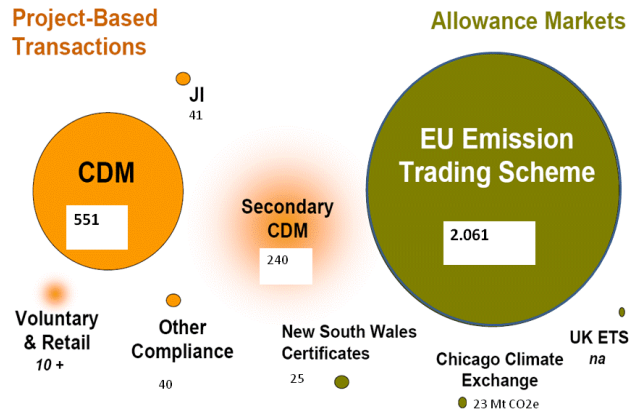
Figure 8: Carbon markets



Since 2004 all markets have steadily grown. In 2004 ca. 200 MtCO₂e were traded, while in 2007 the volume went over 2500 MtCO₂e. However, the inclusion of the forest sector in this growth is relative small.

This reduced participation of the forest sector is a consequence of the fact that forestry activities, especially those under the CDM, are not included in the biggest market - the EU Emission Trading Scheme (EU ETS). For this reason many potential buyers have lost interest in forestry activities as these seem to be less valuable as a consequence of the decision made by the European Union.

Figure 9: Size of the market



4.1 Kyoto Market

Forestry activities in the tropics under the Kyoto regulated market are reduced to afforestation and reforestation in the CDM (A/R CDM). Let us take a look on possibilities to trade Certified Emission Reductions (CERs) from these activities in the international Kyoto markets.

4.1.1 Allowance based markets (cap and trade)

4.1.1.1 European Union GHG Emission Trading Scheme

On January 2005 the European Union Greenhouse Gas Emission Trading Scheme (EU ETS) commenced operation as the largest multi-country, multi-sector GHG emission trading scheme worldwide. The scheme is an allowance-based transaction system that enables developed countries and countries with economies in transition to purchase carbon credits from other developed countries and economies in transition to fulfill their emission reductions commitments. It is based on Directive 2003/87/EC, which entered into force on 25 October 2003, and involves all EU member states. Credits traded under the system are called European Union Allowances (EUAs). According to the World Bank, in 2007 the EU ETS market traded 2,060.8 MtCO_{2e}, and the market was valued at \$50,097.4 million (Capoor and Ambrosi, 2008). Unfortunately, forestry activities in developing countries are not yet eligible in the EU ETS.

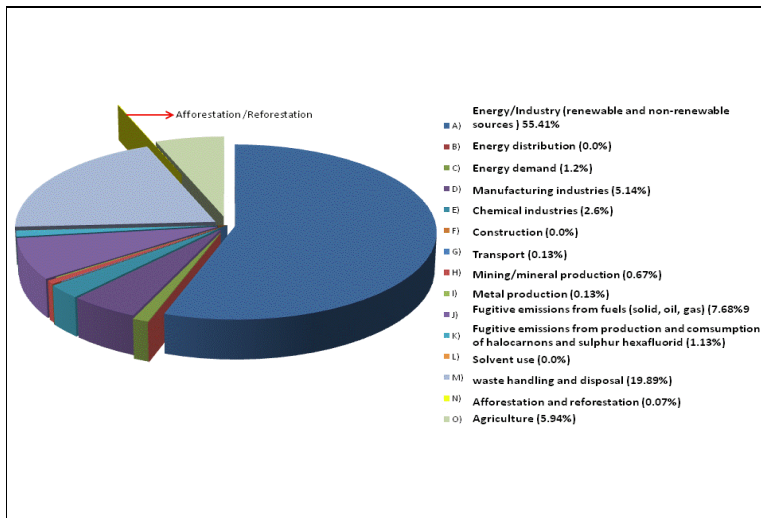
4.1.1.2 Green Investment Scheme

The Green Investment Scheme (GIS) is a newly developed, voluntary mechanism in the framework of the Kyoto Protocol's International Emissions Trading (IET). It is designed to achieve greater flexibility in reaching the targets under the Kyoto Protocol while preserving the environmental integrity of IET. Under the GIS a Party to the Protocol expecting that the development of its economy will not exhaust its Kyoto quota, can sell its excess Kyoto quota units (AAUs) to another Party. As the GIS is a scheme only useful for Annex I countries it is not yet an option for promoting mitigation forestry activities in the tropics.

4.1.2 Project based transactions

The CDM accounted for the vast majority of project-based transactions (at 87% of volumes and 91% of values) and JI saw transacted volumes doubling and values tripling in 2007 over the previous year. The CDM alone saw primary transactions worth US\$ 7.4 billion (€ 5.4 billion), with demand coming mainly from private sector entities in the EU, but also from EU governments and Japan (Capoor date?). Unfortunately, the inclusion of forest activities in the CDM market is still extremely reduced, even below 1% (see Figure 10).

Figure 10: Distribution of the CERs according to scope



Source: UNFCCC Secretariat, CDM Statistics, October 2008

4.2 Other regulated markets

4.2.1 Offsets markets in the United States of America

The USA has not yet ratified the Kyoto Protocol. In order to compensate for the lack of national CO₂ regulation, several states have established their own regulations alone or in conjunction with others. Legislation is also quickly evolving at the national and multi-state level as more states step up to the plate on climate legislation and members of Congress announce new legislative proposals on a monthly basis. As of March 2008, legislators in the 110th US Congress introduced more than 195 bills, resolutions, and amendments addressing climate change. Currently, GHG emissions markets exist or may soon exist under the following regimes:

- Oregon Standard
- Regional Greenhaus Gas Initiave (RGGI)
- Global Warming Solution Act (AB32)
- Western Climate Initiative
- Midwest Regional GHG Reduction Program (MRP)
- The Climate Registry

The majority of these schemes look for reductions in GHG emissions in the energy sector. However, some of them, like the Oregon Standard, include sinks projects. In general all these schemes trade emission reductions occurred only in the USA. However they are increasingly accepting purchase offsets from CDM projects.

4.2.2 The New South Wales Greenhouse Gas Abatement Scheme

The New South Wales (NSW) Greenhouse Gas Abatement Scheme (GGAS) is an Australian mandatory state-level program designed to reduce GHG emissions associated with the production and use of electricity and to develop and encourage activities to offset GHG emissions (Hamilton et al., 2008). The initiative does not accept credits, such as CERs or ERUs, from outside the state. According to the World Bank, outside the Kyoto markets, the NSW GGAS is the world's largest, regulated cap-and-trade GHG market, with about 25.41 MtCO₂e traded in 2007 and an estimated value of US\$ 224.10 million (Capoor and Ambrosi, 2008)

4.3 Voluntary Markets

The Ecosystem Market Place reported **42.1 MtCO₂e** transacted on the "over the counter market" in 2007. Combined with the **22.9 MtCO₂e** transacted on the Chicago Climate Exchange (CCX) in 2007, a total volume of **65.0 MtCO₂e** is said to have been transacted in the voluntary carbon market in 2007.

4.3.1 Chicago Climate Exchange (CCX)³⁷

The CCX was launched in the United States in 2003. CCX Members make a voluntary but legally binding commitment to meet annual GHG emission reduction targets. Those who reduce below the targets have surplus allowances to sell or bank; those who emit above the targets comply by purchasing CCX Carbon Financial Instrument (CFI) contracts. Each CFI contract (the commodity traded at CCX) represents 100 metric tons of CO₂ equivalent. CFI contracts are comprised of Exchange Allowances and Exchange Offsets. Exchange Allowances are issued to emitting Members in accordance with their emission baseline and the CCX Emission Reduction Schedule. Exchange Offsets are generated by qualifying offset projects.

CCX offsets are issued on an ex-post basis. Projects must undergo third party verification by a CCX approved verifier. All verification reports are then inspected for completeness by the Financial Industry Regulatory Authority (FINRA, formerly NASD).

CCX has developed standardized rules for issuing CFI contracts including forestry projects. In addition to EUAs, CCX members can also use CERs for compliance. However, given that secondary CER prices are currently trading at much higher prices than CFIs on the CCX, this option has not been exercised. The CCX does not separate out the number of project-based credits from allowance-based credits exchanged and the CCX has not been able to provide insight in the numbers behind the transactions. It is therefore impossible for us to determine the volumes on the CCX that are actually offset project related (Hamilton et al., 2008).

4.3.2 The Over-the-Counter Market (OTC)

Outside of the CCX one finds the wide range of voluntary transactions that make up a voluntary market not driven by any sort of emissions cap. Since this market is not part of a cap-and-trade system, where emission allowances can be traded, almost all carbon offsets purchased in this voluntary market originate from project-based transactions. Because it does not operate via a formal exchange, these transactions were labeled as the voluntary Over-the-Counter (OTC) market in a report prepared by the Ecosystem Marketplace and New Carbon (Hamilton et al., 2008).

This OTC market is also often referred to as the voluntary offsets market. It is important to bear in mind that offset credits also exist on the CCX. Credits in the OTC market are often generically referred to as Verified (or Voluntary, depending on the source) Emission Reductions (VERs), or simply as carbon offsets. However, voluntary buyers may also purchase credits from the compliance markets or the CCX. Because the OTC market demand is not driven by a cap, especially in the retail market, the demand curve for offset purchases has as much in common with the markets for Fair Trade or organic cotton as it does with the regulated carbon markets. Buyer motivations include wanting to manage their climate change impacts, an interest in innovative philanthropy, public relations, the need to prepare for (or deter) upcoming regulation, and/or plans to resell credits at a profit. Suppliers in the offset market include retailers selling offsets online, conservation organizations hoping to harness the power of carbon finance, developers of potential JI or CDM projects with credits that - for a range of reasons - are currently not sold in the regulated markets, project developers primarily interested in generating VERs, and aggregators of credits.

Forestry projects were dominant in the OTC market in 2006 with a share of 37%. In 2007 this share was reduced to 15% (Hamilton et al., 2008). There are many possible reasons for this fall, including the increment in the offer of other kinds of projects (e.g. renewable energy) or a potential loss of trust on forestry projects. Forestry projects, in particular those involving afforestation/reforestation, have remained some of the highest priced project types throughout 2006 and 2007, with weighted average prices of US\$ 6.8 to US\$ 8.2 per tCO₂e (ibid). Due to the latest developments in the negotiations within the UNFCCC, where forestry mitigation options, especially REDD, are under consideration, interest in forestry activities is increasing. There are however many uncertainties regarding the final decisions to be taken in Copenhagen in 2009.

4.4 Standards in forestry projects

Different standards have been designed to ensure the quality of activities aimed at reducing GHG emissions and enhancing sinks. All standards consider the quality of the carbon balance. Criteria and indicators for other environmental impacts as well as for social impacts are different from standard to standard. Forestry activities are considered in all standards listed in Table 7 in different ways.

Table 7: Standards available for forestry activities

³⁷ For more information regarding the Chicago Climate Exchange visit <http://www.chicagoclimatex.com/>

Standards	web site
The California Climate Action Registry's Climate Action Reserve	http://www.theclimateregistry.org
CarbonFix Standard	http://www.carbonfix.info
Chicago Climate Exchange Offsets Program	http://www.chicagoclimatex.com/content.jsf?id=104
Climate, Community, and Biodiversity Standards	http://www.climate-standards.org
Greenhouse Friendly	http://www.greenhouse.gov.au/greenhousefriendly
Plan Vivo	http://www.planvivo.org/
Social Carbon	http://www.socialcarbon.com
Voluntary Carbon Offset Standard	http://www.carboninvestors.org
VER + Standard	http://www.lifepr.de/pressemeldungen/tuev-sued-ag/boxid-16210.html
Voluntary Carbon Standard	http://www.v-c-s.org
WBCSD/WRI GHG Protocol for Project & Corporate Accounting	http://www.ghgprotocol.org/templates/GHG5/layout.asp?MenuID=849

Currently, project developers have to pay for all the costs of reaching a given standard. These standards however do not ensure neither the entry in a market nor a better offset price.

5 Conclusions

In the previous chapters, a range of issues and proposals has been outlined in respect to forest-based mitigation and adaptation options. Some key points may warrant emphasis at the level of a conclusion:

- **While the land use sector, including forestry, is an important source of anthropogenic GHG emissions, it also has great potential for mitigating climate change.** Forest-based mitigation activities, including REDD, forest restoration and forest management, can contribute to mitigate climate change through both GHG emission reductions and removals by sinks. Only the forestry (and to a certain degree the agriculture) sector offers these two possibilities for mitigation of climate change—all other sectors can only contribute through emission reductions.
- **Many forest-based activities have the potential of being an appropriate and cost-effective adaptation measure, reducing overall vulnerability of social systems and ecosystems to climate change.** Forestry, in particular, has an important role to play. Managing in a sustainable manner the 30% of the global land area that is under forest cover will not only contribute to the mitigation of climate change and contribute as an effective adaptation measure, but has many other collateral environmental and socio-economic benefits. This integrative view clarifies why it is so important to consider forestry options for mitigation in a consistent way and as part of a wider development concept.
- **The UNFCCC, its Kyoto Protocol and any kind of agreement for a post-2012 climate change regime will have an impact on governing land-use and forests in all parts of the world, particularly in developing countries.** An important consideration for policy makers is the need for effective governance in the forest sector in order to achieve a meaningful role for the sector in mitigating climate change.
- **With increased attention to forests mitigation options, particularly through the ongoing discussion on REDD, it is expected that the countries who clarify forest and carbon tenure aspects and effectively address illegality in forestry and land-use practices are more likely to immediately benefit from future forest mitigation incentives.** Climate change-relevant investment in the forest sector is a long-term undertaking. This requires security with respect to land-use and long-term commitment by involved parties.

While managing and conserving the permanent forest estate – in particular in a tropical timber producing country, there is a need to integrate both strategies developed through the climate change convention (mitigation and adaptation). In this regard, a number of observations and conclusions are relevant and outlined hereafter³⁸:

(i) Forest-based Mitigation

Land use change, including deforestation, mostly in the tropics, account for about 18% of global greenhouse gas (GHG) emissions. In most ITTO producer member countries, land use change constitutes by far the main source of GHG emissions. Forests and woodlands will play many roles in climate change mitigation through emission reductions, carbon sequestration, and carbon substitution.

In many places REDD will be a necessary strategy for reducing emissions, but it will need to be complemented by other measures. Forest restoration can help remove GHGs from the atmosphere (carbon sequestration) and also has many co-benefits, including poverty alleviation, biodiversity conservation and the provision of other ecosystem services. The increased use of wood-based biofuels and wood products are options for carbon substitution.

A task of the international community is to help understand and finance the cost of reducing GHG emissions and enhancing carbon sinks through sustainable forest management. This will not only lead to good forest practice but also improve local livelihoods.

To reduce deforestation, the value of forests to landowners and forest users must be at least as great as alternative land uses. Incentives for REDD, therefore, must benefit the agents directly responsible for deforestation and forest degradation and act as an incentive for reducing this destructive behavior. In many

³⁸ This section is mainly inspired from the deliberations of the ITTO Expert Meeting on tropical forests and climate change in Yokohama, 30 April and 2 May. The authors of the present report were acting as facilitators of that meeting.

places, identifying and involving these responsible agents are major challenges. Any potential REDD approaches must avoid perverse outcomes, such as encouraging poor forest practice. Countries could identify hotspots – those forest areas most under deforestation pressure – for targeted REDD activities. Demonstration activities are already testing this approach.

Sustainable forest management is not yet defined in the United Nations Framework Convention on Climate Change (UNFCCC). ITTO has a strong understanding of the principles of sustainable forest management, as well as experience in implementing it in the tropics.

To date, the Clean Development Mechanism (CDM) has not sufficiently encouraged afforestation and reforestation (as defined by the Marrakesh Accords of the Kyoto Protocol). Unless procedures are improved and transaction costs reduced, it is unlikely that the A/R CDM will contribute substantially to the enhancement of carbon sinks.

Many tropical countries have launched programs to increase the role of forests in mitigating climate change. In Brazil, the Amazon Fund is to be established with the aim of promoting effective reductions of GHG emissions from deforestation in the Amazon. In Mexico, an approach has been developed to commit, as permanent carbon sinks, those forests that are under the greatest threat of deforestation. In Africa, the Congo Basin countries aim to place at least 20% of the Basin's production forests under management plans by 2010 and have at least 7 million hectares certified as sustainably managed. While this latter initiative is not designed specifically to address climate change, it will reduce both deforestation and the vulnerability of the region's ecosystems and people to climate change and will therefore contribute to mitigation and adaptation. These and other national and regional initiatives are worthy of international support aimed at mitigating climate change.

Robust and credible strategies to mitigate climate change through sustainable forest management should recognize the historical forest management role of Indigenous and local communities and fully involve them in decision-making and benefit-sharing.

Studies are urgently needed on the implications of climate change for sustainable forest management in the tropics, on the role of tropical forests in mitigating climate change, and on national and international approaches to meeting the costs associated with managing tropical forests in the context of climate change. The ability of countries to monitor carbon stocks in forests is highly variable. Tools are increasingly available to assist in this task but, in many countries, effective monitoring will require significant work and capacity building to establish reliable reference data for measuring deforestation and forest degradation.

Wood is a carbon-neutral material and a renewable resource. Bioenergy production from forestry and the substitution of fossil-fuel-intensive products by wood products could be important approaches to mitigating climate change. Fuels produced from wood can have higher energy efficiency than other bioenergy sources, but production costs must be reduced and the environmental and socioeconomic impacts taken into account. Wood is often more carbon-friendly than other commonly used building materials such as cement, plastic and steel. In certain cases, replacing one cubic metre of concrete or red brick with the same volume of timber can save around 1 ton of carbon dioxide.

In many tropical countries, the traditional use of wood as fuel is still common and the industrial use of wood for biofuel production is also likely to increase dramatically in coming years. More information is needed on the ramifications of wood-based biofuels for the forest sector, the availability of land, and climate change.

(ii) Climate Change Adaptation Agenda and Tropical Forests

Tropical forest ecosystems face many potential threats due to climate change, including changed precipitation regimes and the increased incidence and severity of pests, diseases, fire and storms. They might also be vulnerable to increased in-migration by and pressure from environmental refugees. However, little information is available on the nature of these threats.

The impacts of climate change on forests could exacerbate poverty and the prevalence of human disease while reducing the availability of forest-based traditional medicines and other products and services important for human wellbeing. Forest-dependent people will be particularly affected.

Low-lying coastal forests, particularly mangroves, are likely to be affected by predicted sea level rises due to climate change, with huge implications for important ecosystem services and human health. More information on possible adaptation measures in these forests is urgently required.

Sustainable forest management provides a basis for adaptation to climate change in forests by increasing resilience, but there will be an ongoing need to re-assess forest practices. Many existing forest management tools do not explicitly account for the possible impacts of climate change.

To minimize the impacts of climate change on forest ecosystems and forest-dependent people, countries will require flexible and equitable decision-making processes at local and national levels that allow for rapid and adaptable forest management responses.

Funding for forest-based adaptation is essential, but access by the forest sector to existing adaptation funds needs to be clarified and improved. More efforts are required to convince the international community of the importance of adapting the forest sector to climate change.

6 The Role of ITTO in the evolving forest and climate change agenda

6.1 Experience

Up to the year 2004, ITTO's involvement in climate change was limited to a number of projects submitted by countries (San Nicolas, Colombia; Jambi-pre-project in Indonesia) and capacity building through workshops, e.g. Korea Workshop on CDM in 2003; development of the CDM Afforestation/Reforestation Guidelines).

Since 2004, ITTO's involvement was increased on operational and policy level due to the increased attention that forestry became since the agreements to integrate afforestation and reforestation in the CDM and the initiative of the rainforest nations to consider a wider scope on forests in the climate change agenda.

In order to cope with the increased attention to forests and climate change, the Council commissioned three reports, including the present one, to give an overview on the development of the forestry agenda in climate change. The two prior reports were:

- Robledo, C. 2004. *Developments in UNFCCC/IPCC Discussions Regarding Forests and Implications for Tropical Forests and Tropical Timber Producers*. ITTO report E-C36-14.
- Robledo, C. and O. Masera. 2007. *Developments in UNFCCC/IPCC discussions regarding reducing emissions from forest degradation and deforestation and implications for tropical forests and tropical timber producers*. Presented at the XLII Session of the International Tropical Timber Council. Paper No. 9. Port Moresby, Papua New Guinea.

Further ITTO has an ongoing program on capacity programme in A/R CDM, which is aimed at building capacity to develop and implement A/R CDM project activities in ITTO producer members. The current output of the program are:

- Guidebook for the formulation of A/R projects under the CDM
- Capacity building workshops:
 - o ASEAN-ITTO Regional Workshop on Perspectives of CDM Forestry Projects in Asia and The Pacific (Phnom Penh, Cambodia, 22-24 March 2006)
 - o ITTO Workshop on AR CDM for Sub-Saharan Africa (Accra, Ghana 2-6, October 2006)
 - o Latin American Regional Workshop on Afforestation and Reforestation Projects Development (Lima, Peru, 19-23 March 2007)
 - o African Regional Workshop on Afforestation and Reforestation Projects Development under the CDM (23-27 June 2008, Abidjan, Côte d'Ivoire)
 - o Asia-Pacific Regional Workshop on Afforestation and Reforestation Projects Development under the CDM (8 – 12 Sep 2008, Seoul, Korea)
 - o Latin American Regional Workshop on Afforestation and Reforestation Projects Development under the CDM. 29 September – 3 October 2008, Puerto Vallarta, Jalisco, Mexico
- Selection of and support to PDD finalisation of 6 pilot projects in Asia, Latin America and Africa

Since 2007, ITTO became more active on the international policy front by participating as an observer in UNFCCC negotiations. ITTO was present in various working groups and technical meetings organized in the framework of the climate change agenda, including COP, SBSTA and the specific UNFCCC working group on REDD. ITTO had well attended side event at COP-13 in Bali and the Executive Director got a slot in the final statements at that conference. In 2008, ITTO organized an expert group meeting on tropical forests and climate change in May in Yokohama, participated in the SBSTA working group on forests in June in Yokohama and attended the SBSTA meeting in Ghana, and had a representative at the Umea Conference on Forests and Adaptation in August. ITTO was present in the preparation of the Forest Carbon Partnership Facility Meetings of the World Bank in July, at the UN-REDD preparation meeting in September in Washington and at the Global Forests Leader Forum, organised in the World Bank, also in September. ITTO was also a leading participant in the preparation of the CPF strategic framework document on Climate Change.

Thus, the role of tropical forests in addressing climate change is an evolving challenge for the ITTO. It needs urgent attention of the Council, by:

- Clarifying the role of ITTO in the international forest related negotiation processes considering climate change with particular reference to UNFCCC until COP15 (Copenhagen) and within the CPF
- Developing the necessary internal mechanisms and tools in order to integrate a more holistic approach to SFM, e.g. through the new ITTO Action Plan; a Thematic Programme that integrates climate change mitigation and adaptation and selected project work in member countries
- Defining ITTO's role in international climate change funding mechanisms (e.g. in the UNFCCC Convention Funds; in UN-REDD; in FCPF and the anticipated Forest Investment Program)
- Analysing the potential impacts of UNFCCC decisions and agreements on ITTO's work.

6.2 Recommendations to the Council

The recommendations to the Council presented here are mainly based on the deliberations and recommendations of the ITTO Expert Meeting on Forests and Climate Change held in May 2008. It is proposed that ITTO works on three fields of action to develop an evolving agenda of SFM of tropical forests in the wider context of global climate change. The three fields of action are:

- Development Studies
- Capacity Building
- Knowledge management and information sharing.

These actions can be dealt with at two levels: in the framework of ITTO as an organisation - through a specific thematic line in the biennial work programmes - and in the framework of ITTO member countries through the instalment of a thematic programme on piloting actions on reduced deforestation, forest degradation and forest restoration and enhancing ecosystem services in tropical forests.

Further, the Council should mandate the ITTO secretariat to be actively present in the implementation of the Bali Action Plan. The ITTO should particularly ensure its close collaboration within the CPF (in the framework of the CPF Strategic Plan on Climate Change) and with selected CPF members in facilitating piloting actions including the development of methodologies, the promotion of best practices and approaches on sustainable forest management, including natural forest management, forest restoration, afforestation and reforestation.

More detailed recommendations are listed under 6.3.1 – 6.3.4.

6.2.1 *Developing Studies: Strengthen ITTO's role in SFM and its links to the climate change agenda*

Developing studies are commissioned by the ITTO secretariat and are an integrative part of a specific thematic line of the biennial work programme. Considering the urgency that is imposed by the negotiation calendar of the UNFCCC (Decision on mitigation options in forestry, especially REDD by December 2009 at the COP in Copenhagen), the Council should decide and agree at its 44th Session in November 2008 about an addition in the current 2008/2009 work programme and decide out of the following list of actions to tackle those with urgency:

1. Continue to monitor international processes that relate to climate change mitigation and adaptation and the management of tropical forests and regularly inform Council on such development
2. Study the implications of climate change for sustainable forest management in the tropics.
3. Develop guidelines for climate change mitigation and adaptation options in tropical forests and for accounting for carbon in forest management plans and ITTO projects
4. Update the ITTO Criteria and Indicators of Sustainable Forest Management in Tropical Forests to reflect the current state of knowledge on climate change
5. Assist in the improvement of modalities and procedures in the A/R CDM and CDM institutions.
6. Analyze the possibility of introducing the concept of forest restoration to the post-2012 climate change negotiation process within the UNFCCC.

7. Study methods for accounting for the permanence of carbon in harvested tropical wood products.
8. Commission studies on the substitution potential of wood products and their role in climate change mitigation.
9. Analyze approaches to financing tropical forest-based initiatives to climate change mitigation and adaptation.

6.2.2 Capacity Building of policy makers, forests managers and communities on SFM in the framework of climate change

Capacity building can be either in the framework of the proposed specific thematic line in the biennial work programme (as e.g. in the past the workshops on C&I for SFM, forest restoration workshops or project formulation workshops) or through project activities at the level of the member countries (see 6.3.4). Capacity building activities in regard to SFM and climate change could comprise:

1. Through regional and national training workshops and subsequent piloting projects under a thematic programme as suggested in 6.3.4, help member countries to build forest-sector capacity to mitigate and adapt to climate change, including by:
 - a. supporting regional collaboration on the role of tropical forests in climate change mitigation and adaptation
 - b. encouraging national consultation processes on mitigation and adaptation in the forest sector
 - c. encouraging the development of policy and institutional frameworks that support the role of tropical forests in climate change mitigation and adaptation.
2. Support member countries in the assessment and monitoring of forest carbon stocks and forest-based carbon emissions within their national forest inventory systems and facilitate the exchange of good practices and test-results of new methodologies and technologies.
3. Support member countries in ensuring that forest policy frameworks include climate change considerations, and that tropical forest issues are taken into account in national action plans for adaptation
4. Support local people to participate in and benefit from initiatives in forest-based climate change mitigation and adaptation.
5. Continue to promote community-based forest enterprises as a flexible strategy for assisting forest-dependent people to mitigate and adapt to climate change.
6. Contribute to the development of policies and guidelines to promote sustainable wood-based biofuels in a way that does not jeopardize food security and is consistent with the principles of sustainable forest management.
7. In partnership with the private sector and other stakeholders, encourage and assist governments to promote the use of carbon-friendly wood products in construction.

6.2.3 Knowledge and Information Sharing

Knowledge and Information Sharing could also be ensured through a specific thematic line in the biennial work programme. Activities could include, *inter alia*:

1. Providing information and guidance on the management of tropical forest types particularly vulnerable to climate change.
2. Conducting a global review of best practice in rights-based approaches to REDD and forest-based carbon enhancement in the tropics.
3. Working with other members of the Collaborative Partnership on Forests and other relevant parties

to ensure that modalities for REDD and the enhancement of carbon sinks are user-friendly.

4. Actively providing the UNFCCC process with information on tropical forests and the role of sustainable forest management in climate change mitigation and adaptation.

6.2.4 Create an ITTO Thematic Programme on Reducing Deforestation and Forest Degradation and Promoting Forest Restoration and Enhancement of Ecosystem Services

Promoting sustainable forest management considering future climate scenarios can mitigate climate change and facilitate adaptation of ecosystems and people. This integrative approach will ensure long term standing of the tropical forests while maintaining its functions.

It is proposed to develop a Thematic Programme along the following lines:

Reducing emissions and enhancement of sinks. Deforestation and forest degradation are examples of unsustainable forest management occurring in tropical forests. Natural forest management, forest restoration, reforestation and afforestation are substantial elements in the sustainable forest management framework and can enhance carbon sinks and conserve carbon stocks. Both, GHG emissions from deforestation and forest degradation as well the enhancement of carbon sinks are issued directly addressed through the ITTO's objective on promoting the sustainable management of tropical timber producing forests.

Reduced emissions from Deforestation and Forest Degradation (REDD) and the enhancement of carbon sinks have a central role in the Bali Action Plan. Substantial pledges have already been made within this framework for financing REDD activities in other processes (e.g. FCPF, UN-REDD) or are being to be developed (e.g. FIP). The new funding mechanisms thus constitute a unique opportunity for ITTO and its member countries to access funds for working towards the common goal to manage tropical forests sustainably.

Substitution. Addressing the emerging demand of energy through the use of sustainable biofuels based on HWP and NTFP has an important potential for mitigating climate change. Addressing social and environmental concerns in the production and consumption of biofuels are essential for ensuring if long term positive effects. Other potential of substitution with tropical HWP, especially in the construction sector need to be considered in more detailed, as the stage of knowledge is still relative limited.

Increasing adaptation capacity. The consideration of future climate scenarios and their impacts on ecosystems and people should be seen as complementary to any mitigation option in the forest sector. Indeed promoting sustainable forest management in the tropics will simultaneously reduce GHG in the atmosphere while increasing resilience to many climate risks (see also conclusions of the "conference on adaptation of forests and forest management to changing climate with emphasis on forest health: a review of science, policies and practices", Umea, Sweden August 2008).

The objective of the thematic programme could include, *inter alia*:

Assist member countries to develop proposals for pilot projects on REDD and other forest mitigation options as well as for increasing the resilience of tropical forests to climate change, and consider providing finance for such projects, including

- Reduced deforestation and forest degradation in tropical timber producing forests and thus contribute to REDD activities as defined in the framework of the UNFCCC
- To emphasize forest restoration, rehabilitation of degraded forest sites and secondary forest management in the carbon sink agenda, as well as a forest adaptation measure
- To support forest-dependent communities in achieving sustainable forest management and develop strategies to enhance the capacity of these communities to sustainably manage tropical timber producing forests
- To support efforts for improving governance and combating illegal logging that will contribute to reduced deforestation and forest degradation and promote sustainable forest management

The thematic programme will incorporate activities in agreement with its goal and objectives proposed by members. The main thrust will be to achieve real reduction in deforestation and forest degradation and real enhancement of sinks. To achieve this it is crucial to address the role of local governments, forest-dependent communities and private sector, to stimulate their self-interest in sustainable management of the forest and to

build their capacities in that respect. Development of systems for compensation for ecosystem services could be a relevant activity in this connection.

In addition, it is necessary to ensure good governance that contributes to sustainable forest management and combating illegal logging. Altogether, these efforts will contribute to reaching the central ITTO objectives of sustainable forest management and poverty alleviation, as well as placing ITTO as a central contributor to implementing forest mitigation and adaptation activities relevant to UNFCCC.

*“Avoid the unmanageable and manage the unavoidable”
(Sigma Xi)*

7 Abbreviations

AFOLU	Agriculture, Forestry and Other Land Use
Annex I	Annex to the Convention listing industrialised and transitional countries
Annex II	Annex to the UNFCCC, listing mostly OECD countries, with additional commitments to assist developing countries with funding and technology transfer
AR4	IPCC Fourth Assessment Report
A/R	Afforestation and reforestation
ARWG	Afforestation/Reforestation Working Group
ARD	Afforestation, reforestation, deforestation (as a requirement for Annex I countries in the KP)
AWG-KP	Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol
AWG-LCA	Ad Hoc Working Group on Long-term Cooperative Action under the Convention
BAP	Bali Action Plan
CDM	Clean Development Mechanism
CDM A/R	Afforestation and Reforestation project activities under the CDM
CER	Certified emission reductions
tCER	temporary CER
ICER	long-term CER
CFRT	Community Forest Retention Trust Account
CH ₄	Methane
CO ₂	Carbon dioxide
COP	Conference of the Parties
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (also known as COP/MOP)
CPF	Collaborative Partnership on Forests; The 14 members of the CPF are the Center for International Forestry Research (CIFOR), UN Food and Agriculture Organization (FAO), International Tropical Timber Organization (ITTO), International Union of Forestry Research Organizations (IUFRO), CBD Secretariat, Secretariat of the Global Environment Facility (GEF), UNCCD Secretariat, UNFCCC Secretariat, United Nations Development Programme (UNDP), United Nations Environment Programme (UNEP), World Agroforestry Centre (ICRAF), World Bank, and World Conservation Union (IUCN). The UNFF Secretariat supports the work of the CPF.
DD	Deforestation and forest degradation
EB	Executive Board of the CDM
ENCOFOR	Environment and Community-based Framework for Designing Afforestation, Reforestation and Revegetation Projects in the CDM
EU ETS	European Union Emission Trading System
FAO	Food and Agriculture Organization
FCPF	Forest Carbon Partnership Facility
GEF	Global Environment Facility
GFP	Global Forest Partnership
GHG	Greenhouse gas
GPG	Good Practice Guidance
Ha	Hectare
HFC	Hydrofluorocarbons
HWP	Harvested wood products
IFRT	International Forest Retention Fund
IPCC	Intergovernmental Panel on Climate Change
ITTA	International Tropical Timber Agreement
ITTC	International Tropical Timber Council
ITTO	International Tropical Timber Organization
JI	Joint Implementation
KP	Kyoto Protocol
LCA	Life Cycle Analysis
LULUCF	Land Use, Land Use Change and Forestry
MAI	Mean annual increment
MRV	Measureable, reportable and verifiable
N ₂ O	Nitrous Oxide
NAI	Non-Annex I Parties (see above), mostly developing countries

NFP	National Forest Program
NLBI	Non-legally binding instruments
NTFP	Non-timber forest products
ODA	Official Development Assistance
OECD	Organization for Economic Co-operation and Development
PES	Payment for Environmental Services
PDD	Project Design Document
PFC	Perfluorocarbons
REDD	Reducing Emissions from Deforestation and Forest Degradation
SBSTA	Subsidiary Body for Scientific and Technological Advice
SFM	Sustainable Forest Management
TARAM	Tool for Afforestation and Reforestation Approved Methodologies
UNDP	United Nations Development Program
UNEP	United National Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
UNFF	UN Forum on Forests
WG I	Working Group I (of the IPCC, see above), assesses the literature on the physical science basis of climate change
WG II	Working Group II (of the IPCC, see above), assesses the literature on the impacts, vulnerability and adaptation to climate change
WG III	Working Group III (of the IPCC, see above), assesses the literature on the mitigation of climate change, i.e. reducing GHG emissions
WMO	World Meteorological Organization

8 Glossary

Mitigation

This section presents the definitions regarding mitigation as these are given in the decisions of the UNFCCC.

Actual net greenhouse gas removals by sinks is the sum of the verifiable changes in carbon stocks in the carbon pools within the project boundary, minus the increase in emissions of the greenhouse gases measured in CO₂ equivalents by the sources that are increased as a result of the implementation of the afforestation or reforestation project activity, while avoiding double counting, within the project boundary, attributable to the afforestation or reforestation project activity under the CDM.

Afforestation is the direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land through planting, seeding and/or the human-induced promotion of natural seed sources.

Baseline net greenhouse gas removals by sinks is the sum of the changes in carbon stocks in the carbon pools within the project boundary that would have occurred in the absence of the afforestation or reforestation project activity under the clean development mechanism (CDM).

Carbon pools are those carbon pools referred to in paragraph 21 of the annex to draft decision -/CMP.1 (*Land use, land-use change and forestry*) and are: above-ground biomass, below-ground biomass, litter, dead wood and soil organic carbon.

Cropland management is the system of practices on land on which agricultural crops are grown and on land that is set aside or temporarily not being used for crop production.

Deforestation is the direct human-induced conversion of forested land to nonforested land.

Forest is a minimum area of land of 0.05-1.0 hectares with tree crown cover (or equivalent stocking level) of more than 10-30 per cent with trees with the potential to reach a minimum height of 2-5 metres at maturity *in situ*. A forest may consist either of closed forest formations where trees of various storeys and undergrowth cover a high proportion of the ground or open forest. Young natural stands and all plantations which have yet to reach a crown density of 10-30 per cent or tree height of 2-5 metres are included under forest, as are areas normally forming part of the forest area which are temporarily unstocked as a result of human intervention such as harvesting or natural causes but which are expected to revert to forest.

Forest management is a system of practices for stewardship and use of forest land aimed at fulfilling relevant ecological (including biological diversity), economic and social functions of the forest in a sustainable manner.

Grazing land management is the system of practices on land used for livestock production aimed at manipulating the amount and type of vegetation and livestock produced.

Leakage is the increase in greenhouse gas emissions by sources which occurs outside the boundary of an afforestation or reforestation project activity under the CDM which is measurable and attributable to the afforestation or reforestation project activity.

Long-term CER or "ICER" is a CER issued for an afforestation or reforestation project activity under the CDM which, subject to the provisions in section K below, expires at the end of the crediting period of the afforestation or reforestation project activity under the CDM for which it was issued.

Net anthropogenic greenhouse gas removals by sinks is the actual net greenhouse gas removals by sinks minus the baseline net greenhouse gas removals by sinks minus leakage.

Project boundary geographically delineates the afforestation or reforestation project activity under the control of the project participants. The project activity may contain more than one discrete area of land.

Reforestation is the direct human-induced conversion of non-forested land to forested land through planting, seeding and/or the human-induced promotion of natural seed sources, on land that was forested but that has

been converted to non-forested land. For the first commitment period, reforestation activities will be limited to reforestation occurring on those lands that did not contain forest on 31 December 1989.

Revegetation is a direct human-induced activity to increase carbon stocks on sites through the establishment of vegetation that covers a minimum area of 0.05 hectares and does not meet the definitions of afforestation and reforestation contained here.

Small-scale afforestation and reforestation project activities under the CDM are those that are expected to result in net anthropogenic greenhouse gas removals by sinks of less than 8 kilotonnes of CO₂ per year and are developed or implemented by low-income communities and individuals as determined by the host Party. If a small-scale afforestation or reforestation project activity under the CDM results in net anthropogenic greenhouse gas removals by sinks greater than 8 kilotonnes of CO₂ per year, the excess removals will not be eligible for the issuance of tCERs or ICERs.

Temporary CER or “tCER” is a CER issued for an afforestation or reforestation project activity under the CDM which, subject to the provisions of section K below, expires at the end of the commitment period following the one during which it was issued.

Adaptation

This section provides definitions for the concepts and terms regarding adaptation as used in the Adaptation Policy Framework.

Adaptation – a process by which strategies to moderate, cope with, and take advantage of the consequences of climatic events are enhanced, developed, and implemented.

Adaptation baseline - An adaptation baseline includes a description of adaptations to current climate that are already in place. Also see Baseline.

Adaptation Policy Framework (APF) – a structured process to developing adaptation strategies, policies, and measures to enhance and ensure human development in the face of climate change, including climate variability. The APF is designed to link climate change adaptation to sustainable development and other global environmental issues. It consists of five basic components: project scope and design, assessing current vulnerability, characterizing future climate risks, developing an adaptation strategy, and continuing the adaptation process.

Adaptive capacity – the potential or capability of a system to adjust, via changes in its characteristics or behavior, so as to cope better with existing climate variability and change. It is possible to differentiate between adaptive potential, a theoretical upper boundary of responses based on global expertise and anticipated developments within the planning horizon of the assessment, and adaptive capacity that is constrained by existing information, technology and resources of the system under consideration.

Baseline (also called project baseline) – a description of current conditions, including existing or needed information on socioeconomic conditions, climate risks and hazards, and of known system vulnerabilities and adaptations. See also vulnerability baseline and adaptation baseline.

Climate change – any change in climate over time, whether due to natural variability or because of human activity.

Climate change vulnerability - the degree to which a system is susceptible to, or unable to cope with, the adverse effects of climate change, including climate variability and extremes. See also vulnerability.

Climate variability – variations in the mean state and other statistics (such as standard deviations, the occurrence of extremes, etc.) of the climate on all temporal and spatial scales beyond that of individual weather events. Variability may result from natural internal processes within the climate system (internal variability) or to variations in natural or anthropogenic external forcing (external variability).

Coping range – the range of climate where the outcomes are beneficial or negative but tolerable; beyond the coping range, the damages or loss are no longer tolerable and a society is said to be vulnerable.

Cost-benefit analysis - A quantitative method that makes a detailed comparison of the costs and benefits of a particular measure, or set of measures. A decision to fund the project depends on the ratio of benefits to costs

– the higher the ratio, the more attractive the investment. Its major advantages are its verifiable bottom line and its familiarity to ministries and planning agencies. Disadvantages include limitations regarding the ability to directly address equity considerations and represent non-quantifiable benefits.

Evaluation – a process for determining systematically and objectively the relevance, efficiency, effectiveness and impact of the adaptation strategies in the light of their objectives.

Food insecurity – a situation that exists when people lack secure access to sufficient amounts of safe and nutritious food for normal growth and development and an active and healthy life. It may be caused by the unavailability of food, insufficient purchasing power, inappropriate distribution, or inadequate use of food at the household level. Food insecurity may be chronic, seasonal, or transitory. More recent literature focuses on livelihood security—an expansion of food security to include multiple stresses and sectors to which livelihoods might be exposed.

Hazard – a physically defined climate event with the potential to cause harm, such as heavy rainfall events, droughts, floods, storms, long-term changes in mean climatic variables such as temperature.

Hybrid - “Hybrid” approaches apply uniform and site-specific methods in tandem and within an iterative process to develop and assess the range of adaptation strategies.

Indicator – an item that can be clearly characterized and possibly quantified that represents an abstract concept, such as human well-being.

Logical Framework Analysis Approach/Logframe – a project planning tool that includes project goals, objectives and activities, with specific outputs and measurable indicators of achievements.

Measure – see “Policies and measures.”

Monitoring – a mechanism or mechanisms to track progress in implementation of an adaptation strategy and its various components in relation to targets.

Policies and measures – usually addressed together, policies and measures address the need for climate adaptation in distinct, but sometimes overlapping ways. Policies typically refer to instruments that government can use to change economic and other behaviors. Policies are usually composed of taxes, command-and-control regulations (e.g., performance specifications for technologies), market mechanisms such as trading schemes, incentives such as subsidies for new management techniques, and information gathering (as on the likely impacts of climate change) or dissemination (as on the merits of new technologies or behavior changes). Measures are usually specific actions amenable to implementation, such as re-engineering irrigation systems, planting different crops, or initiating a new industry. Many “projects” could be also termed “measures”.

Priority system - A priority system is the focus of the APF process. It is a system that is characterized as highly vulnerable to different climate hazards, as well as being strategically important at local and/or national levels. It has been identified as a priority system through a stakeholder-driven process.

Probability - defines the likelihood of an event or outcome occurring. Probability can range from being qualitative, using word descriptions such as likely or highly confident, to quantified ranges and single estimates, depending on the level of understanding of the causes of events, historical time series and future conditions.

Reference scenario – an internally coherent description of a possible future without consideration of climate change; the reference scenario is used for comparison with alternative scenarios that include consideration of climate change and options for adaptation policies and measures.

Risk (climate-related) – The result of the interaction of physically defined hazards with the properties of the exposed systems - i.e., their sensitivity or [social] vulnerability. Risk can also considered as the combination of an event, its likelihood, and its consequences - i.e., risk equals the probability of climate hazard multiplied by a given system’s vulnerability.

Scenario – a plausible and often simplified description of how the future may develop, based on a coherent and internally consistent set of assumptions about driving forces and key relationships. Scenarios may be derived from projections, but are often based on additional information from other sources, sometimes combined with a narrative storyline.

Sector – a part or division, as of the economy (e.g., the manufacturing sector, the services sector) or the environment (e.g., water resources, forestry).

Site-specific approaches – These approaches seek to develop and assess detailed adaptation strategies on the basis of specific perceptions of vulnerability that have emerged from the full range of stakeholders at the site level (e.g., local communities, local project).

Socioeconomic vulnerability - an aggregate measure of human welfare that integrates environmental, social, economic and political exposure to a range of harmful perturbations . See also vulnerability.

Stakeholder – those who have interests in a particular decision, either as individuals or as representatives of a group. This includes people who influence a decision, or can influence it, as well as those affected by it.

Strategy – a broad plan of action that is implemented through policies and measures. Strategies can be comprehensive (i.e., focusing on national, cross sectoral scales) or targeted (i.e., focusing on specific sectors, regions, or measures).

System - a system may be a region, a community, a household, an economic sector, a business, a population group, or other systems, such as an agricultural system, that are exposed to varying degrees to different climate hazards, defined in TP 4 as events with the potential to cause harm (see priority system).

Uncertainty – an expression of the degree to which a value (e.g., the future state of the climate system) is unknown.

Uniform approaches – These approaches seek to develop and assess broad adaptation strategies on the basis of a comprehensive perception of vulnerability that may exist – for example across sectors, across regions, across development challenges.

Vulnerability – The degree to which an exposure unit is susceptible to harm due to exposure to a perturbation or stress, and the ability (or lack thereof) of the exposure unit to cope, recover, or fundamentally adapt (become a new system or become extinct). It can also be considered as the underlying exposure to damaging shocks, perturbations or stresses, rather than the probability or projected incidence of those shocks themselves. See also socioeconomic vulnerability and climate change vulnerability.

Vulnerability baseline - A vulnerability baseline includes a description of current vulnerabilities to climate variability and events. Also see Baseline.

9 References

- Achard, F., Belward, A.S., Eva, H.D., Federici, S. Mollicone, D. and Raes, F. 2005. *Accounting for avoided conversion of intact and non-intact forest; technical options and a proposal for a policy tool*. EU Joint Research Council, presented at COP11, Montreal, Dec 1.
- Achard, F., H.D. Eva, H.J. Stibig, P. Mayaux., J. Gallego, T. Richards, and J.P. Malingreau. 2002. *Determination of deforestation rates of the world's humid tropical forests*. Science 297: 999-1002.
- Blaser, J. and J. Douglas. 2000. A future for forests? issues and implications for the emerging forest policy and strategy of the World Bank. *Tropical Forest Update*, 10(4): 9-14.
- Blaser, J. and C. Robledo, 2007. *Initial Analysis on the Mitigation Potential in the Forestry Sector*. Report prepared for the Secretariat of the UNFCCC. August 2007. http://unfccc.int/files/cooperation_and_support/financial_mechanism/application/pdf/blaser.pdf
- Brown, S., 2002. Measuring carbon in forest: Current status and future challenge. Environmental Pollution. 116: 363-372.
- Brown, 2002. *Measuring carbon in forest: Current status and future challenge*. Environmental Pollution. 116: 363-372.
- Carrere; R., 2006 (Coord). *Oil palm from cosmetics to Biodiesel Colonization lives on*. World Rain Forest movement. ISBN: 9974 - 7969 - 7 - 0
- Capoor, K., & P. Ambrosi. 2008. *State and Trends of the Carbon Market 2008*. The World Bank Institute. Washington.
- Defries, R.S Houghton, R.A., Hansen, M.C., Field, C.B., Skole, D., Townshend, J., 2002. *Carbon Emissions from tropical deforestation and regrowth based on satellite observations for the 1980s and 1990s*. Proceedings of the National Academy of Sciences 99, 14256-14261.
- DeFries, R., F. Achard, S. Brown, M. Herold. 2006. *Reducing greenhouse gas emissions from deforestation in developing countries: considerations for monitoring and measuring*. Outcome of GOFCC-GOLD workshop on monitoring tropical deforestation for compensated reductions, 21st – 22nd March 2006. DRAFT 17pp.
- Geist, H. and E. Lambin. 2002. *Proximate causes and underlying driving forces of tropical deforestation*. BioScience. Vol. 52 No. 2 143-150.
- FAO, 2004. “*Global Forest Resources Assessment Update 2005. Terms and Definitions. (Final version)*”. <http://www.fao.org/forestry/site/fra2005-terms/en/>
- FAO 2006. *Global Forest Resource Assessment 2005: Progress toward sustainable forest management*. FAO Forestry Paper 147. FAO, Rome
- Fearnside, P. and Laurence W. 2004. *Tropical Deforestation and Greenhouse-Gas Emissions*. Ecological Applications, 14 (4) 982-986
- Fearnside, Ph. 2000. *Global warming and tropical land-use change: Greenhouse gas emissions from biomass burning, decomposition and soils in forest conversion, shifting cultivation and secondary vegetation*. Climate Change, 46: 115-158.
- Forner, C., J. Blaser, F. Jotzo, C. Robledo. 2006. *Keeping the forest for the climate's sake: avoiding deforestation in developing countries under the UNFCCC*. Climate Policy 6, 2006.
- Frey, E. 2002. *Tropical deforestation in the Amazon: An Economic Analysis of Rodonia, Brazil*. Issues in Political Economy. Vol 11
- Grêt-Regamey, A.; E. Hendrick; S. Hetsch, K. Pingoud, Kimi and S. Rüter. 2008. *Challenges and Opportunities of Accounting for Harvested Wood Products*. Background Paper to the Workshop on Harvested Wood Products in the Context of Climate Change Policies. 9-10 September 2008, Geneva, Switzerland

- Grieg-Gran, M. 2006. *Is deforestation a cost-effective mitigation approach?* Published by the International Institute for Environment and Development. London
- Hamilton, K. M. Sjardin, T. Marcello and G. Xu. 2008. *Forging a frontier: State of the Voluntary Carbon Markets 2008*. A report by Ecosystem Marketplace and New Carbon Finance. Washington.
- Houghton, R. A., 2005: *Aboveground forest biomass and the global carbon balance*. *Global Change Biology* 11(6): 945-958.
- Houghton, R.A. 2003. *Revised estimates of the annual net flux of carbon to the atmosphere from changes in land use and land management 1850-2000*. *Tellus* 55: 378-390.
- Houghton, R.A., K.T. Lawrence, J.L. Hackler, and S. Brown. 2001. *The spatial distribution of forest biomass in the Brazilian Amazon: a comparison of estimates*. *Global Change Biology* 7: 731-746
- House, J.; I. Prentice, N. Ramankutty, R. Houghton, m. Heinmann. 2003. *Reconciling apparent inconsistency in estimates of terrestrial CO₂ sources and sinks*. *Tellus*, 55B. 345-363.
- IISD/IUCN/SEI-B/Intercooperation, 2003. "Climate change and livelihoods. Combining disaster risk reduction, natural resource management and climate change adaptation in a new approach to the reduction of vulnerability and poverty".
- IPCC 2003a. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, IGES, Hayama, Japan. www.ipcc-nggip.iges.or.jp/public/gpplulucf/gpplulucf.htm
- IPCC 2007 *Climate Change 2007: The physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Summary for Policymakers..
- IPCC 2007b *Climate Change 2007: Climate change impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Summary for Policymakers.
- IPCC, 2007c. *Climate Change, 2007: Mitigation Options: Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Chapter 9 – Forestry.
- IPCC, 2003. *Definitions and methodological options to inventory emissions from human-induced degradation of forest and devegetation of other vegetation types* [Penman, J.; M. Gytarsky, T. Hiraishi, T. Krug, D. Krugger, R. Pipatti, L. Buendia, K. Miwa, T. Ngara, K. Tanabe, and F. Wagner (eds)]. IGES. Kanagawa, Japan.
- IPCC, 2001: *Climate Change 2001: The Scientific Basis. Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change* [Houghton, J.T., Y. Ding, D.J. Griggs, M. Noguier, P.J. van der Linden, X. Dai, K. Maskell, and C.A. Johnson (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 881pp.
- IPCC, 2000, *Land Use, Land use change, and forestry. A special report of the IPCC*. (Watson, R.T., Noble, I.R., Bolin, B., Ravindranath; N. H., Verardo; D. and D. J. Docken (eds)). Cambridge University Press, Cambridge, United Kingdom and New York, N.Y. USA, 881 pp.
- ITTO, 2002. "ITTO Yokohama Action Plan 2002 – 2006". Yokohama, Japan
- ITTO, 2005. "Revised ITTO criteria and indicators for the sustainable management of tropical forests including reporting format". ITTO Policy Development Series No 15. Yokohama, Japan
- IPCC, 2001: "Third Assessment Report of the Intergovernmental Panel on Climate Change [Houghton, J.T., Y. Ding, D.J. Griggs, M. Noguier, P.J. van der Linden, X. Dai, K. Maskell, and C.a. Johnson (eds)]. Cambridge University Press, Cambridge, United Kingdom and New Your, USA.
- Jung, M., 2005: *The Role of Forestry Sinks in the CDM-Analysing the Effects of Policy Decisions on the Carbon Market*. HWWA DISCUSSION PAPER 241, Hamburg Institute of International Economics, 32p.

Kaimowitz, D and A. Angelsen (1999). *The World Bank and Non-Forest Sector Policies that Affect Forests. Background Paper for the World Bank's Forest Policy and Strategy*. Center for International Forest Research, Bogor, Indonesia.

Moutinho, P and S. Schwartzam (eds). 2005. *Tropical Deforestation and Climate Change*. Instituto de Pesquisa Ambiental da Amazônia; Washington DC: Environmental Defense.

Mollicone, D.; F. Achard, S. Federici, E. Hugh, G. Grassi, A. Belward, F. Raes, G. Seufert, H. Stibling, G. Matteucci, E. Schulze. 2006. *An incentive mechanism for reducing emissions from conversion of intact and non-intact forest*. Climatic Change DOI 10.1007/s10584-006-9231-2

Niles, J. O., S. Brown, J. Pretty, A. S. Ball and J. Fay. 2002. „*Potential carbon mitigation and income in developing countries from changes in use and management of agricultural and forest lands*“. Contribution to the Special Theme Issue 'Carbon, biodiversity, conservation and income: an analysis of a free-market approach to land-use change and forestry in developing and developed countries'. The Royal Society, 10.1098/rsta.2002.1023

Robledo, C., Blaser, J., Byrne, S., Schmidt, K. (2008). *Climate Change and Governance in the Forest Sector: An overview of the issues on forests and climate change with specific consideration of sector governance, tenure and access for local stakeholders*. Rights and Resources Initiative. In press

Robledo, C. and Blaser, J. UNDP. 2008. *Key issues on Land Use, Land Use Change and Forestry (LULUCF) with an Emphasis on Developing Country Perspectives*. United Nations Development Programme. Bureau for Development Policy. Environment and Energy Group. New York.

Robledo, C. and O. Masera. 2007. *Developments in UNFCCC/IPCC discussions regarding reducing emissions from forest degradation and deforestation and implications for tropical forests and tropical timber producers*. Presented at the XLII Session of the International Tropical Timber Council. Paper No. 9. Port Moresby, Papua New Guinea.

Robledo, C., M. Kanninen, L. Pedroni, 2005. *Tropical forests and adaptation to climate change: in search of synergies*. CIFOR, Bogor, Indonesia. 186p. ISBN: 979-24-4604-4.

Robledo, C and C. Forner, 2005. "Adaptation of forest ecosystems and the forest sector to climate change. Forest and Climate Change Working Paper 2. FAO. Rome.

Robledo, C. 2004. *Developments in UNFCCC/IPCC Discussions Regarding Forests and Implications for Tropical Forests and Tropical Timber Producers*. ITTO report E-C36-14

Sanitlli, M., Moutinho, P., Schwartzman, S., Nepstad, D., Curran, L. Nobre, C. 2005. *Tropical deforestation and the Kyoto Protocol: An editorial essay*. Climate Change 71 pp 267-276 Reprinted in Mouthinho, P. and Schwartzman, S. (2005) *Tropical Deforestation and Climate Change Belem Brazil*: Instituto de Pesquisa Ambiental da Amazonia and Environmental Defense

Santilli, M. (2003) *Compensated reduction of deforestation*. Presented at COP9, Milan

Sathaye, J.A., Makundi, W, Dale, L and Chan, P. (2005). *GHG Mitigation Potential, Costs and Benefits in Global Forests: A Dynamic Partial Equilibrium Approach*. Ernest Orlando Lawrence Berkeley National Laboratory. LBNL-58291.

Sathaye, J. and K. Andrasko, 2007. *Special issue on estimation of baselines and leakage in carbon mitigation forestry projects*. Mitigation and Adaptation Strategies for Global Change 12(6): 963-970.

Sathaye, J. and K. Andrasko, 2007a. *Land use change and forestry climate project regional baselines: A review*. Mitigation and Adaptation Strategies for Global Change 12(6): 971-1000.

Scherr, S; A. Khare and A. White, 2003: "Current status and future potential of markets for ecosystem services of tropical forest". Report prepared for ITTO. Forest Trends, Washington.

Soares-Filho, B.S., D.C. Nepstad, L.M. Curran, G.C. Cerqueira, R.A. Garcia, C.A. Ramos, E. Voll, A. McDonald, P. Lefebvre and P. Schlesinger, 2006. *Modelling conservation in the Amazon basin*. Nature 440, 520-523.

Sohngen B., and R. Beach. 2006. *Avoided deforestation as a greenhouse gas Mitigation tool: Economics Issues for considerations*.

- Sohngen, B. and R. Sedjo, 2006. *Carbon sequestration costs in global forests*. Energy Journal Special Issue
- Sohngen, B., R. Mendelsohn, R. Sedjo. 1998. *The effect of climate on global timber markets*. <http://www-agecon.ag.ohio-state.edu/people/sohngen.1/forests/globcc.pdf>
- Stern, N. 2006. *The Economics of Climate Chang. Stern Report*. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA . 712 p
- Tavoni, M., B. Sohngen, V. Bosseti. 2006 *Forestry and the carbon market response to stabilize climate*. <http://ideas.repec.org/p/fem/femwpa/2007.15.html>
- Trines, E., Hohne, N., Jung, M., Skutsch, M.,Petsonk A., Silva-Chavez, G., Smith P., Nabuurs Gert-Jan., Verweij, P., Schlamadinger B (2006). *Integrating agriculture, forestry and other land use in future climate regimes. Climate change. Scientific assessment and policy analysis*. Report 500102002.
- UNCTAD, 1994. “*International Tropical Timber Agreement*”.
- UNFCCC 2006e *Report of COP serving as the meeting of the Parties to the Kyoto Protocol on its first session, held at Nairobi from 6 to 17 November 2006. Add. Part two. Action taken by the COP serving as the meeting of the Parties to the Kyoto Protocol at its second session*. FCCC/KP/CMP/2006/10/Add.1
<http://unfccc.int/resource/docs/2006/cmp2/eng/10a01.pdf>
- UNFCCC 1997 *Kyoto Protocol to the United Nations Framework Convention on Climate Change*
<http://unfccc.int/resource/docs/convkp/kpeng.pdf>
- UNFCCC (2003): *Estimation, reporting and accounting of harvested wood products*. Technical paper. FCCC/TP/2003/7. <http://unfccc.int/resource/docs/tp/tp0307.pdf>
- UNFCCC 2006a. *Report of the Subsidiary Body for Scientific and Technological Advice on its twenty-fourth session, held at Bonn from 18 to 26 May 2006*. FCCC/SBSTA/2006/5 <http://unfccc.int/resource/docs/2006/sbsta/eng/05.pdf>
- UNFCCC 2006b. *Background paper for the workshop on reducing emissions from deforestation in developing countries. Working paper No.1 (a) (2006)*.
http://unfccc.int/files/methods_and_science/lulucf/application/pdf/part_i_scientific_issues.pdf
- UNFCCC 2006c. *Report of the Subsidiary Body for Scientific and Technological Advice on its twenty-fifth session, held at Nairobi from 6 to 14 November 2006*. FCCC/SBSTA/2006/11 <http://unfccc.int/resource/docs/2006/sbsta/eng/11.pdf>
- UNFCCC 2006d. *Report of COP serving as the meeting of the Parties to the Kyoto Protocol on its first session, held at Montreal from 28 November to 10 December 2005. Add Part two. Action taken by the COP serving as the meeting of the Parties to the Kyoto Protocol t its first session*. FCCC/KP/CMP/2005/8/Add.3
<http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=3>
- UNFCCC, 2001. “*Marrakech Accords*”, FCCC/CP/2001/13/.
- UNFCCC, 2002: *COP 8 report and Delhi Declaration*, FCCC/CP/2002
- UNFCCC, 2003. „*Estimation, reporting and accounting of harvested wood products*“. FCCC/TP/2003/7
- UNFCCC, 2004: *COP 9 Report*, FCCC/CP/2003/6
- UNFCCC, 2006. *Background paper for the workshop on reducing emissions from deforestation in developing countries. Working Paper 1 by Secretariat*. Workshop on REDD.
- Wright, E. and J. Erickson, 2003. “*Incorporating catastrophes into integrated assessment: Science, impacts and adaptation*” in *Climate Change* 57: 265 – 286. Kluwer Academic Publishers, Netherlands.
- www.joanneum.at/jea-bioenergy-task38
- WWF, 2002. *Oil palm plantations and deforestation in Indonesia. What role do Europe and Germany Play?* Switzerland. 56p.

10 Annexes

10.1 Countries with quantified commitments for the Kyoto Protocol

Party ^a	Mt C/yr
Australia	0.00
Austria	0.63
Belarus	
Belgium	0.03
Bulgaria	0.37
Canada	12.00
Croatia	0.265 ^b
Czech Republic	0.32
Denmark	0.05
Estonia	0.10
Finland	0.16
France	0.88
Germany	1.24
Greece	0.09
Hungary	0.29
Iceland	0.00
Ireland	0.05
Italy	2.78 ^d
Japan	13.00
Latvia	0.34
Liechtenstein	0.01
Lithuania	0.28
Luxembourg	0.01
Monaco	0.00
Netherlands	0.01
New Zealand	0.20
Norway	0.40
Poland	0.82
Portugal	0.22
Romania	1.10
Russian Federation	33.00 ^c
Slovakia	0.50
Slovenia	0.36
Spain	0.67
Sweden	0.58
Switzerland	0.50
Ukraine	1.11
United Kingdom	0.37

^a The list of countries in this table differs from that found in decision 5/CP.6 as a result of consultations undertaken during the session.

^b This figure has been added by decision 22/CP.9.

^c This figure is changed from 17.63 to 33.00 by decision 12/CP.7.

^d This figure is changed from 0.18 to 2.78 by decision 8/CMP.2.

10.2 Background on key decisions of the COP with regard to LULUCF

The eligibility, modalities and procedures for forestry activities under the CDM are ruled by the following decisions:

- “Marrakesh Accords”, COP 7, 2001 (FCCC/CP/2001/13):
 - o Decision 11/CP.7: “Land Use, Land-Use Change and Forestry”
 - o Decision 17/CP.7: “Modalities and procedures for a clean development mechanism as defined in Article 12 of the Kyoto Protocol”
- COP 9, 2003 (FCCC/CP/2003/6):
 - o Decision 19/CP.9: “Modalities and procedures for afforestation and reforestation project activities under the clean development mechanism in the first commitment period of the Kyoto Protocol.”
- COP 10, 2004 (FCCC/CP/2004/10)
 - o Decision 13/CP.10: “Incorporation of the modalities and procedures for afforestation and reforestation project activities under the clean development mechanism into the guidelines under Articles 7 and 8 of the Kyoto Protocol.”
 - o Decision 14/CP.10: “Simplified modalities and procedures for small-scale afforestation and reforestation project activities under the clean development mechanism in the first commitment period of the Kyoto Protocol and measures to facilitate their implementation.”
 - o Decision 15/CP.10: “Good practice guidance for land use, land-use change and forestry activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.”

COP 11 and CMP 1, 2005 (FCCC/CP/2005/10)

Two of the decisions above, which were originally drafted by the COP, were adopted by the first CMP, which took place in Montreal, Canada, in December 2005 and re-numbered as follows:

- o Decision 5/CMP.5 “Modalities and procedures for afforestation and reforestation project activities under the clean development mechanism in the first commitment period of the Kyoto Protocol.”
- o Decision 6/CMP.1 “Simplified modalities and procedures for small-scale afforestation and reforestation project activities under the clean development mechanism in the first commitment period of the Kyoto Protocol and measures to facilitate their implementation.”
- COP 12 and CMP 2
 - o No major decision on REDD or A/R
- COP 13 and CMP 3
 - o Decision 1/CP.13: “Bali Action Plan.”
 - o Decision 2/CP.13: “Reducing emissions from deforestation in developing countries: approaches to stimulate action.”
 - o Decision 1/CMP.3 “Adaptation Fund”
 - o Decision 9/CMP.3: “Implications of possible changes to the limit for small-scale afforestation and reforestation clean development mechanism project activities.”

10.3 Definitions of forest and forest degradation in different international processes

Forest	
ITTO	<p>ITTO defines various related termini:</p> <p>Permanent forest estate (PFE): Land, whether public or private, secured by law and kept under permanent forest cover. This includes land for the production of timber and other forest products, for the protection of soil and water, and for the conservation of biological diversity, as well as land intended to fulfil a combination of these functions.</p> <p>Planted forest: A forest stand that has been established by planting or seeding.</p> <p>Primary forest: Forest which has never been subject to human disturbance, or has been so little affected by hunting, gathering and tree cutting that its natural structure, functions and dynamics have not undergone any changes that exceed the elastic capacity of the ecosystem.</p> <p>Production PFE: That part of the PFE assigned to the production of timber and/or other extractive uses.</p> <p>Protected area: An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity and of natural and associated cultural resources, and managed through legal or other effective means.</p> <p>Protection PFE: That part of the PFE in which the production of timber (or other extractive uses) is prohibited.</p>
UNFCCC/KP	<p>Forests are defined in the Marrakech Accords as follows:</p> <p>Forest is a minimum area of land of 0.05-1.0 hectares with tree crown cover (or equivalent stocking level) of more than 10-30 per cent with trees with the potential to reach a minimum height of 2-5 metres at maturity <i>in situ</i>. A forest may consist either of closed forest formations where trees of various storeys and undergrowth cover a high proportion of the ground or open forest. Young natural stands and all plantations which have yet to reach a crown density of 10-30 per cent or tree height of 2-5 metres are included under forest, as are areas normally forming part of the forest area which are temporarily unstocked as a result of human intervention such as harvesting or natural causes but which are expected to revert to forest.</p> <p>Note: According to the modalities and procedures for afforestation and reforestation within the CDM, each non-Annex I country had to submit their definition on forest for the first commitment period within the ranges established in the Marrakech Accords (Decision 19/CP.9).</p>
IPCC	<p>Forest land: This category includes all land with woody vegetation, consistent with thresholds used to define forest land in the national GHG inventory, sub-divided at the national level into managed and unmanaged, and also by ecosystem type as specified in the <i>IPCC Guidelines</i> (since forest management has a particular meaning under the Marrakech Accords, a subdivision of managed forests as described in Chapter 4 of the IPCC Good Practice Guidance for LULUCF may be required). The category also includes systems with vegetation that currently fall below, but are expected to exceed, the threshold of the forest land category.</p> <p>Further, in the Good Practice Guidelines for LULUCF the IPCC uses the definition of forest agreed as part of the Marrakech Accords.</p>
FAO for FRA 2005	<p>? [Forest?] Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds <i>in situ</i>. It does not include land that is predominantly under agricultural or urban land use.</p> <p>Explanatory notes:</p> <ol style="list-style-type: none"> 1. Forest is determined both by the presence of trees and the absence of other predominant land uses. The trees should be able to reach a minimum height of 5 meters <i>in situ</i>. Areas under reforestation that have not yet reached but are expected to reach a canopy cover of 10 percent and a tree height of 5 meters are included, as are temporarily unstocked areas, resulting from human intervention or natural causes, which are expected to regenerate. 2. Includes areas with bamboo and palms provided that height and canopy cover criteria are met. 3. Includes forest roads, firebreaks and other small open areas, forest in national parks, nature reserves and other protected areas such as those of specific scientific, historical, cultural or spiritual interest. 4. Includes windbreaks, shelterbelts and corridors of trees with an area of more than 0.5 hectares and width of more than 20 meters. 5. Includes plantations primarily used for forestry or protection purposes, such as rubberwood plantations and cork oak stands. 6. Excludes tree stands in agricultural production systems, for example in fruit plantations and agroforestry systems. The term also excludes trees in urban parks and gardens.
Forest Degradation	
ITTO	The reduction of the capacity of a forest to produce goods and services. 'Capacity' includes the maintenance of ecosystem structure and functions.
UNFCCC/KP	None available yet.
IPCC	<ol style="list-style-type: none"> a) A direct human-induced loss of forest values (particularly carbon). Likely to be characterised by a reduction of the tree crown cover. Routine management from which crown cover will recover within the normal cycle of forest management operation is not included. b) Changes within the forest that negatively affect the structure or function of the stand and site, and thereby lower the capacity to supply products and/or services. c) Direct human-induced activity that leads to a long-term reduction in forest carbon stocks.
FAO	FAO 2000: A reduction of the canopy cover or stocking within the forest through logging, fire,

	windfelling or other events, provided that the canopy cover stays above 10%. In a more general sense, forest degradation is a long-term reduction of the overall potential supply of benefits from the forest, which includes wood, biodiversity and any other product or service. FRA 2005: [?] Changes within the forest, which negatively affect the structure or function of the stand or site, and thereby lower the capacity to supply products and/or services.
UNEP/CBD/SBSTTA 2001	A degraded forest is a secondary forests that has lost, through human activities, the structure, function, species composition of productivity normally associated with a natural forest type expected on that site.
Deforestation	
ITTO	n.a.
UNFCCC/KP	Deforestation is the direct human-induced conversion of forested land to non-forested land.
IPCC	Deforestation is the direct human-induced conversion of forested land to non-forested land (considered in IPCC 2003 as in the Marrakech Accords for the Kyoto Protocol).
FAO for FRA 2005	The conversion of forest to another land use or the long-term reduction of the tree canopy cover below the minimum 10 percent threshold. Explanatory notes: 1. Deforestation implies the long-term or permanent loss of forest cover and implies transformation into another land use. Such a loss can only be caused and maintained by a continued human-induced or natural perturbation. 2. Deforestation includes areas of forest converted to agriculture, pasture, water reservoirs and urban areas. 3. The term specifically excludes areas where the trees have been removed as a result of harvesting or logging, and where the forest is expected to regenerate naturally or with the aid of silvicultural measures. Unless logging is followed by the clearing of the remaining logged-over forest for the introduction of alternative land uses, or the maintenance of the clearings through continued disturbance, forests commonly regenerate, although often to a different, secondary condition. In areas of shifting agriculture, forest, forest fallow and agricultural lands appear in a dynamic pattern where deforestation and the return of forest occur frequently in small patches. [To simplify reporting of such areas, the net change over a larger area is typically used.] 4. Deforestation also includes areas where, for example, the impact of disturbance, overutilization or changing environmental conditions affects the forest to an extent that it cannot sustain a tree cover above the 10 percent threshold.

10.4 ITTO member countries' data in the National Communications

ITTO Producing Countries – AFRICA

Country	Sector	Gross CO2 emission (Gg)* (emissions)	Gross CO2 removal (Gg)* (removals)	Net CO2 emission (Gg)* (emissions minus removals)	Rating Year / National Communication	Annual Forest Cover Change 1990 – 2000 (in 1000 ha)	Total closed natural tropical forest (in 1000 ha)
Cameroon	LUCF	28.196	- 6.216	+ 21.979	1994 / 1	-222 (-0,9%)	19.985
Central African Republic	LUF	1.534	- 140.000	- 138.466	1994 / 1	-30 (-0,1%)	4.826
Congo	Forest	n.a.	n.a.	- 70.120	1994 / 1	-17 (-0,1%)	22.000
Cote d'Ivoire	LUCF	n.a.	n.a.	- 22.246	1994 / 1	-265 (-3,1%)	3.248
Democratic Republic of the Congo	LUCF	414.248	- 597.579	- 183.331	1994 / 1	-532 (-0,4%)	126.236
Gabon	LUCF	2.307	- 503.280	- 500.973	1994 / 1	-10 (n.a.)	21.800
Ghana	LUCF	5.738	- 25.618	- 19.878	1994 / 1	-120 (-1,7%)	1.634
Liberia	LUCF	9.500	- 50.000	- 40.500	n.a.	-76 (-2%)	4.124
Nigeria	LUCF	n.a.	n.a.	+ 75.542	1994 / 1	-398 (-2,6%)	4.456
Togo	LUCF	n.a.	n.a.	+ 19.964	1995 / 1	-21 (-3,4%)	272

* (+) stands for CO2 emission and (-) for CO2 removal

ASIA & PACIFIC

Country	Sector	Gross CO2 emission (Gg)* (emissions)	Gross CO2 removal (Gg)* (removals)	Net CO2 emission (Gg)* (emissions minus removals)	Rating Year / National Communication	Annual Forest Cover Change 1990 – 2000 (in 1000 ha)	Total closed natural tropical forest (in 1000 ha)
Cambodia	LUCF	n.a.	n.a.	- 19.636	1994 / 1	-56 (-0,6%)	5.500
Fiji	LUCF	2.149	- 9.989	- 7.840	1994 / 1	-2 (-0,2%)	747
India	LULUCF	37.675	- 23.533	+ 14.142	1994 / 1	38 (0,1%)	22.500
Indonesia	LUCF	559.471	-403.846	+ 155.625	1994 / 1	-1.312 (-1,2)	100.382
Malaysia	LUCF	7.636	- 68.717	- 61.081	1994 / 1	-237 (-1,2%)	19.148
Myanmar	LUCF	n.a.	n.a.	- 9.402	1990 / n.a.	-517 (-1,4%)	32.700
Papua New Guinea	LUCF	n.a.	n.a.	+ 413	1994 / 1	-113 (-0,4%)	30.150
Philippines	LUCF	65.549	- 68.323	- 2.774	1994 / 1	-89 (-1,4%)	5.288
Thailand	LUCF	99.577	- 39.101	+ 60.476	1994 / 1	-112 (-0,7)	10.127
Vanuatu	LUF	n.a.	n.a.	- 1	1995 / 1	1 (0,1)	442

* (+) stands for CO2 emission and (-) for CO2 removal

LATIN AMERICA

Country	Sector	Gross CO2 emission (Gg)* (emissions)	Gross CO2 removal (Gg)* (removals)	Net CO2 emission (Gg)* (emissions minus removals)	Rating Year / National Communication	Annual Forest Cover Change 1990 – 2000 (in 1000 ha)	Total closed natural tropical forest (in 1000 ha)
Bolivia	LUCF	38.617	- 4.537	+ 34.080	1994 / 1	-161 (-0,3%)	47.999
Brazil	LUCF	n.a.	n.a.	+ 776.331	1994 / 1	-2.309 (-0,4%)	489.515
Colombia	LUCF	16.540	n.a.	+ 14.505	1994 / 1	-190 (-0,4%)	51.437
Ecuador	LUCF	n.a.	n.a.	+ 45.543	1990 / 1	-137 (-1,2%)	10.854
Guatemala	LUCF	3.245	- 42.904	- 39.659	1990 / 1	-54 (-1,7%)	2.824
Guyana	LUCF	2.531	- 29.195	- 26.664	1994 / 1	-49 (-0,3%)	16.916
Honduras	LUCF	54.111	- 52.763	+ 1.380	1995 / 1	-59 (-1%)	3.811
Mexico	LULUCF	99.760	- 12.883	+ 86.811	2002 / 3	-631 (-1,1%)	33.120
Panama	LUCF	20.455	- 11.732	+ 8.722	1994 / 1	-52 (-1,6%)	3.052
Peru	LUCF	82.488	- 45.290	+ 37.197	1994 / 1	-269 (-0,4%)	64.204
Suriname	LULUCF	5.340	- 3.862	+ 1.477	2003 / 1	n.a.	14.100
Trinidad and Tobago	LUCF	n.a.	- 1.524	- 1.524	1990 / 1	-2 (-0,8%)	250
Venezuela	LUCF	35.780	- 50.138	- 14.360	1999 / 1	-218 (-0,4%)	49.926

* (+) stands for CO2 emission and (-) for CO2 removal

ITTO Consumer Countries

Country	Sector	Gross CO2 emission (Gg)* (emissions)	Gross CO2 removal (Gg)* (removals)	Net CO2 emission (Gg)* (emissions minus removals)	Rating Year / National Communication	Annual Forest Cover Change 1990 – 2000 (in 1000 ha)
Australia	LULUCF	47.675	- 45.800	+ 1.875	2003 / 4	-282 (-0,2%)
Canada	LUCF	276.094	- 297.927	- 21.833	1999 / 3	n.a.
China	LUCF	23.713	- 431.192	- 407.479	1994 / 1	1.806 (1,2%)
Egypt	LUCF	n.a.	- 9.900	- 9.900	1990/91 / 1	2 (3,3%)
European Union:						
Austria	LUCF	287	- 13.060	- 12.773	2003 / 4	8 (0,2%)
Belgium/Luxembourg	LULUCF	n.a.	n.a.	- 3.359 (Gg equiv.)	2003 / 4	-1 (-0,2%)
Denmark	LUCF	n.a.	n.a.	- 1.204 (Gg equiv.)	2003 / 4	1 (0,2%)
Finland	LULUCF	n.a.	n.a.	- 17.880	2003 / 4	8 (n.a.)
France	LUCF	107.048	- 160.121	- 53.073	2003 / 4	62 (0,4%)
Germany	LULUCF	42.301	- 78.554	- 36.252	2004 / 4	n.a.
Greece	LULUCF	n.a.	n.a.	- 5.533	2003 / 4	30 (0,9%)
Ireland	LUCF	n.a.	n.a.	- 629	2001 / 3	17 (3%)
Italy	LUCF	n.a.	n.a.	- 16.444	2000 / 3	30 (0,3%)
Netherlands	LUCF	5.324	- 2.563	+ 2.761	2003 / 4	1 (0,3%)
Portugal	LUCF	n.a.	n.a.	- 3.195	2004 / 4	57 (1,7%)
Spain	LUCF	15.504	- 55.622	- 40.118	2003 / 4	86 (0,6%)
Sweden	LUCF	117.640	- 139.139	- 21.499	2003 / 4	1 (n.a.)
United Kingdom	LUCF	n.a.	n.a.	- 3.542	2004 / 4	17 (0,6%)
Japan	LUCF	445.557	- 142.262	- 96.705	1995 / 4	3 (n.a.)
Nepal	LUCF	22.895	- 14.778	+ 8.117	1994/95 / 1	-78 (-1,8%)
New Zealand	LULUCF	18.400	- 42.900	- 24.400	2003 / 4	39 (0,5%)
Norway	LULUCF	2.500	- 23.400	- 20.900	2003 / 4	31 (0,4%)
Republic of Korea	LUCF	2.121	- 11.569	- 9.488	2001 / 2	n.a.
Switzerland	LUCF	n.a.	n.a.	- 1.700	2003 / 4	4 (0,4%)
United States of America	LUCF	n.a.	n.a.	- 990.400	1999 / 3	388 (0,2%)

* (+) stands for CO2 emission and (-) for CO2 removal

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10.5 Statement by the International Expert Meeting on Addressing Climate Change through Sustainable Management of Tropical Forests³⁹

Key messages:

- Forest restoration and sustainable forest management are important measures for mitigating climate change. They also have many additional benefits, including biodiversity conservation, the provision of other ecosystem services, and the alleviation of poverty.
- Tropical forests and forest-dependent people are highly vulnerable to climate change. Measures to help the forests sector adapt to climate change are urgently required.
- Sustainable forest management can help increase the resilience of tropical forest ecosystems and forest-dependent people in the face of climate change.
- Bioenergy production from forestry and the substitution of fossil-fuel-intensive products by wood products could be important strategies for mitigating climate change.
- ITTO can play an important role in encouraging and assisting member countries to develop and implement forest-based climate change mitigation and adaptation initiatives.

ITTO is an UN-established inter-governmental agency tasked with promoting the conservation and sustainable management, use and trade of tropical forest resources. On 30 April–2 May 2008, it convened an expert meeting to explore the role of sustainable tropical forest management in climate change mitigation and adaptation.

Participants at the meeting explored existing and possible future schemes for reduced emissions from deforestation and forest degradation (REDD), reviewed other mitigation options in the forest sector, and examined the need to assist the forest sector to adapt to climate change.

The meeting listened to the views of non-government stakeholders through representatives of ITTO's Trade Advisory Group and Civil Society Advisory Group and heard presentations from the World Bank's Forest Carbon Partnership Facility, the Forest Department of the Food and Agriculture Organization of the United Nations, the Center for International Forestry Research, the World Agroforestry Centre, a number of ITTO member countries, and experts in the field of forests and climate change. It made the following conclusions and recommendations

Recommendations

The meeting generated recommendations for ITTO, national governments, and members of the Collaborative Partnership on Forests (CPF) and other relevant organizations.

A. Recommendations for ITTO

- **Development studies**

³⁹ *International Expert Meeting on Addressing Climate Change Through Sustainable Management of Tropical Forests, held in Yokohama, Japan, on 30 April–2 May 2008, organized by ITTO with the support of the governments of Japan, Switzerland and Norway and the City of Yokohama.*

- 1) Study the implications of climate change for sustainable forest management in the tropics.
- 2) Develop guidelines for climate change mitigation and adaptation options in tropical forests and for accounting for carbon in forest management plans and ITTO projects, and update the ITTO Criteria and Indicators of Sustainable Forest Management in Tropical Forests to reflect the current state of knowledge on climate change.
- 3) Assist in the improvement of modalities and procedures in the A/R CDM and CDM institutions.
- 4) Analyse the possibility of introducing the concept of forest restoration to the post-2012 climate change negotiation process within the UNFCCC.
- 5) Study methods for accounting for the permanence of carbon in harvested tropical wood products.
- 6) Commission studies on the substitution potential of wood products and their role in climate change mitigation.
- 7) Analyse approaches to financing tropical forest-based initiatives to climate change mitigation and adaptation.

- **Capacity building**

- 8) Help member countries to build forest-sector capacity to mitigate and adapt to climate change, including by:
 - supporting regional collaboration on the role of tropical forests in climate change mitigation and adaptation
 - encouraging national consultation processes on mitigation and adaptation in the forest sector
 - encouraging the development of policy and institutional frameworks that support the role of tropical forests in climate change mitigation and adaptation
 - supporting financial contributions to REDD and the enhancement of carbon sinks
 - supporting forestry officials in member countries to participate in climate change negotiations
- 9) Support member countries in the assessment and monitoring of forest carbon stocks and forest-based carbon emissions within their national forest inventory systems and facilitate the exchange of good practices and test-results of new methodologies and technologies.
- 10) Support member countries in ensuring that forest policy frameworks include climate change considerations, and that tropical forest issues are taken into account in national action plans for adaptation
- 11) Encourage and assist member countries to develop proposals for pilot projects on REDD and forest mitigation options and for increasing the resilience of tropical forests to climate change, and consider providing finance for such projects.
- 12) Support local people to participate in and benefit from initiatives in forest-based climate change mitigation and adaptation. In this regard, work with relevant parties, including other members of the Collaborative Partnership on Forests, to ensure that forest-dependent people benefit from REDD, the enhancement of carbon sinks in forests and payments for ecosystem services.
- 13) Continue to promote community-based forest enterprises as a flexible strategy for assisting forest-dependent people to mitigate and adapt to climate change.
- 14) Contribute to the development of policies and guidelines to promote sustainable wood-based biofuels in a way that does not jeopardize food security and is consistent with the principles of sustainable forest management.
- 15) In partnership with the private sector and other stakeholders, encourage and assist governments to promote the use of carbon-friendly wood products in construction.
- 16) Ensure that forest-based approaches to climate change mitigation and adaptation fully consider the need for good governance, equity, the involvement of civil society and local communities, respect for human rights, and poverty reduction.

- **Knowledge management and information sharing**

- 17) Provide information and guidance on the management of tropical forest types particularly vulnerable to climate change.

18) Conduct a global review of best practice in rights-based approaches to REDD and forest-based carbon enhancement in the tropics.

19) Work with other members of the Collaborative Partnership on Forests and other relevant parties to ensure that modalities for REDD and the enhancement of carbon sinks are user-friendly.

20) Actively provide the UNFCCC process with information on tropical forests and the role of sustainable forest management in climate change mitigation and adaptation.

B. Recommendations for national governments

21) Increase the capacity of personnel working on forest-based climate change at the national and sub-national level

22) Increase awareness among all stakeholders, including policy-makers, of the importance of forest-based mitigation and adaptation options in national responses to climate change.

23) Where lacking or insufficient, develop land-use mapping and planning, inventory and monitoring to assist adaptive land management.

24) Undertake demonstration activities to develop and understand REDD and the enhancement of carbon sinks in the context of climate change, including through ITTO support.

25) Promote community-based forest enterprises as a flexible strategy for assisting local people to adapt to climate change.

26) Use participatory consultation processes to incorporate forests more fully in national development agendas and i approaches to the Millennium Development Goals.

27) Support the involvement of civil society, communities and other relevant stakeholders in national policies and actions on forest-based climate change mitigation and adaptation.

28) Ensure that forest-based approaches to climate change mitigation and adaptation fully consider the need for good governance, equity, the involvement of civil society and local communities, respect for human rights, and poverty reduction.

29) Develop public awareness programmes on the important and dynamic relationship between forests and climate change.

30) Study the feasibility of wood-based biofuels in climate change mitigation compared to other energy alternatives.

31) Where appropriate, encourage the development of community-based wood energy programmes

32) Develop policies and guidelines to promote sustainable wood-based biofuels in a way that does not jeopardize f security and is consistent with the principles of sustainable forest management.

Recommendations for members of the Collaborative Partnership on Forests and other relevant organizations

- 33) Generate information on the relationship between forests and climate change and support national forest inventories and design monitoring methods to assist in generating such information.
- 34) Strengthen research on the links between climate change, forests and human wellbeing.
- 35) Provide information and guidelines on the management of forest types that are especially vulnerable to climate change.
- 36) Develop and test options for adapting the forest sector to climate change.
- 37) Help build capacity among forestry officials in member countries to increase their awareness of and participation in climate change negotiations.
- 38) Collaborate more strongly on assisting members to mitigate and adapt to climate change.
- 39) Raise awareness of the role of forests in climate change mitigation and adaptation.
- 40) Facilitate free access to remote sensing for monitoring the role of forests in climate change mitigation and adaptation.

10.6 Selected examples of cooperation programs including forestry mitigation options

Austria

Austria has established a JI/CDM Programme which has been in operation since August 2003. with a budget of about €300 million from 2003 to 2012 for the acquisition of Emission Reduction Units (ERUs) und Certified Emission Reductions (CERs). The programme is managed by the Kommunalkredit public consulting (<http://www.ji-cdm-austria.at>). Austria also contributes to the World Bank's Community Development Carbon Fund (CDCF), and the EcoSecurities Facility as well as the South Pole Carbon Procurement Facility

Australia

he International Forest Carbon Initiative is a key part of Australia's international leadership on reducing emissions from deforestation. The Initiative will support international efforts to reduce deforestation through the United Nations Framework Convention on Climate Change (UNFCCC). It aims to demonstrate that reducing emissions from deforestation and forest degradation can be part of an equitable and effective international agreement on climate change. A central element is the Initiative's focus on developing practical demonstration activities in the region, particularly in Indonesia and Papua New Guinea.

Besides, Australia participates in other initiatives as he Indonesia-Australia Forest Carbon Partnership, the PNG-Australia Forest Carbon Partnership. Australia also contributes to the World Bank's Forest Carbon Partnership Facility.

(<http://www.ausaid.gov.au/keyaid/mitigation.cfm>)

Belgium

Belgium has established funds at federal and regional levels. With this aimed the Federal has launched two tenders. Besides, the Walloon government has invested in the World Bank's CDCF. The Flemish Economy Minister uses two channels, tenders and its participation in the Multilateral Carbon Credit Fund (MCCF).

Denmark

Besides its participation in the ET ETS, Denmark has developed two purchase programmes, the DanishCarbon.dk, which is purchasing CO2 credits from Central and Eastern Europe (www.danishcarbon.dk). The Ministry of Foreign Affairs is purchasing credits from CDM projects in developing countries. (www.danishcdm.dk) In addition, Denmark participates in two carbon funds. Danish Carbon Fund managed by the World Bank and the NEFCO Baltic Sea Region Testing Ground Facility.

Finland

Finland's mechanism-related activities can be divided into two categories: (i) bilateral CDM and JI project activities; and (ii) investments in carbon funds. Finland has thus far invested in three multilateral funds: the Prototype Carbon Fund (PCF) of the World Bank, the Baltic Sea Region Testing Ground Facility, and the Multilateral Carbon Credit Fund (MCCF) of the European Bank for Reconstruction and Development. Bilateral project activities are managed by the Finnish Environment Institute through the Finnish Carbon Procurement Programme (Finnder). <http://www.environment.fi/finnder>

France

France is providing direct support to the preparation and development of climate-friendly projects and activities, including CDM and JI projects, using a variety of tools dealing with institutional strengthening, project documents design and project funding.

Germany

Germany plans to meet its target primarily through domestic measures and has no public procurement programme. Nevertheless, since Germany has the highest number of installations taking part in the EU ETS, German companies will be a major participant in the private market.

Besides, the German Government will extend the maximum cap to which CERs and ERUs can be used within the EU ETS up to 20% for each facility during the period 2008-2012.

.Germany has currently a broad variety of international activities to foster private sector engagement comprising inter alia workshops, the development of project portfolios, start-up financing of Carbon Funds and the bilateral co-operation within Memoranda of Understanding (MoU).

Italy

Italy has invested in World Bank Carbon Funds as well as in bilateral programs. Italy contributed to the World Bank's Community Development Carbon Fund (CDCF) and to the BioCarbon Fund. The Italian Carbon Fund has its own capitalization.

Japan

The government of Japan has been cooperating with host countries and providing comprehensive support for capacity building necessary for sustainable CDM/JI projects. Japan has activities aimed at facilitating projects through its programme on Project development Assistance. Further Japan has created the Japan Carbon Finance, which combines two modalities:

- Acquisition as a Project Participant
 - Participate in projects, sign emission reduction purchasing agreements (ERPA) with project implementers ,
- Acquisition from Project Implementers
 - Purchase credits with ERPA from project implementers who have acquired or will acquire credits in the future.

Luxembourg

Luxembourg has established a “fund to finance Kyoto mechanisms” in 2005. The government also contributes to the World Bank's Community Development Carbon Fund (CDCF).

The Netherlands

Netherlands has governmental purchase programmes for the acquisition of greenhouse gas reductions through the flexible mechanisms of the Kyoto Protocol and facilitates the participation of the private sector in EU ETS through its CDM/JI approval policy. Besides, the country has purchase agreements with the Governmental Agency SenterNovem, the International Bank for Reconstruction and Development, the International Finance Corporation, the European Bank for Reconstruction and Development, the latin-american regional bank Corporación

Andina de Fomento, the private bank Rabobank and the government of Indonesia. In addition, the Netherlands government participates in two carbon funds of the World Bank: the Prototype Carbon Fund (PCF) and the Community Development Carbon Fund (CDCF). As a follow-up of CoP/MoP-2 in Nairobi The Netherlands decided to strengthen its CDM efforts in Africa through a cooperation with the Netherlands Development Finance Company (FMO).

Portugal

Portugal has created the Portuguese Carbon Fund (PtCF), for use in Kyoto Mechanisms. The PtCF has invested in the Luso Carbon Fund, a private trust fund regulated by the Comissão do Mercado de Valores Mobiliários, and has subscribed the Carbon Fund for Europe, launched by the International Bank for Reconstruction and Development/World Bank and the European Investment Bank. It is examining further investments such as the Asian Development Bank's Carbon Facility

Spain

Spain has designed an overall strategy for the use of the Kyoto Protocol's flexible mechanisms. The first actions implemented, among others, are: the establishment of the institutional framework needed to use the flexible mechanisms, the design of a multilateral and bilateral approach with non-Annex I countries, the evaluation of the existing financial tools for the acquisition of credits in the international markets, and enhancing cooperation with private sector and financial institutions.

Spain participates in several funds including the Spanish Carbon Fund, BioCarbon Fund, the CDCF and the CF Assist. Spain has also signed an agreement with the Andean Development Corporation (CAF) for the establishment of the *Iberoamerican Initiative for Carbon* (IIC), Spain participates in the *Multilateral Carbon Credit Fund* (MCCF) through an agreement with the European Bank for Reconstruction and

Development and the European Investment Bank. Finally, the latest initiative undertaken by the Spanish government is the participation in the Asia Pacific

Carbon Fund (APCF) managed by the Asian Development Bank,

Additionally the government has signed a Technical Cooperation Programme with the Inter American Development Bank.

Sweden

The Swedish Energy Agency is managing the Swedish CDM and JI programme (SICLIP).

Through the Energy Agency, Sweden participates in the Asian Development Bank's (ADB) Asia Pacific Carbon Fund. Moreover, Sweden participates in the World Bank's Prototype Carbon Fund (PCF), and in the European Bank of Reconstruction and

Development's (EBRD) Multilateral Carbon Credit Fund (MCCF)

United Kingdom

The UK has become a substantial centre for carbon trading. This includes UK private investors and also bodies like the European Carbon Fund who are managing their CDM investment operations in London.

The UK has also established a Climate Change Projects Office (CCPO) which promotes private investment in the CDM and JI project sectors in the UK, and provides general and bespoke advice to potential project investors (<http://www.dti.gov.uk/sectors/ccpo/index.htm>).