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**Addressing the challenges of deforestation and forest degradation to tackle climate
change and biodiversity loss**

IMPACT ASSESSMENT

{COM(2008) 645}

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{SEC(2008) 2620}

Executive summary

On a global scale, net deforestation is most prevalent in tropical forests, which cover some 1.7 billion hectares, i.e. nearly half of the world's total forest area. During the last five years, between 11.8 and 13 million ha of this area has been lost annually. This is an alarming trend and in the past 20 years no significant decrease in the deforestation rate has been recorded.

The causes of deforestation and degradation include a combination of direct and indirect economic, institutional, political, natural or social factors: for example, demand for agriculture or infrastructure development, or government failure to protect these valuable assets. The result is that forests are often lost or degraded even when it is not in the countries' long-term interests.

High rates of deforestation have severe consequences for climate change. Forests play a vital role in the global carbon cycle, storing roughly half the world's terrestrial carbon. In 2004 the forestry sector accounted for 17.4 % of global annual greenhouse gas emissions. This is why the targets set in the Commission's Communication "Limiting Global Climate Change to 2 degrees Celsius - The way ahead for 2020 and beyond" are unlikely to be met without a reduction in greenhouse gas emissions from deforestation and forest degradation, in addition to the other measures put forward. Tackling deforestation and degradation should also safeguard to the maximum extent possible biodiversity and the ecosystem goods and services it can provide. Doing so could support local populations, and contribute to tackling poverty.

The target that needs to be met is to halt global forest cover loss by 2030 at the latest and reduce gross tropical deforestation by at least 50 % by 2020 compared to the current levels. A number of options are examined with this aim in mind.

Business as usual would be unsatisfactory on a number of counts. A first option of promoting a Multilateral Environmental Agreement on halting and reversing deforestation is discarded as unfeasible at present. A second option of tightening existing policies/instruments is also analysed. The policies examined as part of this second option include improving policy coherence at the EU level, strengthening institutional and governance systems in third countries and promoting effective multilateral responses. This could have a positive effect but will fall well short of the target if not combined with additional measures.

This is why a third option of raising new funds for halting deforestation and forest degradation is examined. This could be done, for example, by

- setting up a new Global Forest Carbon Mechanism (Option 3a) generating a financial stream through auctioning revenues from emissions trading, e.g. the EU's Emission Trading Scheme, or
- through revenues coming directly from the carbon market (Option 3b).

A number of technical parameters related to coverage, criteria, monitoring and payment mechanisms of such an option are also examined.

The preferred option until 2020 is a combination of strengthening existing policies/instruments (Option 2) and creating the Global Forest Carbon Mechanism raising new funds through auctioning revenues (Option 3a). A direct link to the carbon market via forest emission reduction credits (Option 3b) could be further tested. These options should become elements of the global climate change agreement in Copenhagen in 2009 to which the EU would contribute its fair share.

This Impact Assessment is, though, only one step in a longer process. The preferred option needs further details and elaboration, particularly in relation to the designing of the Global Forest Carbon Mechanism. This will be done in a timely manner to inform the final UNFCCC negotiations in December 2009.

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1. PROCEDURAL ISSUES AND CONSULTATION OF INTERESTED PARTIES

1.1. Reference to Agenda Planning and Work Programme

The Communication is planned under action 254.11-E2 of DG Environment Work Programme 2008 and Agenda Planning 2008 N. 20.

1.2. Chronology and ISG Experience

The impact assessment was drafted during July 2008 by the Commission services. No external expertise was employed since extensive information is available on deforestation and its root causes in the policy domain. Inter-service meetings on the Communication and its policy proposals were held with all the interested parties¹ in December 2007, and in February and June 2008. Written comments were received and were taken into account in drafting the impact assessment and the policy proposals themselves.

Policy context

In January 2007, the Commission adopted a Communication² “Limiting Global Climate Change to 2 degrees Celsius - The way ahead for 2020 and beyond”. The objectives set out in that document will not be reached without reducing greenhouse gas emissions from deforestation and forest degradation, in addition to the other measures put forward. EU Environment Ministers adopted Conclusions on the Communication in February 2007, emphasising that a global and comprehensive post-2012 climate change agreement needs to halt and reverse emissions from deforestation in developing countries within the next two to three decades.

In September 2007, the Commission adopted a Communication³ on Building a Global Climate Change Alliance (GCCA) with Developing Countries. The Communication identified the reduction of deforestation as one of five key areas for action. The recent Commission paper introducing the Implementation Framework of the Global Climate Change Alliance⁴ identified the key priorities for each region as discussed between developing countries and the Commission, and described the modalities of implementation of the GCCA, like the EU contribution for 2008-2010, the GCCA support facility and the criteria to be used for selecting countries for the 2008 pilot phase of the scheme.

In December 2007, the UN Framework Convention on Climate Change (UNFCCC) launched a process known as the Bali Action Plan to work towards the adoption of a decision in 2009 on a future climate change regime. Among the topics to be taken up in this process are “*policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation (REDD) in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries*”.

¹ RELEX, DEV, AGRI, ENTR, TREN, AIDCO, TRADE, JRC

² COM(2007) 2

³ COM(2007) 540

⁴ SEC(2008)

To streamline international commitments for biodiversity conservation at EU level, the Commission adopted in May 2006 a Communication on Biodiversity and its Action Plan⁵, which sets out an ambitious policy approach to halting the loss of biodiversity by 2010. The EU has also renewed its commitment to reverse the loss of biodiversity in the revised Strategy for Sustainable Development and in the recent UN Convention on Biological Diversity (UNCBD) Conference of the Parties in Bonn (COP 9), in May 2008. In October 2010 the Convention on Biological Diversity will review progress towards its target of significantly reducing biodiversity loss by 2010, and deforestation is likely to feature prominently in these discussions.

The increasing global acknowledgement of the need to tackle climate change, including emissions from deforestation and forest degradation in developing countries, means that the time is right for policy proposals through which the European Union can contribute to efforts to reduce such emissions. In doing so, the EU will also contribute to other global policy goals, in particular poverty alleviation and biodiversity conservation.

The *timing* for putting forward new policy proposals is crucial as negotiations within the UNFCCC Bali Road Map are gaining momentum and a new agreement is expected by the end of 2009 in Copenhagen. Technical discussions on the scope and working mechanisms for a REDD scheme to support developing countries (i.e. non Annex I countries) will intensify on the way towards the Copenhagen conference and the European Commission can play a pivotal role in coordinating Member States' actions and pooling resources at European level.

The policy proposal put forward by the Commission addresses deforestation and forest degradation in developing countries, as agreed in the Bali Action Plan. This means that mainly tropical and subtropical forested ecosystems are targeted by this proposal.

1.3. Stakeholder consultation

A public Internet consultation was launched on 25 June 2008 and closed on 22 August 2008. Summary results are described in chapter 1.4. In addition to this, Green Week 2008 dedicated an entire session (5 June 2008) to tropical deforestation, its drivers and possible policy responses, and broad and active public participation was recorded.

An expert meeting was convened on 6 June 2008 to discuss specific technical and financial issues linked to the avoided deforestation debate. The Communication has also taken into account submissions made by countries in the context of the UNFCCC reporting as well as ongoing consultations on forest policy in the context of Forest Law Enforcement Governance and Trade (FLEGT) VPA processes.

EC and EU Member State contributions for the UNFCCC negotiations in Accra, during August 2008, are reflected in this document. Information was collected during a workshop organised by the French Presidency in Montpellier, on 7-8 July 2008. To a large extent, the workshop built upon the proceedings of the UNFCCC workshop in Tokyo, in June 2008, where around 180 participants from 70 countries, international organisations and NGOs met to debate methodological issues relating to reduction of emissions from deforestation and forest degradation in developing countries. These meetings are the most recent ones organised within the UNFCCC but consultation and working groups meet frequently in preparation for

⁵ COM(2006) 216

the forthcoming COP 15 in Copenhagen at the end of 2009. International consultations on the Bali Action Plan, including REDD discussions, between the EU, MS and all parties signatory to the Convention take place on a regular basis and they are likely to intensify further in the run-up to the end of 2009.

The Commission's minimum standards for public consultation have been met.

1.4. Summary of consultation

A total of 366 respondents participated in the online public consultation, 85% from EU Member States, 10% from developing countries and the rest from other OECD countries. About a third of the respondents answered on behalf of organisations and two thirds as individuals. Nearly all respondents consider that combating tropical deforestation is an international environmental priority. Most are in favour of multilateral or EU-level efforts rather than initiatives on the part of individual Member States. The UNFCCC and CBD processes are considered relevant to this issue and the need to reward carbon emission reduction by halting deforestation and forest degradation is acknowledged.

Suitable measures to fight tropical deforestation are identified at the consumer level (purchasing legally and sustainably produced wood products; reducing waste and recycling). The main perceived deforestation drivers are land conversion for agricultural purposes, mining and quarrying, unclear land-use policies and tenure rights (ineffective governance in general) and little consultation of civil society and the private sector.

90% of the respondents indicated that the EU should pursue the objective of halving deforestation by 2020 and stopping it by 2030 but 40% also considered that this target was not ambitious enough. The contribution of internal and external EU policies to halt deforestation is considered highly relevant. A significant level of funding from 2013 to 2020 for the fight against deforestation is expected from the EU (both EC and MS). Public funds, as well as market mechanisms such as carbon markets, are seen as primary sources of funding to combat deforestation. Most respondents consider it essential to put in place an effective monitoring system at international level, as well as developing and improving national forest inventories. Third party monitoring is supported by 60% of the respondents.

The messages from the Green Week deforestation session in June 2008 confirmed what is indicated above; in particular they indicate the need to/for:

- support developing countries in improving governance,
- incentive schemes to avoid deforestation and to sequester carbon but also for biodiversity and ecosystem services,
- define baselines to quantify deforestation in time and space,
- a change in consumption patterns to avoid exporting products in demand leading to deforestation.

1.5. Impact Assessment Board opinion

In drafting this final report, the recommendations contained in the opinion of the Impact Assessment Board (IAB) were taken into account. In particular, the IAB asked for more information on current initiatives to prevent deforestation, on the amount of funding that

would be necessary to induce those concerned to refrain from deforestation, as well as more discussion on non-financial incentives and on issues requiring further analysis. More precisely, it sought clarification as follows:

- Explain what lessons have been learnt from ongoing actions on deforestation (by assessing critical success factors for funding and lessons learnt).
- Discuss the issue of the uptake of the planned financial incentives.
- Develop alternative options (within option 2, while explaining why CDM cannot be harnessed).
- Indicate which issues should be subject to more detailed analysis in the future.

The present revised version of the Impact Assessment Report takes fully into account the recommendations of the IAB. Section 2.4.1 (bilateral initiatives on forest conservation) contains an extended analysis of alternatives as well as the lessons learned. Section 5.2.2 contains a more in-depth analysis of the expected uptake and in particular provides detail on the trade-offs with alternative land uses in the major countries and the amount of funding needed. Section 4.4.3 (Item 4 Permanence) includes re-verification and liability to ensure that funding is performance-based. Section 2.4.1 (United Nations Framework Convention on Climate change) and section 5.2.3 explain more clearly why CDM could not be harnessed to raise funds for deforestation. Finally, section 5.2.2 explains that a more detailed and in-depth analysis of marginal costs of deforestation and the use of any ETS revenues at Community level will be part of future work.

2. PROBLEM DEFINITION

The problem is the ongoing loss of tropical forests, particularly in some developing countries, due to deforestation, as well as the loss of environmental goods and services due to forest degradation.

Definitions of deforestation and degradation

The term *deforestation* is used quite variably, so it is important to clarify its definition. Here we consider the FAO definition of forest which is determined "both by the presence of trees and the absence of other predominant land uses" within a "land spanning more than 0.5 hectares with trees higher than 5 metres and a canopy cover of more than 10%".

Deforestation is then defined as the conversion of forest land to another land use (or reduction under 10% crown cover without change in land use). This type of definition is also used in the context of the Kyoto Protocol⁶ with some flexibility in the selection of the minimum forest area (between 0.05 and 1 hectares) and crown cover threshold (between 10 and 30 percent).

A distinction is also made between *gross deforestation* - the total forested area lost - and *net deforestation* – gross deforestation minus areas under reforestation and afforestation⁷. In terms of environmental services, it is better to avoid deforestation than to deforest and reforest subsequently: deforestation leads to some irreversible effects in terms of biodiversity loss and

⁶ UNFCCC (2001): COP-7: The Marrakech accords. (Bonn, Germany: UNFCCC Secretariat)

⁷ Cf FAO, 2005

soil degradation for instance. Old-growth natural forests act as large long-term carbon sinks, accumulating carbon in soils and woody biomass, and preventing its release. By contrast, young forests frequently produce far more CO₂ than their regrowth will absorb, and even mature plantations are almost always net emitters of carbon. Furthermore, the disturbance to soil and the previous vegetation caused by commercial logging and replanting causes woody debris, litter and soil organic matter to decompose and release carbon (Luysaert et al., 2008).

The term *degradation* is defined by the IPCC as “a direct human-induced loss of forest values (particularly carbon), likely to be characterised by a reduction of tree cover. Routine management from which crown cover will recover within the normal cycle of forest management operations is not included”. This concept is more subjective and therefore more difficult to quantify. According to recent studies (Putz et al., 2008), the potential for emission reductions through improved forest management is at least 10% of that obtainable by curbing tropical deforestation.

2.1. Current forest coverage and loss

Consistency over time and countries is an issue when working on forest change data. This is mainly due to the fact that deforestation occurs mostly in developing countries, with sometimes limited capacity to undertake frequent and reliable forest inventories. However, all the information contained in this section comes mainly from the FAO, the source with the most consistent reporting available.

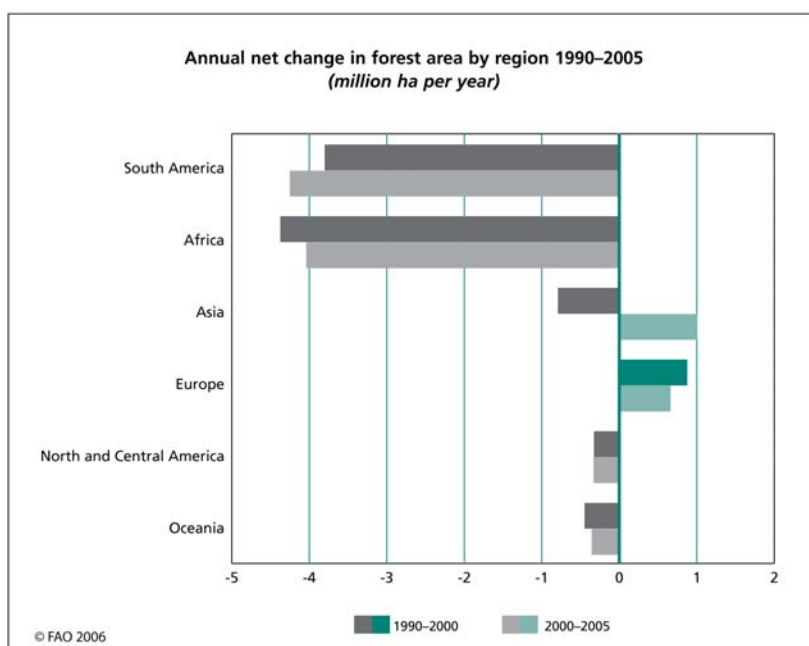
The world forest area is about 4 billion hectares, or 30.3 % of the total land area. More than half of the global coverage is found in the Russian Federation, Brazil, Canada, USA and China, combined. Tropical forests are mainly restricted to the land area between the latitudes 22.5° North and 22.5° South of the Equator, or in other words between the Tropic of Capricorn and the Tropic of Cancer (fig. 1, **Annex 1**). Tropical forests account for some 1.7 billion ha, i.e. 44% of the total global forested area (FAO, 2005). The countries with the largest tropical forest resources are Brazil, D.R. Congo and Indonesia, accounting for 40% of the total tropical forest cover. Above-ground biomass in tropical rain forests has a particularly high carbon stock, holding on average 50 % more carbon per hectare than forests in temperate and boreal areas⁸.

The annual gross deforestation rate in tropical regions is estimated between 11.8 million ha and 13 million ha per year, for the period 2000-2005⁹, with a net global rate of deforestation at 7.3 million ha per year (and a net rate of deforestation in tropical regions at 11.3 million ha per year). In the past 20 years, no significant decrease of deforestation rate has been recorded (fig. 2, **Annex 1**).

The figure below shows the annual net change in forest area by region and provides clear evidence of the reduction in forest cover in South America and Africa.

⁸ Houghton, 2005

⁹ JRC estimate based on FAO data (FAO, 2006)



The ten countries with the largest net forest loss per year between 2000 and 2005 (Brazil, Indonesia, Sudan, Myanmar, Zambia, United Republic of Tanzania, Nigeria, Democratic Republic of the Congo, Zimbabwe, Venezuela) had a combined net forest loss of 8.2 million hectares per year¹⁰.

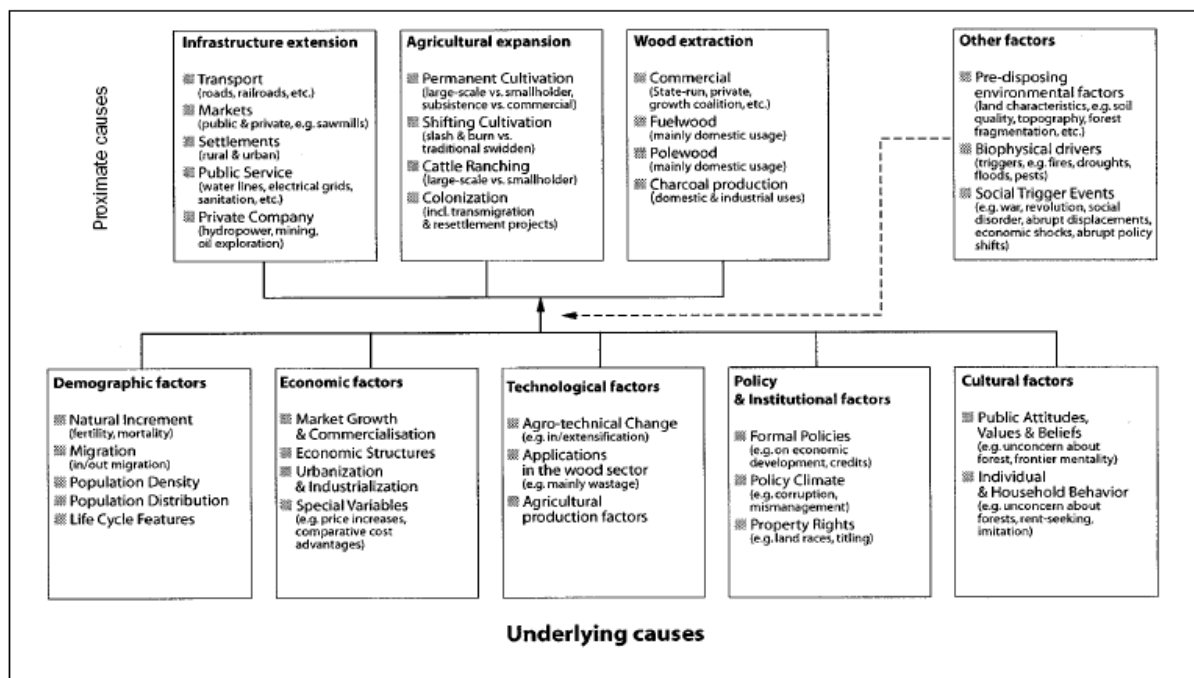
2.2. Causes of the deforestation

In most cases, drivers of deforestation are a combination of direct and indirect economic, institutional, political, natural or social factors. The figure below provides an example of the main drivers of deforestation and forest degradation¹¹.

The reasons for continued conversion of tropical forest land are interrelated; their importance can vary among countries and regions or within countries and can change over time. Some of the main causes are described below.

¹⁰ FAO, 2007

¹¹ Geist and Lambin, 2002



2.2.1. Direct causes: Land-use changes

The diverse drivers of deforestation, many of which originate outside of the forestry sector, make it challenging to find a global solution.

Agricultural expansion

Agricultural expansion is a leading cause worldwide¹² due, inter alia, to population pressure and increase in GDP, with more land being needed to grow food and non-food crops and to expand pasture for livestock production. A substantial and increasing share of deforested land is also converted to expanding intensive, large-scale production of soybeans and other feed crops. This is driven mainly by the sharp increase in demand for livestock products especially in Asia, where land scarcity has led producers to rely increasingly on imported feed. The emerging market for agri-fuels could also exert further pressure on forest resources.

Some general trends can be identified at continent level: in Africa, the main drivers of forest clearing are small-scale subsistence farming and demand for firewood. In South America, agricultural expansion is directed towards beef and soya production for export. In South-East Asia, oil palm, coffee and timber are the main commodities leading to forest land conversion.

Mining

Mining for the extraction of natural resources is frequently a destructive activity that damages forest ecosystems, causing problems for people living near to and downstream of mining operations. Large-scale mining operations, especially those using open-pit mining techniques, can result in significant deforestation through forest clearing and road construction which open remote forest areas and provide access for settlers and small-scale, sometimes illegal, miners. Mining as a significant driver of deforestation has been reported in Africa (Congo-gold mining and Ghana), in Central America (Guatemala, Nicaragua), in South America (Peru, Ecuador-Intag), and also in Asia (Bangladesh-Phlbari coal mine, and Burma).

¹² Geist & Lambin, 2002

Infrastructure development

Development of new, or expansion of existing, infrastructures such as roads, urban and industrial settlement, energy plants and lines contribute to the deforestation process. New forest roads can also provide farmers with easier access to previously inaccessible land, thus extending the agricultural frontier.

Unsustainable and illegal logging

Wood demand can be satisfied through utilisation of natural and semi-natural forests by either selective logging or clear cutting, or through forest plantations. Unsustainable and illegal logging, mainly targeting high commercial value trees, can contribute to deforestation and forest degradation. Degraded forests are more likely to become deforested land as access due to logging makes things easier for farmers.

It is on these direct drivers that European actors may have the biggest influence, mainly through demand for agricultural, forestry and mining products. However, EU policies and instruments impacting on tropical forests are not always fully consistent with the Union's environmental goals and further action may be needed in this direction.

2.2.2. Indirect causes: Institutional issues

Governance issues and market failures

Protecting tropical forests is difficult for several institutional and governance reasons:

- Land tenure and property rights are often unclearly defined;
- Corruption frequently undermines effective law enforcement and policy implementation;
- Law enforcement capacity is generally weak and does not effectively address illegal logging;
- Limited presence of state authorities in weak and sparsely populated forest areas.

The relevance of these factors varies from country to country. A general underlying cause of governance failure, though, is the fact that the major benefits associated with forest conservation and sustainable forest management are non-marketed externalities, accruing to society on a local and/or global scale.

Perverse incentives

In some countries, governments have put in place policies which indirectly encourage deforestation through agriculture incentives, transportation and infrastructure development, urban expansion, and timber subsidies.

A number of studies have recognised that policies outside the forest sector, such as land planning, infrastructure development, mining/quarrying, agriculture, land tenure, etc. can have a large impact on deforestation, often much more substantial than forest policies per se.

2.3. The impacts of deforestation and forest degradation

High rates of tropical deforestation contribute to severe climate-change, as well as causing loss of biodiversity, flooding, siltation and soil degradation. In addition, deforestation and degradation pose threats to the livelihoods and cultural integrity of forest-dependent people and the supply of timber and non-timber forest products for future generations. It can,

however, also lead to increased economic revenues arising from alternative land uses, in certain cases accruing benefits to a limited number of people. These economic and social outcomes affect different populations across the world in different ways.

2.3.1. *Global climate impacts*

Forests play a vital role in the global carbon cycle, storing roughly half of the world's terrestrial carbon¹³. When forests grow, they withdraw carbon dioxide from the atmosphere and sequester it in trees and soil. When they are destroyed or degraded, much of this carbon is released, either immediately if the trees are burned or more slowly if the organic matter decays naturally. A very small fraction is stored for a longer period in houses or other long-lasting wooden structures. Overall, above-ground biomass typically holds 20 to 50 times more carbon per unit area than the ecosystems that replace them¹⁴. Above-ground biomass in tropical forests typically stores 50 % more carbon per unit area than in non-tropical forests. The average biomass of tropical forests is estimated at 129 t C/ha while average biomass of non tropical forests is estimated at 45 t C/ha¹⁵.

Deforestation of tropical forest therefore leads to large-scale emissions of CO₂. But uncertainty remains about the exact quantification of annual greenhouse gas emissions from deforestation.

FAO estimates put total net deforestation in the period 2000–2005 at 7.3 million hectares per year. The FAO estimated a net decrease in forest biomass in the period 2000 to 2005 of 1.2 Gt of carbon annually for the world or 1.6 Gt of carbon annually for the tropics. This value for the tropics is equivalent to an annual decrease of 5.8 Gt CO₂, slightly higher than the annual decrease for the period 1990 to 2000 which was estimated at 5.2 Gt CO₂. A similar result for the 2000 to 2005 period can be found in a study by IIASA¹⁶.

Over this period from 2000 to 2005, the estimated net loss in carbon stock from living biomass was, according to the FAO, particularly high in South and Southeast Asia (13.6 Gt CO₂¹⁷), Central and South America (10.6 Gt CO₂) and Africa (5.1 Gt CO₂). In all other regions carbon stocks increased.

The IPCC estimated that in 2004 the forestry sector accounted for 17.4 % of global annual greenhouse gas emissions or an amount of emission equivalent to 8.5 Gt CO₂. This includes emissions from deforestation, decay, peat soils and other sources, having higher estimates for emissions than those stemming from land-use change that take only living biomass into account.

Estimates by the IPCC as regards net emissions from land-use change give a broad range of estimates for average annual emissions in the 1990s, ranging from 2 Gt CO₂ at the low end to 10 Gt CO₂ at the high end, with an average of 6 Gt CO₂¹⁸.

¹³ Millennium Ecosystem Assessment, 2005

¹⁴ Exact emissions are difficult to measure and depend on the rates of deforestation and/or degradation, the carbon storage capacity of the forest in question, and the resulting land use, among other factors.

¹⁵ Houghton, 2005.

¹⁶ Kindermann et al., 2006

¹⁷ FAO FRA 2005 report

¹⁸ The IPCC report also discusses the issue of the Residual land sink (WGI, chapter 7). Even though land use change leads to net emissions, there is still an observed net uptake of CO₂ by the total land

Much uncertainty remains on how to measure gross and net deforestation and the resulting emissions of deforestation and forest degradation. This uncertainty is caused by, for instance, the difficulty of measuring degradation itself, the difficulty of capturing in the estimates all potential sources and sinks (only above ground or including the soil, only living biomass or also decay and peat) and understanding and modelling the correct processes associated with these different sources and sinks.

Nevertheless, it is clear that emissions from deforestation and forest degradation are of great magnitude. As such, reducing them is a mitigation option offering significant and immediate carbon emission impact in the short term, because large amounts of carbon (about 350-900 tCO₂/ha) would not be released into the atmosphere. Reducing these emissions will need to be part of the action on mitigation to ensure that low emission stabilisation scenarios can be reached, as confirmed in several studies¹⁹.

2.3.2. Biodiversity implications and the loss of ecosystem services

About fifty per cent of World's plant and animal species are found in tropical forests; many of these are threatened with extinction²⁰. Forest hotspots in Brazil, Colombia and Indonesia are home to the greatest plant biodiversity in the world.

The study on the "*Cost Of Policy Inaction (COPI): the case of not meeting the 2010 biodiversity target*"²¹ assesses how much biodiversity will be lost if no preventive action is taken. This assessment is done both in quantitative terms (using the mean species abundance indicator²²) and in monetary terms, using valuation studies for biodiversity and ecosystem services. Overall, it is estimated that **tropical forests and tropical woodland will together lose some 13% of their original biodiversity by 2050** if no preventive action is taken. Details are provided in **Annex 2**.

Loss of forests translates into biodiversity loss which in turn translates into the loss of ecosystem services. Forests provide important ecological functions and goods and services such as soil protection and reduction of landslides and erosion, water supply, local climate regulation and protection from the risk of natural disasters. Besides a climate mitigation role, avoided deforestation is also an important climate adaptation measure.

One example of loss of potential revenues is given by bio-prospecting: 40-50% of pharmaceutical drugs in the market have an origin in natural products, with 42% of the sales of the 25 top-selling drugs worldwide either constituting biological, natural products, or derived from natural products, some of which are found in tropical forests.

biosphere, implying that there must be an uptake by terrestrial ecosystems elsewhere, called the 'residual land sink' (formerly the 'missing sink'). Recent findings suggest that 15 per cent of the global forest area sequester about 1.3 G t of carbon per year (Luyssaert et al., 2008)

¹⁹ Forthcoming IIASA and MNP study and Staff working document accompanying the Communication "Limiting Global Climate Change to 2 degrees Celsius - The way ahead for 2020 and beyond" (SEC (2007) 7)

²⁰ See in particular the Economics of Ecosystems and Biodiversity. TEEB. Interim report for analysis of biodiversity and ecosystem service impacts.

²¹ Cf http://ec.europa.eu/environment/nature/biodiversity/economics/index_en.htm - The COPI study is a meta-analysis based on the whole literature on biodiversity valuation studies. Therefore, its results give a representation of the whole knowledge currently available on the topic.

²² If the value of the Mean Species Abundance index is 100%, the average abundance of (a selection of) the original species of the system investigated is similar to the natural (or only slightly affected) state. If the indicator value approaches 0%, the natural system has been converted or degraded almost completely.

A general literature finding on land-use change is that it is often not socially optimal because law and policy does not adequately take forests' values into account. This can be seen in the work of Balmford et al.²³ to quantify the net marginal benefits of different human uses of tropical forest areas. In Malaysia (Selangor) unsustainable logging was associated with greater private benefits through timber harvesting but reduced social and global benefits. The total economic value (TEV) of forests was some 14% greater when placed under sustainable forest management. In Mount Cameroon (Cameroon), a comparison between low-impact logging and land-use change found that private benefits favour conversion to small-scale agriculture. Social benefits from non-timber-forest products as well as global benefits from carbon sequestration were highest under sustainable forest management. Overall, the TEV of sustainable forestry was 18% greater than small-scale farming, whereas oil palm and rubber plantations had a negative TEV.

2.3.3. *Impact on local communities*

The loss of ecosystem services has an impact on local communities and forest-dependent people in developing countries, but the net impact is likely to be mixed. Timber harvesting associated with deforestation can create employment, as can the alternative land uses which follow from forest conversion. On the other hand, communities which have traditionally used a wide range of forest products for their livelihoods can be adversely affected. Hence, poverty and the loss of ecosystems and biodiversity are intertwined.

Forest degradation can be a source of intense conflicts between rural populations, governments, commercial interests and, increasingly, sections of the public at large. FAO has estimated that forests are home to 300 million people around the World, and another 350 million people who live within or adjacent to dense forests depend on them for subsistence and income. About 60 million indigenous people are almost wholly dependent on forests for their livelihoods.

Broadly speaking, policies intended to preserve forests and prevent deforestation are likely to be advantageous to local communities, if they are well designed and implemented.

2.4. **The baseline**

This section draws a distinction between the baseline policies currently in place and having an impact on deforestation and the baseline scenarios of the models used for analytical purposes, which do not take into account all the existing policies, as models are necessarily a simplification of the reality.

As explained in previous sections, the Communication put forward by the Commission focuses on deforestation and forest degradation in developing countries, as agreed in the UNFCCC Bali Action Plan. This means that mainly tropical and subtropical forested ecosystems are targeted.

Understanding the baseline predictions for rates of deforestation is crucial to understanding the amount of effort needed to stop deforestation. The baseline scenario, while it is a simplification of reality, attempts to reflect the extent and complexity of the deforestation process and the range of relevant policies at Community and international level. A brief

²³ Balmford et al., 2002. Economic reasons for conserving wild nature. *Science*, Vol. 297, 950-953

overview of bilateral and multinational initiatives is provided below, with a more comprehensive review in **Annex 3**.

2.4.1. *Baseline policies*

This section presents a brief overview of bilateral and multinational initiatives and policies having an impact on deforestation. However, it has to be emphasised that forestry-relevant policies are not restricted to the forest sector. Other sectors - such as *production and consumption patterns, trade, energy, agriculture, food security and development cooperation* - play a major role in contributing to the conservation and sustainable management of world forest resources. A more comprehensive review of the relevant EC policies is provided in **Annex 3**, together with the positions of major developing countries on how to tackle deforestation and forest degradation, as expressed in the UNFCCC negotiations.

International Forest policy

Forest conservation has been a priority on the international political agenda for the past two decades. Several processes and organisations are currently geared to promoting sustainable forest management and reducing deforestation: United Nations Forum on Forests (UNFF), International Tropical Timber Organisation (ITTO), FAO, UN Convention on Biological Diversity (CBD), Forest Law Enforcement and Governance process (FLEG) and the EU Forest Law Enforcement, Governance and Trade Action Plan (EU FLEGT).

In 1992, with the UN Conference on Environment and Development (UNCED) seeing the opening for signature of the UN Convention on Biological Diversity and the UN Framework Convention on Climate Change, it did not prove possible to agree a legally binding framework for forests. Instead, the Conference adopted the non-legally binding Forest Principles²⁴ and Agenda 21 – a comprehensive programme for global action on sustainable development – which included a chapter on combating deforestation.

During the 1990s the international community continued to develop global policies on forests under the auspices of the UN Commission on Sustainable Development, through the Intergovernmental Panel on Forests (IPF) from 1995 to 1997 and the Intergovernmental Forum on Forests (IFF) from 1997 to 2000. In 2000 the EU and others argued for a multilateral convention on forests to be negotiated, but it was not possible to achieve consensus on this proposal. A new international arrangement on forests was agreed, with the establishment of the UN Forum on Forests (UNFF) and a five-year mandate. The issue of a forest convention came up again in 2005 and, once more, it did not prove possible to achieve consensus.

In 2006 the International Tropical Timber Agreement was agreed (ITTA 2006). This Agreement superseded the ITTA 1994. The overall objectives of the Agreement are to promote the expansion and diversification of international trade in tropical timber from sustainably managed and legally harvested forests and to promote the sustainable management of tropical timber-producing forests. The Agreement does not include specific provisions on deforestation or quantitative targets.

At its sixth meeting in February 2006, the United Nations Forum on Forests (UNFF) agreed on a "non-legally binding instrument on all types of forests" containing four global objectives

²⁴ Non-legally binding authoritative statement of principles for a global consensus on the management, conservation and sustainable development of all types of forests

of which objective 1, aiming to *"reverse the loss of forest cover worldwide through sustainable forest management, including protection, restoration, afforestation and reforestation, and increase efforts to prevent forest degradation"*, is of particular relevance for the climate change process as well as for the international efforts to slow and halt the loss of biodiversity. The objectives are non-binding for the individual country, agreeing to work globally and nationally to make progress towards their achievement by 2015. By that time a review of the instrument will take place and the possibility of a legally binding instrument will once more be put on the table. It should be considered, however, that many governments, including some key forest-rich countries like Brazil, continue to oppose the idea of a binding multilateral agreement on forests. They in particular insist that legislation and law enforcement are issues of national sovereignty.

United Nations Framework Convention on Climate Change

Existing commitments under the UNFCCC²⁵ are relevant to deforestation. Article 4, in particular, provides that all Parties

- (a) taking into account their common but differentiated responsibilities and their specific national and regional development priorities, objectives and circumstances, shall: [...]
- (b) Formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, and measures to facilitate adequate adaptation to climate change;
- (c) Promote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or prevent anthropogenic emissions of greenhouse gases not controlled by the Montreal Protocol in all relevant sectors, including the energy, transport, industry, agriculture, forestry and waste management sectors;
- (d) Promote sustainable management, and promote and cooperate in the conservation and enhancement, as appropriate, of sinks and reservoirs of all greenhouse gases not controlled by the Montreal Protocol, including biomass, forests and oceans as well as other terrestrial, coastal and marine ecosystems; [...]"

The Kyoto Protocol establishes incentives for the conservation and enhancement of sinks in developed and developing countries. For developing countries, the clean development mechanism (CDM) established the framework for financing projects to reduce emissions or enhance removals. However, among the potential activities related to land use, only afforestation and reforestation are eligible under the CDM. In addition, for the first commitment period a cap of 1% (of base year emissions times 5) for the use of land-use, land-use change and forestry (LULUCF) projects applies. So far, the use of CDM afforestation and reforestation credits has been limited. 32 LULUCF-related methodologies for CDM projects have been proposed. 11 large-scale and 3 small-scale methodologies have been approved. Among the 1157 CDM projects registered by the CDM Executive Board in mid-September

²⁵ Articles 3.3, 4.1b, 4.1c and 4.1d

2008, only one is a LULUCF CDM project, which started in China in 2006. 20 projects are at the validation stage. One of the main problems making it difficult for the CDM to be extended to encompass projects aiming at reducing deforestation and forest degradation or promoting better management of forests is linked to the so-called risk of leakage: as CDM projects are restricted to rather limited geographical areas they do not easily account for in-country leakage, which is very likely to happen in the case of project-based activities to reduce deforestation. This was one of the main reasons why the LULUCF CDM was limited to afforestation and reforestation projects for the first commitment period and, due to the limitations and drawbacks of a project-based approach, the CDM at this stage is not an appropriate means to generate incentives for the protection or better management of existing forests and to address (gross) deforestation.

At the UNFCCC COP 13 in Bali (December 2007), however, policy approaches and positive incentives to reduce emissions from deforestation and forest degradation in developing countries were included in the Bali Action Plan on long-term cooperative action, which launches a comprehensive negotiation process on the post-2012 international climate change agreement to be finalised by December 2009²⁶. A specific decision on reducing emissions from deforestation in developing countries (the so-called REDD decision)²⁷ was also adopted: it launches a methodological programme of work to support the development of policy approaches and positive incentives to reduce emissions from deforestation and forest degradation in developing countries; encourages Parties to the UNFCCC to launch capacity-building, technical assistance and technology transfer in order to support the development of these policy approaches in developing countries; and finally, encourages Parties to the UNFCCC to undertake demonstration activities in the field of reducing emissions from deforestation and forest degradation in order to support the development of the UNFCCC REDD approach. REDD may lead to the development of an international financial mechanism to address deforestation and forest degradation and thereby become a kind of "CDM for deforestation and forest degradation".

Bilateral initiatives on forest conservation and/or halting deforestation

- Initiatives with periodical financial commitments:
 - The Norwegian government has established a special project on climate and forests. In Bali, Norway has committed up to US\$600 million a year in the period from 2008 to 2012 towards efforts to reduce emissions from deforestation and forest degradation in developing countries.
 - At the Convention on Biological Diversity COP 9 in Bonn, in May 2008, Germany pledged €500 million between 2009 and 2012 for protection of forests and ecosystems and an additional €500 million every year thereafter. Funding will be generated from the proceeds of the auctioning of allowances under the Emissions Trading Scheme.
- Initiatives with non-periodical financial commitments:
 - The Brazilian Government launched, in June 2008, a US\$200 million rainforest voluntary fund to protect the Amazon and adopted national targets to curb

²⁶ UNFCCC Decision 1/CP.13

²⁷ UNFCCC Decision 2/CP.13

deforestation. The aim is to prevent deforestation and enable emissions reduction on a larger scale than project-based activities.

- The UK and Norway have launched a US\$200 million Fund for the Congo Basin Forest to monitor forest depletion and promote economically viable alternatives;
- Australia launched, in 2007, a US\$200 million fund (Global Initiative on Forests and Climate) to support forestry in selected developing countries (particularly in South-East Asia and the Pacific). It focuses on reducing deforestation, encouraging reforestation, promoting monitoring and forest assessment technology and methodologies.
- The *World Bank* launched, in June 2008, its US\$300 million Forest Carbon Partnership Facility (FCPF), which will pilot projects using a system of policy approaches and performance-based payments. The facility consists of two components: A US\$100 million Readiness Fund will provide grants to help countries set up systems and processes to monitor and credibly govern their forests. Several countries will also be able to sell emission reductions to a special US\$200 million Carbon Fund supported by donor countries, as well as the private sector and organisations. Nine industrialised countries have already pledged, in December 2007, US\$155 million to kick-start the 10-year initiative. Eighty per cent of these pledges come from EU Member States (Germany US\$59 million, UK US\$30 million, the Netherlands US\$22 million, France US\$7 million, Denmark and Finland US\$5 million each). The remainder comes from Australia and Japan (US\$10 million each), while Switzerland (US\$7 million) and US-based Nature Conservancy also pledged US\$5 million. With 23 countries having already applied to the Readiness Mechanism, the FCPF is now delivering input to feed into the UNFCCC REDD process in terms of methodological needs, strategies and related challenges and problems envisaged by countries.
- The World Bank BioCarbon Fund raised US\$54 million for the period 2004-2007 and a new tranche opened in 2007 with US\$ 38 million. This fund finances projects that sequester or conserve greenhouse gases in forests, agro-ecosystems and other ecosystems. Through its focus on carbon sinks, this Fund finances the generation of credits that comply with CDM or Joint Implementation, giving these countries access to the carbon market. Accordingly, this Fund has focused mainly on afforestation and reforestation projects but also has a window aimed at testing REDD projects.
- The European Commission launched, in 2007, the Global Climate Change Alliance (GCCA) with initial funding of €50 million. Halting deforestation will be one of the five areas of support of the GCCA. The Commission is currently considering a contribution to the WB FCPF in the region of €5 million.

Most of the above initiatives are relatively recent and hence it is too early to draw lessons from them. However, the Commission and EU Member States have been providing development assistance for forests for many years and have gathered valuable experience. Several key general lessons emerge from this area. This includes the need for:

- long-term support, taking account of the absorption capacity of institutions and communities, especially in remote or sparsely populated areas,
- participatory national processes to develop consensus on policy,
- inter-Ministerial and inter-sectoral coordination,
- political leadership to counter vested interests,
- public awareness and use of media,
- high-quality research to identify and quantify the contribution of forests to people's livelihoods as well as to quantify, as far as possible, the value of public goods provided by forests.

UN Convention on International Trade in Endangered Species (CITES)

The EC and Member States actively implement a broad range of biodiversity-related international agreements that aim at protecting certain species, regions or ecosystems. For example, as one of the principal markets for trade in endangered species, the EU has been playing a very active role by strictly regulating trade in species (including several timber species like mahogany, ramin, afronesia) that are most at risk and by putting pressure on and offering incentives to range states to ensure that trade is sustainable. Progress has also been made in creating synergies between the CBD and other biodiversity-related agreements; for example, the 2010 target has been taken up as a central objective of the Convention on International Trade in Endangered Species (CITES).

UN Convention on Biological Diversity (CBD)

The EU ratified the UN Convention on Biological Diversity (CBD) in 1993 and is an active player in international biodiversity governance on the world stage. In 2002, the CBD adopted its strategic plan which included the overall target to significantly reduce the rate of biodiversity loss by 2010²⁸. More recently, the EU played a key role in achieving ambitious decisions at the Ninth Meeting of the Parties (COP9) to the CBD in Bonn, in May 2008. The global principle that the production and use of biofuels should be sustainable in relation to biodiversity was established.

COP9 also set in motion an expert-process for feeding biodiversity considerations into the ongoing international climate negotiations. An Ad Hoc Technical Expert Group (AHTEG) on Biodiversity and Climate Change was created to provide biodiversity-relevant information to the processes under the UNFCCC. It includes representatives of indigenous and local communities and Small Island Developing States (SIDS). Among the tasks of the AHTEG is the identification of:

- opportunities to deliver multiple benefits for carbon sequestration, and biodiversity conservation and sustainable use in a range of ecosystems,
- options to ensure that possible actions for REDD do not run counter to the objectives of the CBD but rather support the conservation and sustainable use of biodiversity;

²⁸ Convention on Biological Diversity Decision VI/26 Annex (Strategic Plan) paragraph 11, see: <http://www.biodiv.org/decisions/default.aspx?m=COP-06&id=7200&lg=0>

- means to incentivise the implementation of adaptation actions that promote the conservation and sustainable use of biodiversity.

The results of the AHTEG will be fed directly into the climate negotiations and also be discussed at the Fourteenth Meeting of the CBD's Subsidiary Body on Scientific, Technological and Technical Advice (SBSTTA) in 2010 as well as at the Tenth Conference of the Parties to the CBD in October 2010 (CBD COP10).

2.4.2. *Description of baseline scenarios*

It is difficult to measure the current extent of deforestation and its progress over time. Instead, we must rely on models to provide estimates of the baseline scenario. While being a simplification of the reality, these baseline scenarios are intended to reflect as fully as possible the extent and complexity of the deforestation process and the range of relevant policies at Community and international level. Baseline scenarios represent the hypothetical situation in which current or already agreed actions would go on but no new initiative would be taken to prevent deforestation. Baseline projections for emissions from deforestation need to be in line with estimates of historic emissions. As such they are also subject to a similar uncertainty in terms of absolute quantification of emissions from deforestation including the type of potential sources and sinks they represent. Understanding the baseline projections for rates of deforestation is crucial to understanding the amount of effort needed to stop deforestation.

Furthermore, baseline projections are driven by other assumptions that can stem from forests but are not directly linked to the types of sources and sinks. These assumptions increase the range of uncertainty. Important assumptions relate to the future governance structure in areas with remaining forests, evolution of infrastructure in these areas and the value of other land uses that can lead to deforestation (mainly agriculture) that are in turn driven by factors such as global and regional changes in population, GDP and energy prices.

Several baseline scenarios exist for deforestation trends and include assumptions on population development, economic growth and land use. The recent IPCC fourth assessment report compares recent integrated assessments of land-use change and forestry carbon emissions with those of the IPCC's Special Report on Emission Scenarios (SRES) in 2000. It concludes that the more recent projections still indicate high global annual net releases of carbon in the near future that will decline over time²⁹. In the time period up to 2030 highly diverse baselines are projected, some increasing and some decreasing already by more than 50% compared to the current level.

²⁹ IPCC, Fourth Assessment Report, WGIII, chapter 3

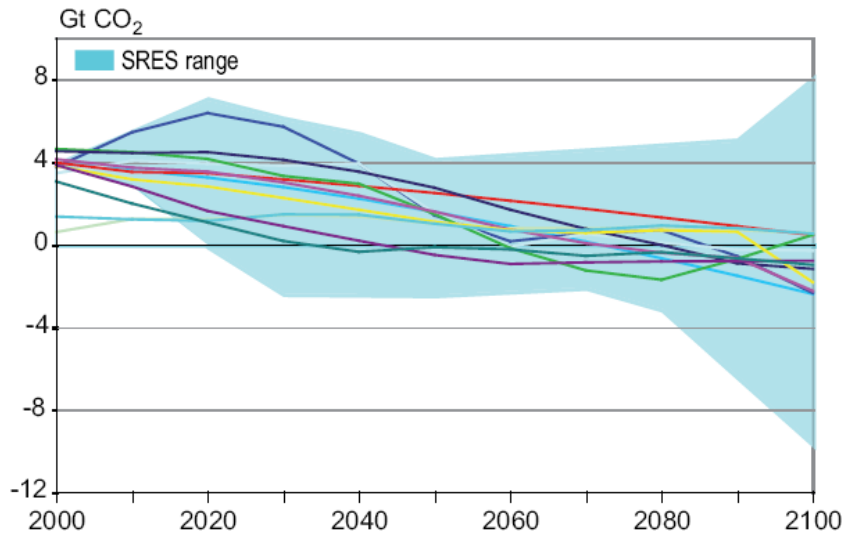


Figure: IPCC, Fourth Assessment report, WG III, Chapter 3, figure 3.10, Baseline land-use change and forestry carbon net emissions. The different lines refer to different technical scenarios.

Analysis³⁰ used for the Stern review to assess the financial incentives needed for avoiding deforestation implicitly assumed continued constant deforestation rates and used the FAO estimates for gross deforestation for the period from 2000 to 2005 at 13 million hectares per year (FAO, 2006).

A study by IIASA³¹ sees deforestation rates decreasing to 8 million hectares by 2025, starting from a similar level in 2005. This reduces emissions from deforestation from 4 Gt CO₂ at present to 3.2 Gt CO₂ in 2025. Halving deforestation by 2020 would thus require protecting around 6.5 (12.5 divided by two) million ha/year compared to today. Stopping deforestation by 2030 would require preventing deforestation of 8 million hectares per year that remains in the baseline in 2025.

A more recent study compares results from three different models and focuses on deforestation in tropical areas with high expected deforestation rates in the baseline, i.e. Central and South America, Africa and Southeast Asia³². Average annual projected gross deforestation in these tropical regions for the period 2005-2030 ranges between 10.6 and 11.7 million hectares, resulting in emission equivalent to a range between 3.2 and 4.7 Gt CO₂. Halving deforestation would require saving each year around 5.5 (5.3 to 5.9) million hectares of forests.

Although using different assumptions, parameters and general set-ups, all models conclude that deforestation will continue in the mid term and at high levels but with a tendency to decrease over time. Note that these models do not take into account current and planned initiatives to combat deforestation as presented in section 5.4.1. The main driver is the increased demand for agricultural land. Moreover, none of the models presented take into account the rising energy and food prices, which increase demand for agricultural land and hence reduced forest area.

³⁰ Grieg-Gran, 2006.

³¹ Kindermann et al., 2006

³² Kindermann et al., 2008

2.5. EU right to act and value added by EU actions

The legal basis for the EU to propose actions to combat climate change and biodiversity loss by halting deforestation/forest degradation is provided by the Treaty Article 174, which states that Community policy on the environment shall contribute to ‘preserving, protecting and improving the quality of the environment’, based *inter alia* on the precautionary principle.

However, the final responsibility for implementation of future policies and internationally supported activities to halt deforestation and forest degradation lies at the level of developing countries.

Given the large scale of the problem and the number of issues at stake in tackling climate change and biodiversity loss by halting deforestation in an effective and coherent way, proactive determination and leadership on the part of the EU are required to undertake a coherent and ambitious set of initiatives. *The magnitude and urgency of the problem calls for a coordinated EU-wide plan, pulling together actions and resources from the Commission budget as well as from Member States to achieve critical mass.* The EU is in the forefront of the global fight against climate change and should also play a leading and driving role in the battle against global deforestation. The EU now has the opportunity to take the lead in the international discussions on a Reduction of Emissions from Deforestation and forests Degradation (REDD) mechanism.

3. OBJECTIVES

3.1. General Policy Objective

The *general policy objective* is to tackle climate change, reaching the global goal of keeping temperature rise below 2°C, and limiting biodiversity loss by halting deforestation and forest degradation in developing countries.

Reaching the 2°C objective is unlikely to be achieved without stopping tropical deforestation. Given the scale of emissions from deforestation, any climate change deal that does not fully integrate forestry will fail to meet the necessary targets. Forestry, in particular reduced deforestation, has the potential to make a substantial and relatively immediate contribution to a low-cost global mitigation portfolio³³.

Besides playing a part in climate mitigation, tropical forests can have an important climate adaptation role as they host more than two-thirds of the world's plant and animal species³⁴. Preserving tropical forests will therefore have significant positive effects on global biodiversity and its related goods and services.

3.2. Specific Policy Objective

The Commission has already addressed, in its Communication on "Limiting Global Climate Change to 2°C – the way ahead for 2020 and beyond", the need for a swift reduction of emissions from deforestation to contribute to achieving its general policy objective of halting

³³ Stern, 2008

³⁴ FAO, *Cattle ranching and deforestation*, Livestock Policy Brief n°3

emissions from net deforestation within two decades³⁵. Similarly, the Environment Council of 20 February 2007 stated in its conclusions that "*concrete policies and actions as part of a global and comprehensive post-2012 agreement are needed to halt these emissions (from deforestation in developing countries) and reverse them in the next two to three decades while ensuring the integrity of the climate regime and maximising co-benefits, in particular with regard to biodiversity protection and sustainable development*".

Based on the above, a more precise target should now be explored, aiming at **halting global forest cover loss by 2030 at the latest and reducing gross tropical deforestation by at least 50% by 2020 compared to the current levels**. This corresponds to the Environment Council objective to halt deforestation in the next two decades (i.e. by 2030) with, in addition, a mid-term target to review the progress made and make the process smoother and more effective, assuming a linear path to the 2030 objective. The deforestation baseline against which the 2020 halving target will be compared corresponds to the period 1990-2005. It should be noted that halting net deforestation would not necessarily mean that no more deforestation would occur, but that any deforestation would be balanced by afforestation and reforestation activities.

Halving gross tropical deforestation by 2020 will deliver the largest share of the environmental benefits. From a climate change perspective, this is needed since tropical forests store much more carbon in trees and soils than new planted forests: emission reductions delivered by an hectare of tropical forest saved is quantitatively and timely more beneficial to the atmosphere than removals building up over time in new planted forests. And from a biodiversity perspective, tropical forests host about fifty percent of the World's plant and animal species, many of which are at risk of extinction.

This is a measurable objective as recognised in the UNFCCC negotiations and technical discussions. Forest monitoring will, however, need to improve in quality and coverage if it is to be used to assess performance in reducing deforestation at a country level. The Communication recognises the need to scale up capacities in developing countries in this area; technology advances are making such monitoring easier. Given that a limited number of countries contain most of the world's tropical forest area it will be possible to develop tailor-made policies for specific country circumstances. When this approach is combined with significant financial resources the target is considered achievable.

3.3. Operational objectives

In order to encourage forest conservation and sustainable forest management in developing countries, the EU will work towards two operational objectives:

- Firstly, to render existing EC policies and instruments more compatible with tropical forests conservation and sustainable forest management in developing countries;
- Secondly, to develop effective ways to financially reward actions to reduce deforestation and forest degradation (REDD) in developing countries, and to provide the necessary support to develop institutional and technical capacity to implement the necessary actions.

³⁵ (p.12, COM (2007) 2).

3.4. Consistency with other EU policies

The conservation and sustainable use of forests is essential to mitigate climate change, help stop biodiversity loss, alleviate poverty in developing countries and to achieve other benefits.

The proposals contained in the Communication are in line with relevant EC policies, as described in Annex 3. They also contribute to developing the concept of Policy Coherence for Development (PCD), maximising synergies between policies and having a beneficial impact on developing countries. The aim of this proposal is also in line with the Sustainable Development strategy agreed by the European Council in June 2006, via its focus on the protection of natural resources, and with the European Consensus on Development (also referred to as Development Policy Statement or DPS³⁶), which commits the EU to providing more and better aid.

3.5. Criteria to assess whether the objectives are reached

Three sets of criteria will be used to compare how the different options are able to reach the objectives:

- the effectiveness of the measures proposed; in other words, the extent to which different options reduce deforestation and forest degradation;
- the efficiency of the different options; the more efficient the option the lower the cost of achieving a given outcome;
- the distributional and poverty implications.

The *effectiveness* of the different options depends on the following main factors:

1. **Additionality:** The options satisfy the additionality criterion if they create reductions in deforestation that are additional to any reduction that would occur in the absence of implementation of the option.
2. **Leakage prevention:** The options satisfy this criterion if they ensure that avoided deforestation in one area does not lead to accelerated deforestation in another area.
3. **Permanence/Liability:** The options satisfy this criterion if they ensure that avoided deforestation due to the implementation of the option is permanent and guarantees as much as possible that deforestation / forest degradation does not occur at a later time.
4. **Verifiability:** The options satisfy this criterion if they ensure that avoided deforestation is easily and accurately verifiable.

The *efficiency* of the different options depends on the following main factors:

1. **Start-up costs,** such as installation of monitoring equipment and associated training, collection of information to establish a baseline, institutional capacity-building, enforcement and other preparedness measures.
2. **Running costs,** including administrative and transaction costs.
3. **Efficiency over time:** it is likely that any option's efficiency will improve over time, resulting from learning-by-doing.

The *distributional and poverty implications* of the different options:

Options can also help with poverty reduction in the countries concerned. More precisely, the implications of an option in terms of the following factors would have to be considered

³⁶ Adopted by the Council, the European Parliament and the Commission on 22 November 2005.

although, in practice, this will be largely determined by the design and implementation of policies in those developing countries:

1. Distribution of the risks and benefits of implementing the options among and within countries.
2. Distribution of the risks and benefits of implementing the options over time.
3. Effects of implementation of the options on local and indigenous communities.

4. POLICY OPTIONS

4.1. Baseline option: business as usual

Under this option, no additional policies and financial resources are put in place and, in the absence of financial incentives and non-financial measures to reduce deforestation and forest degradation, it is reasonable to expect steady or increased deforestation rates in the short/medium term. This will happen in response to the profitability of converting forest land into agricultural land for the production of food and energy commodities, as well as exploiting forests for timber production. Continuing world population growth (from around 6 billion now to 8-10 billion by 2050) and growing per capita consumption (a two to four-fold increase by 2050) will increase the demand for commodities in the coming decades. A recent study³⁷ (see text below) concludes that at baseline an additional 500 million hectares of forest will be lost in 100 years.

While this option does not entail any additional costs, tropical regions are expected to lose out in terms of public economic benefits, such as provisioning and regulating services provided by forest ecosystems, including carbon storage.

4.2. Option 1: Promote a Multilateral Environmental Agreement (MEA) on Forests

As described in chapter 2.5.1, despite a number of attempts it has not proven possible to achieve international consensus on a legally binding multilateral framework for forests over the past two decades. This can be attributed partly to the fact that, as forests occupy large areas of land, many states are unwilling to be constrained in the use of such land through an international instrument.

Due to the past history and to the ongoing controversy over the promotion of a specific legally binding MEA on forests, this option is discarded and not analysed further in this policy proposal. Nevertheless, the Commission will continue to provide the necessary input to the existing international fora on forests, such as ITTO and UNFF, and will give further consideration to the post-2015 multilateral negotiations for the follow-up to the current international arrangement on forests.

4.3. Option 2: Tighten existing policies/instruments

The rationale for this option is that Community internal and external policies can have an impact on deforestation in third countries. Therefore, an improved and more coherent approach to tackling deforestation, which ensures synergy between actions for international governance (through multilateral fora such as *UNFCCC*, *CBD*, *CITES*), and relevant policies such as *energy*, *agriculture* and *forestry*, *trade* (including bilateral agreements), *production*

³⁷ Kindermann et al. 2006

and *consumption* as well as *economic and development cooperation* could potentially reduce the rates of deforestation and forest degradation.

This policy option pursues three tiers of policy interventions targeted at improving/re-orienting relevant policies, without introducing new financial measures.

1st tier: Improving policy coherence at EU level in all areas likely to have an impact on tropical deforestation

According to recent estimates³⁸ the EU is home to 7.7 % of the global population and is also responsible for 16 % of the global ecological footprint³⁹. The EC can target a reduction in the EU's overall impact on tropical forest resources through:

- Assessing and quantifying the impact of EC policies on tropical deforestation through *ex post periodical reviews* of existing legislation and policies;
- Ex ante impact assessment of new policy proposals in sensitive areas such as agriculture, trade, energy, public procurement, development cooperation;
- Continuing to support efforts to improve forest governance, such as through the implementation of the *FLEGT action plan*, including finalisation of bilateral VPAs and implementation of the new Regulation on additional options to combat illegal logging⁴⁰;
- Prioritising funding under the *ENRTP instrument* for projects targeting REDD-related topics (i.e. capacity-building, pilot activities at national level);
- Supporting the shift towards *second-generation biofuels* and other renewable energy sources which are considered as having a limited impact on third countries' forest and other environmental resources. With regard to energy uses of biomass, such as the use of woodchips for electricity generation, the Commission proposes to develop a specific sustainability scheme;
- Linked to the above, developing and implementing information campaigns targeting EU consumers to raise awareness and *encourage sustainable consumption practices*;
- Consulting Member States with the aim of developing common *procurement criteria* for each of the sectors that utilise wood as a base material. With respect to wood and wood products, the recent Communication adopted by the Commission (cf. Annex 3) identifies four priority sectors, in which wood is (one of) the basic material(s): construction, energy, paper and printing services, and furniture. Preliminary Green Public Procurement criteria for these wood-related priority sectors have been developed and are available online (http://ec.europa.eu/environment/gpp/toolkit_en.htm);
- Investigating options of providing trade concessions for legal and sustainable wood and wood products in the context of development of the next regulation on the General System of Preferences for the period 2012-2015. In addition, the possibility of providing preferential tariffs for legal and sustainable timber can be investigated in the context of current negotiations for Regional Free Trade and Association Agreements;

³⁸ “Europe 2007 – Gross Domestic Product and Ecological Footprint”, available at: http://assets.panda.org/downloads/europe_2007_gdp_and_ef.pdf.

³⁹ Estimate based on the production capacity of the EU's biologically productive area and the area needed to supply its current consumption. For details of the methodology see www.footprintnetwork.org

⁴⁰ Due for adoption in September 2008

- Strengthening *agricultural research* and related dissemination of improved knowledge and *technology transfer* to increase agricultural productivity in Europe and in developing countries in a sustainable manner.

2nd tier: Prioritise strengthening of institutional and governance systems in third countries

- The Commission could consider as a priority, within its development cooperation programmes and in line with the Paris declaration on aid effectiveness⁴¹, increased support to developing countries for improving their internal *institutional and governance systems* through bilateral or regional processes/initiatives.
- Beyond the current FLEGT scheme the EU will continue and strengthen its engagement with countries such as China, Japan and Russia through participation in regional Forest Law Enforcement and Governance (FLEG) initiatives in response to G8 statements and through bilateral dialogues.
- Changes in timber market requirements, requiring adaptation and improvement of national capacity to respect the new standards, are also expected as a response to the recent amendments in the relevant US legislation (the "Lacey Act's Wildlife provisions"⁴²), introducing a national ban on import of trees, timber and wood products in violation of foreign law.

3rd tier: Promote effective multilateral responses

- The EU will aim at promoting further action to ensure *effective multilateral responses*, limiting overlaps and ensuring maximum efficiency. A coordinated approach between the EU and Member States is needed to pull together resources and ensure complementarity of actions at the global level. Reversing emissions from deforestation will require a heightened EU profile in international forest-related processes and a considerably greater effort to combat deforestation through development cooperation instruments.
- Accordingly, the EC will ensure that the UNCBD AHTEG (cf. chapter 2.4.1) makes an important contribution to discussions on deforestation. It will nominate experts to participate in this group, submit information for discussion prior to the AHTEG meetings and work to ensure that the recommendations in its report are reflected in the substantive EU positions defended in the climate negotiations.
- The Commission will also explore ways to develop synergies with the recent UN REDD Collaborative Programme⁴³, involving FAO, UNDP and UNEP. The objectives are to assist forested developing countries and to facilitate international cooperation in identifying various methodologies, risk management formulae and payment structures in support of the UNFCCC process.

⁴¹ <http://www.oecd.org/dataoecd/11/41/34428351.pdf>

⁴² <http://www.illegal-logging.info/uploads/Guzman0608.pdf>

⁴³ http://unfccc.int/files/methods_and_science/lulucf/application/pdf/080627_fao01_japan.pdf

4.4. Option 3: Raise new funds (via the carbon market) for halting deforestation and forest degradation

The analysis of baseline policies showed that the amount of EU ODA fell in 2007 for the first time since 2000. Recent data from the OECD (2005) on the total ODA/OA commitments to forestry by OECD countries and multilateral agencies indicate an annual average commitment to forestry of US\$564 million between 1996 and 2004.

Hence, additional funding will be required if a substantial reduction in deforestation is to be achieved. Funds could be raised domestically or through donor countries, they could be drawn from public financing or be linked to a market mechanism. Existing international incentive channels, including bilateral and multilateral ODA and specific funds, such as the GEF, can be used to fund baskets of national measures aimed at addressing local and regional drivers of deforestation (such as subsistence farming, firewood collection, non-enforcement of property rights), as opposed to the global drivers such as agricultural or timber exports. Option 3 looks at three crucial elements to be considered when increasing the funding for avoiding deforestation.

1. Firstly, to assess the potential impact of increasing financial flows on the rate of deforestation and emissions.
2. Secondly, to assess what types of policy instruments in the area of deforestation are necessary to distribute these financial flows.
3. Finally, to assess from which sources these additional financial flows could realistically come. More specifically, the carbon market is widely seen as a potential source for such funding for avoided deforestation. In this context, two principal options will be further examined, i.e. (i) the use of auctioning revenues and (ii) the creation and recognition in the carbon market of emission reduction credits from reduced deforestation and forest degradation. These two main options are described in more detail below.

4.4.1. Sub-Option 3a: Use auction revenue to establish a Global Forest Carbon Mechanism

At present, the allowances in the EU emission trading system (EU ETS) are largely allocated for free. Under the EU climate change and energy package, the Commission proposes to make auctioning as of 2013 the general principle of allocation in the EU ETS. This could potentially raise substantial revenues.

Revenue from auctioning of carbon allowances could provide a source of funding for a Global Forest Carbon Mechanism set up to reduce deforestation. Member States can start to auction part of the allowances for the period 2008-2012. Germany has earmarked some of the revenue from auctioning to reduce emissions from deforestation. Beyond 2012, use of an unquantified part of the auctioning proceeds for tackling forest degradation is proposed under the climate change and energy package.

Of course, in order for this to be effective other developed countries would have to provide their fair share of finance to such a Global Forest Carbon Mechanism. Interestingly, similar provisions for the investment of auctioning revenues into avoided deforestation are also being

discussed in the legislative proposals for a US cap and trade system put forward earlier this year in the US Senate.

This option would not result in emission credits from avoided deforestation being recognised for compliance in the EU ETS. It does, however, ensure that substantial and predictable revenues would be generated.

The Global Forest Carbon Mechanism, in principle, would pay for the carbon saved on the basis of the foregone rents from not cutting the forest. Funding should be efficiently allocated through a competitive public purchase programme, e.g. by auctioning the allocation of funds.

Such a new Global Mechanism would have to be coordinated with other international public and private initiatives in the same area in order to avoid duplication.

This option is very similar to a proposal by *Brazil* that envisages the support of *voluntary national action on deforestation* through a new funding mechanism financed by developed countries without creation and recognition in the carbon market of emission reduction credits.

4.4.2. *Sub-Option 3b: Raise new funds by creating and recognising in the carbon market emission reduction credits from reduced deforestation and forest degradation*

Another option would be to create some type of forest emission reduction credit for action that reduces deforestation or forest degradation. Afforestation and reforestation projects are already covered under the CDM during the Kyoto Protocol's first commitment period from 2008 until 2012, and it is assumed that this will continue after 2012. Only the ceiling for these project types will have to be revisited and to be determined for the next commitment period. The functioning of a potential new system for credits from reduced deforestation and forest degradation (REDD) should build on the lessons learnt from the Clean Development Mechanism and Joint Implementation, and also take account of the ongoing discussions as regards possible future sectoral crediting mechanisms. This forest emission reduction credit could then be recognised in the global carbon market and used for compliance by

- governments of countries that have binding targets under a post-2012 climate change agreement and/or
- companies in trading systems such as the EU ETS.

Recognising credits for reduced deforestation for compliance purposes would give them a commercial value in the global carbon market.

This option is very similar to a proposal by the *Rainforest Coalition* (cf. **Annex 3** for details) providing for a crediting mechanism if countries could decrease their deforestation rate below an *ex ante determined baseline*. The credits generated from this voluntary action to reduce deforestation below the baseline would be recognised in the global carbon market and could be used for compliance by developed countries.

4.4.3. *Design parameters for options 3a and 3b*

Whichever of the options 3a and 3b is finally chosen, a number of practical design questions will need to be addressed. The broad options and issues for these design parameters are set out below.

1/ Geographical coverage and carbon leakage

More than half of the global land-use carbon emissions occur in only eight countries⁴⁴. Most of the world's tropical forests with net high deforestation rates are concentrated in a relatively small number of countries. Thus, it makes sense to focus efforts on these countries. However, identification of target countries would need to cover both countries with high forest cover and those with high rates of deforestation – while there is some overlap, these are not always the same. Such a list of countries would include, for instance, Brazil, Democratic Republic of Congo, Indonesia, Malaysia, Myanmar, Nigeria, Papua New Guinea, Sudan, Tanzania and Zambia.

However, such a focused approach may lead to a situation where many countries will not be covered by the scheme for halting deforestation or forest degradation, hence increasing the risk of leakage. Leakage occurs when the activity causing deforestation in one project area is shifted to a different location outside the boundaries of the project area. International leakage can also occur between countries in different parts of the world, when the policy changes in one country lead to a change in the supply-and-demand equilibrium for tradable goods like cash crops, biofuels and timber, causing market actors to shift production from one country to another (market leakage). Indeed, if avoided deforestation programmes are too closely focused on a set of selected countries, then timber supply may decrease, prices will rise and this situation will be partially rebalanced by increased supply (and increased deforestation) in non-participating countries. However, it has to be noted that this possible international leakage is very unlikely to happen between tropical and non-tropical countries. Indeed, timber and agricultural goods produced in tropical and non-tropical countries are very different and can be considered as substitutes only on a very limited scale.

A related issue concerns countries with quite large forested areas that have already successfully protected their forests from deforestation activities. If the funding mechanism is too closely focused on countries with high deforestation rates, these countries might lack an appropriate incentive to maintain low deforestation rates and may succumb to deforestation pressures that leak from countries with new policies in place. A solution would be to assist these countries in preserving their forests.

Therefore, it seems that no country should be a priori excluded from the scheme, although some kind of prioritisation and a differentiated set of financial incentives may be envisaged.

2/ Does the scheme apply different features to different countries?

Developing countries are at very different stages of development and thus face different responsibilities and have vastly differing capabilities, and therefore might need different approaches to tackle deforestation. Almost all developing countries face the problems of poverty and environmental degradation. However, measures and incentives which can prove appropriate for the least developed countries such as Liberia, Sierra Leone and Solomon Islands might not be suitable for emerging economies such as China, India and Brazil. From the latter, it would be reasonable to expect higher mobilisation of domestic resources, in human and financial terms, and an ambitious level of nationally appropriate mitigation action. For many countries in the other category, due account will need to be taken of absorption capacity constraints (e.g. owing to lack of qualified staff) and of the need to ensure that actions to combat deforestation are consistent with development priorities.

⁴⁴ Stern review (2007), page 245.

Estimation of the financial value per ha of forest would need to take into account a number of factors such as the cost of monitoring and protecting the forest as well as the income foregone by not converting a forest to an alternative form of land use. Revenues based on the latter would help generate financial resources for the economic development of the countries concerned, including for measures to respond to climate change, which would otherwise be based in part on the income or export revenue from alternative land uses.

In this context it is worth noting that one important part of the Bali Roadmap negotiations is the development of a mechanism to reward reduced emissions from deforestation and forest degradation. In the coming months, UNFCCC negotiators will have to decide on a variety of REDD design options with implications for the climate regime post-2012 and on the overall governance structure that will need to be put in place. Independently of the outcome of the negotiation process, a key to the success of any mechanism that will be put in place is the commitment on the part of countries subscribing to the scheme to develop and implement appropriate national mitigation strategies, including avoiding deforestation and forest degradation.

An ongoing study contract financed by the Commission⁴⁵ developed country profiles for 12 selected developing countries, with information on forests, deforestation, drivers of deforestation and forest policies. For the selected countries, two to three quantitative scenarios for the evolution of emissions from deforestation by 2030 are identified as well as some key design options for a future funding mechanism.

The interim results suggest that there should be differentiation between three main groups of countries:

- Group 1 countries (with high forest areas and low deforestation rate): e.g. Democratic Republic of Congo
- Group 2 (high deforestation rate): e.g. Brazil, Indonesia, Cameroon, Colombia, Zambia, Tanzania, Papua New Guinea, Mexico, Ghana
- Group 3 countries (increasing forest areas): e.g. India, China

Criteria for determining the deforestation baseline, the accountable emission reductions as well as the pros and cons of each method, are currently being elaborated. Besides funding for carbon sequestration and permanence in countries with a high deforestation rate, the possibility of supporting forest conservation activities in countries with a low deforestation rate is being explored (i.e. a PES - payment for ecosystem service - type fund, which could be a special window under the proposed Global Forest Carbon Mechanism). For countries with currently increasing forest area, and past gross deforestation, a sectoral crediting approach, with a mechanism separate from REDD, will be further explored. The final results of this study will be available by the end of 2008.

3/ Country level versus project-based incentives

In order to implement the idea of providing financial incentives for developing countries to maintain their tropical forests, a number of critical organisational issues will have to be

⁴⁵ SCOPE OF AN INTERNATIONAL SCHEME TO REDUCE EMISSIONS FROM DEFORESTATION (ENV.C.5/FRA/2006/0071), Ecofys Consortium

resolved, the main one being that for the financial incentive to be ultimately effective, it will have to reach the decision-maker responsible for land use, be it a forest owner, a farmer or a local community. In the long run, the financial incentive will also have to cover the costs of monitoring, reporting and verification as well as law enforcement.

Financial incentives need to be based on programmes that target, and are adjusted to, diverse and often small-scale local and regional deforestation and forest degradation contexts. Such incentives need to address and reach those people that cause forest cover changes because of subsistence needs such as food, energy or living space. Decentralised and small-scale redistributive financial mechanisms that work on a national and sub-national scale, and are supported through international funds, pose a number of challenges. However, there are quite a few positive indications from different parts of the world that solutions are available to address small-scale diversity and needs, such as through micro-finance and payments for ecosystem services of forests (Maynard and Paquin 2004, Pagiola et al. 2005).

Nationwide implementation involving the entire forestry sector allocates ultimate liability to governments and implies strong national forestry monitoring and national management of forests. It gives countries flexibility to decide how to manage their forest resources, and how to devolve responsibility and liability, and it is the only way to account for in-country leakage. However, such a scheme needs to find cost-efficient ways to limit bureaucratic procedures to the necessary minimum while at the same time exerting sufficient external control on specific projects and all actors in the forest sector; individual land owners and local communities need to receive sufficient benefits from a nationwide sectoral scheme to change their current practices. All in all, national implementation requires strong governance capabilities by central governments, while, in some cases, it is exactly the lack of such a strong central governing authority that has allowed continued high rates of deforestation. Sub-national (regional) implementation can also be envisaged, especially in large countries with regional disparities.

Project-based implementation would essentially be an extension of the existing CDM. Funding would go to project managers which could be individual forest owners or local communities. This scheme would initially be easier to implement, would accommodate different regional and local circumstances, and would take advantage of within-country heterogeneity in the capacity to implement projects for reducing deforestation and forest degradation. However, projects are limited in scale and carry significant transaction costs, and thus might not be the most cost-efficient way to reduce emissions from deforestation. As they are restricted to rather limited geographical areas, they do not easily account for in-country leakage, for which countrywide monitoring, reporting and verification as well as national forest policy and legislation will have to be established in any case. Projects will have to guarantee the existence of an entity that would accept long-term liability if non-permanence of the emission reduction credit were to become an issue or alternative institutional arrangements would have to be established (e.g. full buyer liability, insurance, superfunds, discounting, temporary crediting).

Approaches **combining** elements of national and project-based systems can be contemplated. Pilot projects could facilitate learning and capacity-building and build momentum among local stakeholders, country agents and investors. However, the CDM experience has shown the limitations of a project-based mechanism as regards forestry. Therefore, a country-based approach should be preferred. In any case, the decision on whether to pursue national or sub-national sectoral or project-based implementing measures will significantly affect other

elements of any incentive mechanism, such as the design of emission baselines, protection against leakage, and ensuring permanence.

Neither of the two approaches, however, can deal satisfactorily with international leakage, which could occur across borders and is highly likely with respect to land use that is linked to globalised markets like timber, cash crops and biofuels. For this, an approach aiming at global coverage of tropical forests, including forest areas showing negligible signs of deforestation and forest degradation, would have to be developed.

4/ Permanence

The CDM experience is relevant on this issue: CDM credits generated by forestry projects are temporary and issued ex post once the emission reduction has been monitored, reported and certified. Projects and emission reductions are re-verified every five years, at which time additional credits may be generated. Eventually, the temporary forest credit will have to be replaced with a permanent emission credit. The same approach may be envisaged for financial incentives to reduce emissions from deforestation, be it project-based or national-based.

In addition, in a UNFCCC Annex I country context, liability as regards possible reversals of the sequestration achieved by the national forest is ensured through the continuous accounting over time of the removals and emissions occurring in this national forest. Such a solution can also be extended to the context of reducing emissions from deforestation and forest degradation in developing countries.

5/ Maximising co-benefits: biological diversity, watershed protection, poverty eradication, etc.

Apart from carbon benefits, in many situations other environmental co-benefits like preservation of biological diversity, watershed protection, reduced risk of erosion, and/or social benefits like poverty reduction will together often have a much greater value than the carbon value alone⁴⁶. However, as these are public goods their benefits are usually not reflected in market values. Whatever incentive system is being created for carbon, it should try to take these co-benefits into account and maximise them where possible. This could be done by assessing these co-benefits and directing incentives coming from the Global Forest Carbon Mechanism or via forestry emission reduction credits towards actions which generate the highest co-benefits. Forestry emission reduction credits could, for instance, be labelled in accordance with such benefits ('gold standard').

6/ Timing and Frequency of payments

Another organisational issue concerns the timing and frequency of payments. This is very much related to the conditionality criterion for receiving funding, while the timing is also related to monitoring issues. Timing of payments is also crucial, as is shown by the experience with all CDM projects. Funding for capacity-building and for up-front investment is usually required before the first revenue from carbon credits is generated. Instalments are paid when progress of the project is established and verified (certified) on the ground. Another solution is to make payments at the end of the project, after verification, and allow only for assistance in the beginning. But this last option needs further clarification as to the issues of project life and the questions related to permanence and liability. In general,

⁴⁶ Sukhdev. 2008. The Economics of Ecosystems and Biodiversity. An interim report. Brussels

financial markets have found effective and practical solutions for most of these cash-flow-related problems.

7/ Governance structure, especially monitoring systems

Good governance requires transparent accountability including monitoring systems that verify emissions reductions, changes in land cover and the effectiveness of the new financial mechanism, as well as compliance and enforcement mechanisms. Within the context of the ongoing UNFCCC negotiations, no common position has been registered so far on these issues.

As with the existing CDM and the Kyoto Protocol, some elements of the overall governance structure (e.g. CDM Executive Board, Compliance Committee) could exist at international level and some at national level but the extent of their mandates, the financial coverage, management and adaptation to national circumstances would have to be defined. There is a general and wide international consensus on the *need to start capacity-building programmes* at national level to establish deforestation and forest degradation baselines, national registries, research, technical and legal support, and to prepare for the deployment of appropriate technologies.

Globally there is a *lack of consistent data on forest change*. This is mainly due to the lack of national capacities in most developing countries. Where inventories are undertaken they are infrequent and inconsistent, both within and between countries. Some information regarding forest related emissions may be contained in the National Communication submitted to the UNFCCC. In general, global forest cover knowledge is currently weak and there is a need to establish standard and globally agreed definitions and methods for collecting baseline information⁴⁷. Estimates of deforestation rates vary depending on the definition and methods used. Methods range from visual photo interpretation to sophisticated digital analysis, and from wall-to-wall mapping to hot-spot analysis and statistical sampling.

During the UNFCCC SBSTA 28 meeting in June 2008 in Bonn, the most critical methodological issues for estimating and monitoring changes in forest cover and associated carbon stocks - and greenhouse gas emissions - were debated. The *role of national monitoring systems* in facilitating results-based, demonstrable, transparent and verifiable estimates and the need for robust, consistent methodologies including forest inventories, ground-based, and remote-sensing approaches, were emphasised.

A recent UNFCCC technical workshop in Tokyo showed that methodologies and technology to collect deforestation data exist but there is a need to make use of existing knowledge to initiate *forest carbon inventories* in non Annex I countries. In fact, only a few of these countries have established permanent forest monitoring - or have institutions in place which produce consistent and comprehensive data on forest area and land-use change on a regular basis. In certain cases, methods used for the elaboration of national forest inventory have changed over time, hampering the comparison of data provided for different points in time and making it difficult to derive consistent time series of data. Without consistent and regular data on forest area, no accurate estimates on trends of deforestation can be produced.

⁴⁷ "Do trees grow on money"? The implications of deforestation research for policies to promote REDD/by Markku Kanninen, Daniel Murdiyarto, Frances Seymour, Arild Angelsen, Sven Wunder, Laura German. Bogor, Indonesia: Center for International Forestry Research (CIFOR), 2007 CIFOR report, 2007

Whatever option is chosen, it will be essential to develop national strategies to build forest policies and legislation, monitoring, reporting and verification capacity, targeting in the short term forest-rich countries and countries where significant deforestation processes are ongoing. On the financial side, it will be important to ensure that resources are available up-front to cover independent verification and monitoring costs. This could be easily provided for under option 3a), the Global Forest Carbon Mechanism, but would not be possible under option 3b) unless it were to be complemented with a separate funding facility. **Annex 4** provides some indicative estimates of monitoring costs in a sample of relevant countries.

According to the Stern report (Grieg-Gran, 2006), the annual administration costs associated with a payment scheme for reducing emissions from deforestation of 6.2 million hectares might range from US\$25 million to US\$93 million in the first year. But the area to be monitored would each year increase with an equal amount. By year 10, annual administration costs would range from US\$250 million to just under US\$1 billion. These costs could be reduced over time by setting up national plans, building up capacity and learning-by-doing.

5. ANALYSIS OF IMPACTS

5.1. Analysis of option 2

Option 2 consists essentially of an incremental building up of existing policies - increasing efforts across the board of existing policies and making sure they are better integrated, and are adjusted according to experience. This makes sense – the different elements should all contribute towards meeting the objectives - but whilst they will contribute towards meeting the target, they will be grossly insufficient.

Particular attention will be paid to building capacity at national level and preparing the ground for the implementation of all necessary actions to tackle deforestation and forest degradation. The Commission considers *strengthening governance* to be a prerequisite for forest sustainability and a necessary condition for sustainable trade. Moreover, improving governance should not be restricted to forestry but adopted in a wide-ranging approach, i.e. addressing reforms of judicial systems, improving transparency and fighting corruption in public administration, promoting and enforcing better regulation and land tenure reforms, and improving land planning processes.

In conclusion, **option 2 is considered necessary - but not sufficient - to reach the target of halting deforestation and forest degradation globally. This option is, though, complementary to option 3, which can only be efficiently implemented in conjunction with option 2.** Given the incremental nature of option 2, the following analysis concentrates on option 3.

5.2. Analysis of option 3

5.2.1. *Global and regional potential and marginal costs of reducing carbon emissions from forests*

The IPCC's fourth assessment report concluded that forest-related mitigation activities can considerably reduce emissions from sources and increase CO₂ removals by sinks at low cost, and can be designed to create synergies with adaptation, conservation of biological diversity and sustainable development. The IPCC assessed how sinks could be enhanced in the forest sector through afforestation, reforestation, reducing deforestation and degradation, and

concluded that 65% of the total potential is located in the tropics and about 50% of the total could be achieved by reducing emissions from deforestation there⁴⁸.

The fourth assessment report estimates that the capacity to reduce emissions from the forest sector globally could be between 2.7 and 13.8 GtCO₂-eq/yr in 2030, in regional bottom-up studies and global top-down studies, respectively, at carbon prices less than or equal to 100 US\$/tCO₂, as such reversing the net emissions from deforestation into a net sink. Regional bottom-up predictions give a reduction estimate for the whole forest sector that is only 22% of the value given by global top-down studies. The reason for this, according to the IPCC, is that regional studies tend to use more detailed data, consider a wider range of mitigation options, and thus may more accurately reflect regional circumstances and constraints than top-down global models⁴⁹. This highlights the fact that in order to realise the mitigation potential, the policy instruments and financial mechanisms in the field will need to cater for regional specificities.

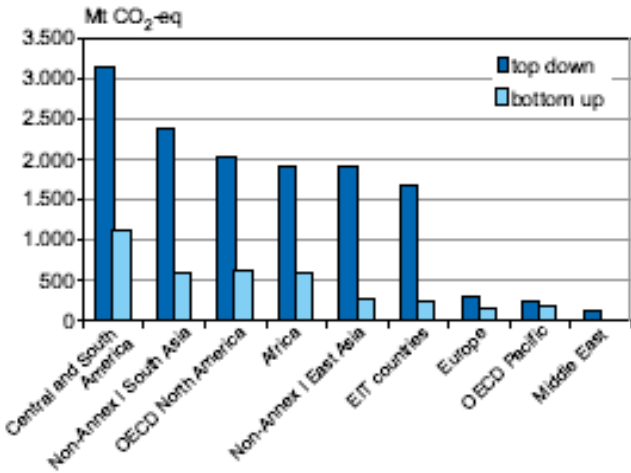


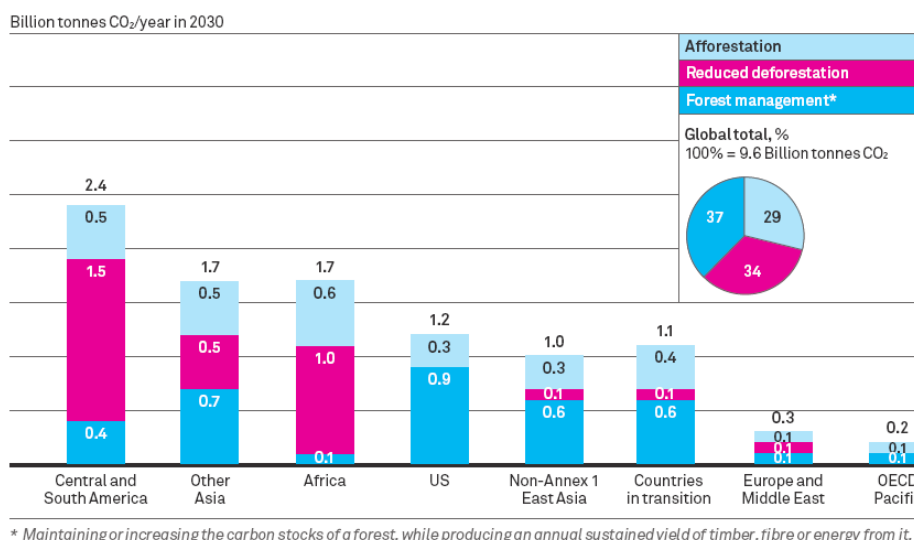
Figure: IPCC, Fourth Assessment Report: Comparison of outcomes of economic mitigation potential at <100 US\$/tCO₂-eq in 2030 in the forestry sector, as based on top-down global models versus the regional modelling results

A regional breakdown of the IPCC 4th Assessment Report results⁵⁰ is shown below.

⁴⁸ IPCC, Fourth Assessment Report, Technical Summary, WG III, pg. 69
⁴⁹ IPCC, Fourth Assessment Report, Technical Summary, WG III, pg. 69
⁵⁰ Nabuurs et al. 2007. Chapter 9: Forestry. IPCC, AR4.

Some estimates put forestry mitigation potential as high as 10 billion tonnes CO₂ by 2030. Forestry mitigation potential with costs up to \$50/tonne CO₂

Source: Results of three global forest sector modelling studies as reported in Nabuurs et al. (2007)



The IPCC information therefore demonstrates that halting deforestation in tropical countries would have dramatic positive effects on CO₂ global emissions (of around 3 Gt CO₂ per year).

5.2.2. Option 3a: Use auction revenue to establish a Global Forest Carbon Mechanism

The principal question, of course, is how much funding would be required for a Global Forest Carbon Mechanism to effectively reduce deforestation. As mentioned before, the Global Mechanism would in principle pay forest owners or forest users for the foregone rents. A review of the literature is presented below, followed by a comparison of the estimated amounts needed for other expenses.

Literature review

An assessment for the Stern Report⁵¹ estimates the costs for eliminating deforestation in Brazil, Indonesia, Papua New Guinea, Cameroon, Congo, Ghana, Bolivia, and Malaysia which would account for a 46% reduction of global deforestation and 70% of land-use emissions of carbon. The method for estimating the costs is to pay the foregone rent through one-off payments to land owners for 30 years if they do not cut their forests. The funding necessary to do so is estimated to be between US\$3 billion and US\$11 billion (€2.4 billion to €8.8 billion)⁵² on an annual basis with an average of US\$6.5 billion⁵³ (some €5.2 billion), not taking into account costs for administrating and monitoring the scheme. The variance is due to taking into account the value of the timber (is it burned or sold) and the value of the crop that replaces the forest. The table illustrates the costs of the land values used for the medium scenario and shows the competition with the various types of land use in each of the eight countries. The last row shows the annual costs per country for a reduction of global deforestation by 46%.

Costs of foregone land use (US\$2005/hectare)(medium scenario of one-off timber harvesting)

US\$/hectare	Cameroon	DRC	Ghana	Bolivia	Brazil	PNG	Indonesia	Malaysia
Annual food crops	774	774						

⁵¹ Grieg-Gran, 2006.

⁵² An average exchange rate for 2005 of \$1.25 per € is used consistently in this document.

⁵³ US\$ at 2005 price levels

short fallow								
Annual food crops long fallow	346	346						
Cocoa without marketed fruit	1365	1365						
Cocoa with marketed fruit	740	740						
Oil palm	1180	1180				1515- 2705	1515- 2705	2330- 2705
Rubber	1180	1180					1071	1071
Small scale maize and cassava			1052					
Beef cattle				390	2- 626			
Dairy					154			
Soybeans				2135	2135			
Tree plantations					2614			
Manioc/rice/perennials					2- 239			
Smallholder subsistence crops						1737		
Rice fallow							26	26
Cassava monoculture							18	1053
Total costs (mln \$/year)	191	276	121	247	1678	281	2059	183

Source: Grieg-Gran (2006)⁵⁴

The report assumes that no leakage at all would take place and that the system would be fully additional in reducing global deforestation. An estimate for the monitoring and administration of the scheme is put at around US\$25 million to US\$93 million (2005 prices) for each area protected each year.

A study by IIASA (Kindermann et al. 2006)⁵⁵ looks at the emissions from gross deforestation and analyses what the cost would be to bring the emissions down by 50% compared to baseline over the period. The projected baseline figure shows emissions from deforestation declining from 4 Gt CO₂ at present to 3.2 Gt CO₂ in 2025. The study compares the net present value from forest or other uses of land and it assesses two potential policy instruments to decrease the amount of deforestation. One instrument is to pay to land owners *the foregone rent for 5 years* whereby the value is determined by the carbon stock of the land. Forestry can earn income from carbon sequestration and harvestable wood sales accounting for discount rates and planting costs. The net present value of agriculture depends on population density, agricultural suitability and risk-adjusted discount rates. These two values are compared against each other and deforestation is subsequently predicted to occur when the agricultural value exceeds the forest value by a certain margin (for details on forestry models see Annex 6). These models have limitations in that they lack representation of transaction costs and are hampered by other institutional barriers. In addition, they do not yet reflect the impact of recent oil price increases and changes in subsidies for biofuels.

⁵⁴ Grieg-Gran, M. (2006) The Costs of avoiding deforestation, report prepared for the Stern Review of the economics of climate change. IIED, London.

⁵⁵ Kindermann et al., 2006

The IIASA (Kindermann et al. 2006) study finds that the amount of rent is US\$1.6 per ton of CO₂ stock on forest land to be preserved for five years. However, total costs will greatly depend on the assumed amount of leakage:

- If no leakage occurs, it can be assumed that only forest area targeted for conversion ("frontier forests") is to be included in the scheme; it is estimated that a global target of reducing deforestation by half could be reached with a minimum payment of US\$4.1 billion (price level 2000) (around €3.6 billion in 2005 prices⁵⁶) in 2025.
- Assuming that there will be leakage on a regional scale, payments over a larger area will increase to US\$34 billion (some €30 billion in 2005 prices) per year.
- Leakage on a global scale, translating into the need to compensate for the continued conservation of all standing carbon stocks globally, would cost in the order of US\$200 billion to US\$250 billion per year (which is equivalent to more than twice the current annual ODA flows).

A more recent study, comparing results from three different models and focusing on gross deforestation in tropical areas⁵⁷, estimates the funds necessary to halve deforestation over the period from 2005 to 2030 compared to baseline, through a policy instrument that pays forest owners for the *foregone rent* for the period 2005-2030. Achieving a 50% decrease in deforestation would require a rent of between US\$10 and US\$21 per ton of avoided CO₂ emissions. Given differences in the models as regards assumed carbon intensities, with a carbon price of US\$10 per ton of CO₂, a rent per hectare of US\$85 to US\$250 can be assumed. This translates into annual payments of between US\$17 billion and US\$28 billion in 2000 prices (or around €15 billion to €25 billion in 2005 prices) over the period from 2005 to 2030. The study does not quantify additional costs arising from monitoring and leakage that could also increase costs. The study also demonstrates that complete reversal of emissions from deforestation is possible around 2030 at carbon prices below US\$100 per ton CO₂. Extrapolating the results of these models suggests that in that case annual costs might be roughly a factor of two to three higher. Halving global forest loss around 2020 is expected to reduce emissions by 1.5 to 2.7 GtCO₂ per year. Stopping deforestation reduces these emissions by around 3 to 5 GtCO₂ per year.

⁵⁶ The GDP deflator has been used to convert 2000 in 2005 prices.

⁵⁷ Kindermann et al., 2008

The results of these models are summarised in the table below:

Study	Deforestation reduction (%)	Annual cost in billion US\$	Additional costs (monitoring and administration) in billion US\$/year
Stern	46	3-11 (no leakage) Average: 6.5	0.25 -1
IIASA	50	No leakage: 4.1 Regional leakage: 34 Global leakage: 200-250	
Kindermann	50	17-28	

In conclusion, in order to reduce deforestation by 50% by 2020 the estimates indicate that an amount of between US\$3 billion and US\$250 billion would be needed, depending largely on how leakage is taken into account. In the medium range allowing for limited regional leakage, a realistic estimate would be US\$20-30 billion per annum (or around €15 billion to €25 billion in 2005 prices). Stopping deforestation might be two to three times more expensive. The costs of halving deforestation tie in well with the UNFCCC study⁵⁸ on financial flows (see table below), which calculates costs of around US\$20 billion in 2030 for afforestation/reforestation, forest management and reduced deforestation.

Investments and financial flows into the forest sector to address climate change, UNFCCC (2007)

Country/Region	Afforestation/Reforestation				Forest management		Reduced deforestation	
	Emission offset potential (Mt CO ₂) in 2030		Cost in USD billion in 2030		Emission avoided Mt CO ₂	Cost in USD billion in 2030	Emission reduced in 2030 Mt CO ₂	Cost in USD billion in 2030
	Lower	Higher	Lower	Higher				
Annex I	18.79	46.96	0.03	0.15	-	-	-	-
Non-Annex I	43.51	108.74	0.07	0.35	6,522	8.2	5,790	12.3
Global	64.7	161.9	0.1	0.5	6,522	8.2	5,790	12.3

Further work will be required to look in more detail at the interaction with other greenhouse gas mitigation policies. This further work will have to be carried out in preparation for the UN negotiations under the UNFCCC in Copenhagen next year. There is a direct interaction. The more greenhouse gas emissions are reduced through reduced deforestation, the less needs to be reduced by other sources, and vice versa. Furthermore there are indirect interactions, for instance through increased demand for biomass and biofuels. This further work will also make it possible to test the robustness of the deforestation target in the perspective of global climate change policies that include also the other sectors.

Another open issue that would deserve further work is the analysis of the local capacity for uptake of financial resources made available through the Mechanism. Land tenure and rights over forest management and exploitation are expected to play a major role, besides local governance structures and effective national/regional law enforcement. With the exception of Mexico and Papua New Guinea, where indigenous and other local communities respectively

⁵⁸ UNFCCC. 2007. Investments and Financial Flows to Address Climate Change. Table IV.37, pg.83

own some 80 % and 90 % of forests, countries with tropical forests have 77 % of forest land publicly owned and 23 % under community/indigenous and individual ownership (White and Martin)⁵⁹. As described in chapter 4.3.3, these elements will need to be factored in when designing the structure of the Mechanism and its implementation at local level.

The figures put into perspective

It has been estimated that, even if all current FDI⁶⁰ and ODA funding for forestry combined were to be redirected to reduction of emissions from deforestation, this would provide only a fraction of the funding required to cut emissions from deforestation in half while approximately 20-30 % of all ODA would actually be needed to achieve this goal. Domestic investments, however, are a magnitude higher than international investment flows in forestry. All the above projections clearly indicate that halving deforestation by 2020 will require financial support that must come in part from developed countries.

Compared to this, under the proposed directive to amend the EU ETS⁶¹, auctioning, assuming a carbon price of €30 per ton of CO₂, would generate annual revenues in 2020 in the order of €1 billion, of which 20% is intended to be earmarked for climate change policies. If 3% to 5% of the total revenues were to be allocated to forests, an amount of between €1.5 billion and €2.5 billion per annum (equivalent to around US\$2 billion to US\$3 billion per year) would be generated. This would be a significant contribution on the part of the EU to what is supposed to be an international effort involving all countries. It should be noted, however, that at the same time, the economic cost of the EU ETS on the EU's domestic GDP will be higher, if the revenues from auctioning are not fully recycled in the EU economy, but are transferred to developing countries to reduce emissions from deforestation.

The EU's contribution to a Global Mechanism would of course depend upon a fair sharing of efforts at the international level, e.g. how many countries would make financial contributions and the magnitude of their contributions. Financing of mitigation action in developing countries is one of the key building blocks of the Bali Action Plan that should result in an international agreement on climate change in Copenhagen in 2009. The finance requirements concern a diverse set of sectors, well beyond the forest sector. A more detailed analysis of this overall finance requirement needs to be placed in the context of an overall climate agreement.

Trade-offs between stopping deforestation with land use for biofuels and food crops differ from country to country (see also section 2.2.1). Beef and soya production competing in South America, farming and fuelwood in Africa, and oil palm, coffee and timber in South-East Asia. According to the Stern review, in Brazil and Bolivia soy beans have the highest return on land use. In Indonesia, Malaysia and Papua New Guinea, the equivalent would be palm oil. In D.R. Congo and Cameroon the highest returns might come from cocoa, fruit, oil palm and rubber, and in Ghana from timber.

⁵⁹ White A. and Martin A., 2002 Who owns the world's forests? Forest tenure and public forests in transition. Forest Trends, Center for International Environmental Law, Washington D.C.

⁶⁰ The worldwide foreign direct investment (FDI) in agriculture, forestry, hunting and fishing activities combined reached US\$ 1.8 billion in the period 2001-03, i.e. US\$ 600 million per year, most of which is dedicated to agriculture (UNCTAD, 2005)

⁶¹ 2008/0013 (COD), recital 12

5.2.3. *Option 3b): Raise new funds by creating and recognising in the carbon market emission reduction credits from reduced deforestation and forest degradation*

The main question for option 3b) is how the inflow of newly established forestry credits would affect demand and supply in the carbon market, and whether the demand for credits would be sufficient to effectively halve emissions from deforestation in 2020. The balance of the potential supply of credits from avoided deforestation and demand for compliance mechanisms depends to a large extent on the stringency of the caps set either at national or at company level. Unfortunately, none of the peer reviewed studies, so far, have explicitly modelled this option of linking forestry credits to the carbon market.

However, there is much uncertainty as to how many credits could actually be generated, but most models conclude that at a carbon price of €30 per ton of CO₂ (US\$45 per ton of CO₂) a very high proportion of deforestation could be reduced, in the range of several Gt CO₂ per year, especially if forest conservation were also to be allowed in the system.

Compared to this, the emission reduction foreseen in the ETS in 2020 with a proposed emissions cap of around 1720 million allowances is only around 0.46 Gt CO₂⁶². If forestry credits were to be allowed unrestricted into the EU ETS, and if the only demand came from the EU (i.e. unilateral case of reducing EU emissions by 20 % in 2020 compared to 1990) together with the anticipated inflow of credits from other CDM/JI projects, the magnitude of the supply of emission reduction credits could cause a significant drop in the carbon price. In such a case a very large part of the reduction effort in the EU ETS would be offset by avoided deforestation credits, and the EU would forego the expected significant co-benefits with respect to innovation, energy security and air quality. To avoid this, it would be necessary to set strict limitations on the inflow of such credits. Such restrictions would lead to a skewed demand/supply balance that would see a high price paid for only a limited amount of forestry credits that are generated at much lower cost, leading to significant windfall profits. Above all, this would be an inefficient use of scarce financial resources as it would also not spur the significant transformation in the other sectors of the economy which will be necessary in the coming two decades.

Furthermore, the impact on the EU ETS supply/demand balance of creating and recognising emission reduction credits from reduced deforestation and forest degradation depends very much on the international agreement to be concluded in Copenhagen in 2009. This will determine the overall emission reduction commitments, i.e. demand for credits, and the extent to which such forestry credits can be used for compliance with post-2012 commitments. However, even in the case of an international agreement and developed countries committing themselves to collectively reduce their emissions by 30 % in 2020 compared to 1990, it is unlikely that the demand in the carbon market will be sufficient to reduce deforestation to 50 %.

Studies from 'grey' literature seem to confirm this hypothesis. Anger and Sathaye (2008) estimate that even when accounting for high transaction costs the carbon price could fall as

⁶² The EU ETS cap in 2020 is set at -21% below 2005 resulting in a cap of around 1720 million ton CO₂. The difference between the 2005 level and the 2020 level is around 457 million ton CO₂. The indicated cap does not take account of the proposed increase in the scope of the EU ETS.

low as €7.2 per ton of CO₂ in 2020⁶³. Again this would only give a partial solution to reducing deforestation. While Africa would reduce its emissions from forests by almost two thirds, Central America, South America and South-East Asia would do so only by 16 %, 15 %, and 8 % respectively. It is the latter regions where deforestation is predominantly taking place. In total, only 1.1 Gt CO₂ of forestry credits would be sold into the carbon market, which would represent only a fraction of the total deforestation emissions. At the same time, these regions would receive €4.6 billion in revenue, indicating that tackling deforestation emissions via a direct link to the carbon market might be overall more costly. In addition, forestry credits would displace CERs and ERUs from traditional emission reduction projects in other sectors. China, India and Brazil would face revenue losses of more than two thirds for projects that would help in transforming their economies towards a low carbon society. The authors conclude, however, that allowing forestry credits for compliance could have the effect of tightening the carbon constraints of developed countries substantially at similar levels of mitigation costs.

Another ‘grey’ study sponsored by Environmental Defense⁶⁴ predicts around 1.4 Gt CO₂ at a carbon price of US\$30/ton CO₂ (around €20/ton of CO₂). This is a huge amount compared to the size of the current carbon market, but as in the previous study, this represents only a rather limited share of potentially available forestry credits from deforestation which would have to be absorbed by the carbon market in 2030. Amounts and marginal costs are higher as in the previous study, probably because this study assumes an international agreement until 2050 allowing for perfect foresight of the private sector until then, which would result in early procurement of forestry credits and banking until 2050.

Finally, the recent impact assessment accompanying the review of the EU ETS recommended not to include land use and land-use change and forestry (LULUCF) activities in the third period of the ETS, not only because of the impact on the carbon price but also because of monitoring and compliance problems⁶⁵. These problems are: the temporary and reversible nature of LULUCF activities, the fact that these projects cannot physically deliver permanent emission reductions, the reduction in simplicity, transparency and predictability of the EU ETS as well as the fact that the quality of monitoring of reporting of LULUCF emissions is, at present, not comparable with the emissions covered currently by the installations included in the EU ETS.

In conclusion, allowing forestry credits into the carbon market before 2020 requires further careful study. Furthermore, whether the use of temporary forestry credits would also be recognised in other domestic trading schemes (US, Australia, etc.) which are expected to be implemented in the years to come will be determined by the domestic legislation and is not likely to be known until after the Copenhagen deal has been struck.

⁶³ Anger and Sathaye. 2008. Reducing Deforestation and Trading Emissions: Economic Implications for the post-Kyoto Carbon Market. Discussion Paper 08-016. Centre for European Economic Research. Mannheim.

⁶⁴ Environmental Defense. 2008. Reducing emissions from deforestation and forest degradation in developing countries: implications for the carbon market. Washington.

⁶⁵ Impact Assessment, Commission Staff Working Document, accompanying document to the proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC so as to improve and extend the EU greenhouse gas emission allowance trading scheme (COM(2009) 16 final)(SEC(2008)53), 23/1/2008.

Because of the great number of unknowns in the use of forestry credits (e.g. demand/supply, transaction costs, monitoring, verification, permanence, liability) and the significant uncertainty, one should probably start by testing a separate “forest carbon market” which could be financed as part of the Global Forest Carbon Mechanism. In order to encourage developed countries to participate in such an experimental “forest carbon market”, one should test further whether credits generated under such a specific pilot initiative might also be used for compliance with national commitments by Parties after 2012.

6. THE PREFERRED OPTIONS

The preferred option is a combination of option 2 and option 3. Option 2 is necessary because it improves the EU policy baseline and guarantees the necessary capacity building and technical support to third countries. Although implementation of option 2 could start in the short term, i.e. even before the next commitment period starts in 2013, this option is not considered by itself sufficient to achieve the objectives, and it needs to be combined with option 3.

Only together with option 3 can an effective package be produced that is:

efficient, in that avoiding deforestation is a low-cost way of reducing greenhouse gas emissions. Of course, there is still much uncertainty over the exact amount of avoided emissions from reduced deforestation and forest degradation that can be achieved at any given price. These uncertainties relate to many issues, ranging from the type of sources addressed (only above-ground biomass or also soil), the carbon content and loss with deforestation, the rents from alternative land uses, issues related to governance and issues related to leakage. Nevertheless **model projections suggest that deforestation could be halved by 2020 reaching a cost of around €15 billion to €25 billion per year with huge uncertainties**⁶⁶;

effective, in that without new and additional financial incentives it will not be possible to meet the target. Of course, to ensure effectiveness additional funding should only be made available to the developing countries concerned on a performance basis, i.e. for proven reduced/avoided deforestation and forest degradation.

Distributional and poverty implications should, in principle, be positive overall for people dependent on those forests affected, although the exact balance will be largely determined by local implementation and governance, particularly whether payments would reach those decision-makers at the local level that are responsible for deforestation.

With regard to the choice between 3a and 3b, **in the short term, i.e. until 2020, option 3a entailing the creation of a Global Forest Carbon Mechanism is preferred in the context of an international agreement to be concluded in Copenhagen in 2009.** Channelling revenue generated from auctioning of carbon allowances to reduce deforestation does not directly impact on supply or demand in the carbon market. As such it is an option that cannot destabilise the supply/demand balance in the carbon market. The present scale of the EU carbon market is, in fact, not large enough to allow recognition of emission credits for reducing emissions from deforestation and forest degradation. In fact, if such forestry credits were to enter the EU ETS, its supply would far outreach the levels of emission reductions

⁶⁶ Most projections use 2000 or 2005 prices in US dollar. In 2000 the exchange rate for \$ in € was around 0,9, in 2005 it was around 1,2. For the purpose of this estimate the exchange rate was set at 1 € per \$.

envisaged up to 2020 and as such would jeopardise the medium-term stability of the EU ETS. If limits are applied, there is a risk that only a limited amount of credits would enter the EU ETS at high price with high rents for those who can sell them. There would be more environmental benefit if financial resources could be used efficiently without generating these types of unnecessary rents over the coming decade.

In addition, placing limits on the use of forestry credits would not resolve the deforestation issue, and additional incentive mechanisms would be needed to address the remainder of the problem.

Furthermore, liability remains a serious issue, especially if forestry credits can be used for compliance within a company-based system. Finally, leakage would need to be addressed otherwise the overall environmental effect could be worse (less reduction in the EU ETS, no real reductions in deforestation in case of leakage).

As such, generating financial means to avoid deforestation through domestic emission trading systems, like the EU ETS, seems much more suitable in the medium term, through setting aside revenues from auctioning of carbon allowances.

In the medium to long term, i.e. after 2020, the EU position is to consider the recognition of forestry credits into the EU ETS as a complementary tool, provided that criteria such as liability and balanced supply/demand are respected. Hence, the proposed combination of options 2 and 3a – with decreasing importance over time – and 3b – with increasing importance after 2020. The analysis has also shown that practical implementation is not a simple issue. A number of design parameters need to be addressed. For example, leakage is a serious problem that needs to be taken into account in the design of any incentive mechanism that will have to be tailored to the local level. Both the issue of leakage and the question of liability give preference to some extent to national schemes that can ensure that they are addressed at the national level and that incentives are indeed channelled all the way to the local level and the local decision-makers. Thus, it would be desirable to test a trading system in the form of a separate parallel “forest carbon market” which could be funded as part of option 3a), the Global Forest Carbon Mechanism.

These preferred options should be supplemented by appropriate national mitigation actions, including co-funding, in the developing countries concerned.

7. NEXT STEPS

This impact assessment represents only a first step in a longer process. Indeed, if the principle of a mechanism for reduced deforestation goes ahead, implementing details will need to be discussed thoroughly. These will range from the exact source and timing of the funding to discussing the ways in which the money will be used and disbursed on the ground, on how to ensure that it really reaches the population groups enduring the consequences of avoided deforestation.

Work and negotiations to define the mechanisms and the type of funds to be developed are ongoing within the UNFCCC fora. **The Commission is preparing a Communication covering the EU’s mandate for the Copenhagen negotiations to be adopted in January 2009, and to be discussed by EU Heads of State at the Spring Council in March 2009.** In line with the conclusions of the EU Summit in June 2008, it will include a comprehensive

strategy for scaling up finance to address climate change including deforestation. This will include further analysis in order to test the robustness of the results of this impact assessment.

With a view to formulating a common EU position on this matter, the Commission intends to launch further studies in the coming weeks.

In the current absence of a definite REDD architecture, with clearly spelled out disbursement mechanisms and institutional accountability criteria, the EU can play an important role at global level in acting as a fair and equitable broker trying to bring about the best and most effective solution. Some important issues that will need to be taken into account in the negotiation of the eventual funding scheme are:

- (1) the recognition of existing schemes and private sector efforts, to avoid double counting or exclusion of initiatives;
- (2) while targeting a fully functioning REDD, starting a stepwise approach and using pilot projects to facilitate countries' readiness to enter into the scheme. These projects should be compatible with the REDD architecture;
- (3) the inclusion in a REDD design, or in a separate fund running in parallel, of payments for the non-carbon values of forests, i.e. forest ecosystem goods and services and their contribution towards poverty reduction objectives;
- (4) assuring national sectoral commitments from recipient countries, with particular regard to governance, social issues and equity distribution of financial resources and benefits generated by the mechanism;
- (5) ensuring that an effective and reliable monitoring and verification system is put in place to measure progress and assure compliance with the disbursement criteria.

From the Commission's side it will also be useful to fully exploit the possible synergies between the ongoing and future FLEGT and REDD processes so as to maximise public spending and simplify the reforms and activities needed at national level.

Moreover, in collaboration with the *European Investment Bank* (EIB), possible new roles for the Bank could be explored to support the EU's climate change strategy in regions outside the EU, including initiatives to tackle deforestation and forest degradation. The experience gained within the "Global Energy Efficiency and Renewable Energy Fund (GEEREF⁶⁷) and the endorsement and support of the EIB in regard to the Extractive Industries Transparency Initiative⁶⁸ - EITI - could provide useful inputs towards this aim.

⁶⁷ An innovative financing instrument proposed by the European Commission to maximise the leverage of public funds. GEEREF will support regional funds for sub-Saharan Africa, including the Caribbean and Pacific Island States, Latin America, Asia, North Africa and other EU neighbouring countries. Priority is given to investments in countries with energy efficiency and renewable energy policies that are conducive to private sector engagement. http://ec.europa.eu/environment/climat/pdf/key_elements.pdf

⁶⁸ <http://www.eib.org/projects/news/eib-support-for-the-extractive-industry-transparency-initiative.htm>

8. MONITORING AND EVALUATION

Annex 5 describes the state of play as regards monitoring of deforestation at national and international level.

The lessons learnt so far show that monitoring of tropical forest area changes is important at global and regional level. However, the *following shortcomings and knowledge gaps need to be addressed if a new REDD funding mechanism is to become fully operational* together with an effective accountability system:

a) Countries should have the *capacity* to establish reliable and high-quality national monitoring and reporting systems, making the best use of remote sensing surveys where feasible. This is the foundation of any reliable forestry data on which to build national forest policies for sustainable forest management and conservation. At the same time, this will enable countries to fulfil their international reporting requirements, e.g. to the UNFCCC, CBD, UNFF and to FAO global forest resources assessments;

b) Inconsistencies in forest definitions and inventory methodologies over time, and the lack of regular inventories, make it difficult to obtain reliable trend estimates in many developing countries;

c) There is a lack of available information on the current and past rates of deforestation, afforestation and natural expansion of forests in a number of developing countries. Hence, the definition of the country baseline to measure reduction of deforestation rates is a methodological critical issue that requires technical capacity at national level and agreed standards at international level;

d) Regional/global assessments based on remote sensing are better suited than country reporting for some forest-related information, such as forest fragmentation and intact forest landscapes, as well as trends in forest area in different biomes/ecological zones.

e) Global and regional assessments need to be validated and cross-checked at regional and national level to ensure qualitatively good estimates, harmonised application of definitions and general acceptance.

To address the current shortcomings, future monitoring and verification arrangements should consider:

1. The need to *develop*, where appropriate, *in-country capacity* to effectively measure deforestation trends and to account for and report on REDD incentives. This depends to a large extent on the local capabilities and financial means available to define reference baselines and to carry out adequate forest inventories at national level;

2. Within the UNFCCC mandate, *monitoring and reporting of GHG emissions* is fully under the responsibility of the Parties, with periodical independent review organised by the UNFCCC Secretariat. The Parties' are obliged to follow IPCC Guidelines, ensuring that reported greenhouse gas emissions and removals are transparent, consistent, complete, accurate, and comparable. For the new REDD mechanism, proposals are currently under assessment within the UNFCCC negotiations process and a decision is unlikely to be taken before the end of 2009.

3. Besides financially supporting the FAO Forest Resources Assessment (FRA) 2010, the EC could explore possibilities within the Global Monitoring for Environment and Security (GMES) programme - and appropriate synergies with the ongoing JRC activities - to develop an appropriate institutional framework and contribute to a future REDD monitoring system, be it entirely or partly delegated at national level.

Acronyms and conversions

AR Afforestation (establishing a forest on land that is not a forest, or has not been a forest for a long time) and Reforestation (restocking of existing forests and woodlands which have been depleted, with native tree stock)

BAU Business as Usual

CER Certified Emissions Reductions

CBD Convention on Biological Diversity

CDM Clean Development Mechanism

COP Conference of the Parties

COPI Cost of Policy Inaction

ENRTP Environment and Natural Resources Thematic Programme (EU)

FAO Food and Agriculture Organization of the United Nations

FCPF Forest Carbon Partnership Facility (World Bank)

FDI Foreign Direct Investment

FLEG(T) Forest Law Enforcement, Governance (and Trade)

GCCA Global Climate Change Alliance

GHG Greenhouse Gas

GIFC Global Initiative on Forests and Climate (Australia)

Ha Hectare

GMES Global Monitoring for Environment and Security

IIASA International Institute for Applied Systems Analysis

IPCC Intergovernmental Panel on Climate Change

ITTO International Tropical Timber Organisation

JI Joint Implementation

JRC European Commission Joint Research Centre

LUCF Land-Use Change and Forestry

LULUCF Land Use, Land-Use Change and Forestry

Mt Mega tonne

ODA/OA Overseas Development Assistance/Overseas Assistance
RED(D) Reduced Emissions from Deforestation (and forest Degradation)
UNFCCC United Nations Framework Convention on Climate Change
UNFF United Nations Forum on Forests
VPA Voluntary Partnership Agreement

1 tC = 3.67 tCO₂

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9. ANNEXES

Annex 1

Tropical forests and deforestation

Figure 1 shows tropical forest cover and Figure 2 relates this to deforestation (areas in red in Figure 2 indicate areas with ongoing deforestation). (MEA, 2005; Lepers et al., 2000; Mayaux, 2005).

Fig. 1 Tropical forest cover

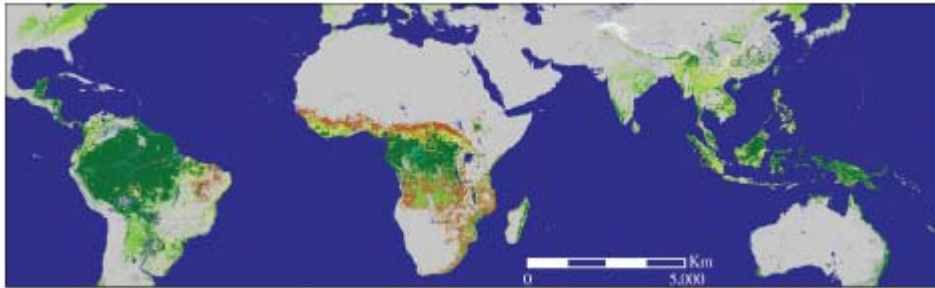


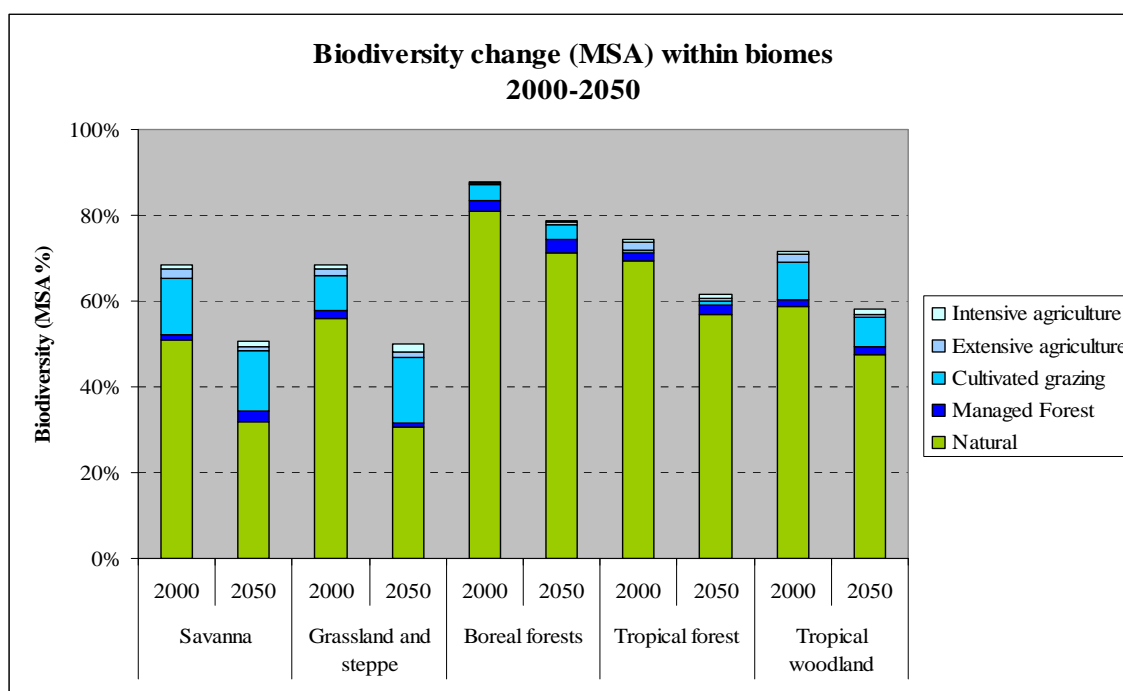
Fig. 2 Tropical deforestation fronts worldwide



Estimates of Biodiversity Loss – quantification to monetisation

The graph below presents the changes in biodiversity index in different biomes⁶⁹. These are taken from the study on the *Cost Of Policy Inaction (COPI): the case of not meeting the 2010 biodiversity target*. The estimates are based on modelling undertaken using the GLOBIO model for the OECD, and are broadly consistent with other modelling exercises such as those by the FAO.

Figure 1, Annex 2: Projected biodiversity change between 2000 and 2050



Source: COPI study, chap.4, p.62

In monetary terms, if nothing is done to stop biodiversity loss in tropical forests (thereby meaning no action to reduce deforestation), the cost of biodiversity loss between 2000 and 2050 is expected to grow to €536 to 3362 billion in 2050⁷⁰.

Losing biodiversity also means losing ecosystem services provided by that biodiversity. The following table sets out the main services which would be at risk, many of which are non-marketed.

⁶⁹ Biomes are defined as the world's major communities classified according to the predominant vegetation and characterised by adaptations of organisms to that particular environment.

⁷⁰ The COPI study uses two evaluation scenarios, a partial estimate and a fuller estimate. The partial estimate has fewer gaps filled by transferring values from one biome to another (e.g. forest of one type to another), while the fuller estimate includes more benefits transfer. Whilst this is obviously different from a 'pure' lower and upper estimate, there are elements of this also present: in particular, the partial estimate has a lower estimate for future growth rates of certain values (e.g. food provision and carbon prices), while the fuller estimate employs higher rates (e.g. value of provisions rises with GDP).

Figure 2, Annex 2: Millennium Ecosystem Assessment description of ecosystem services

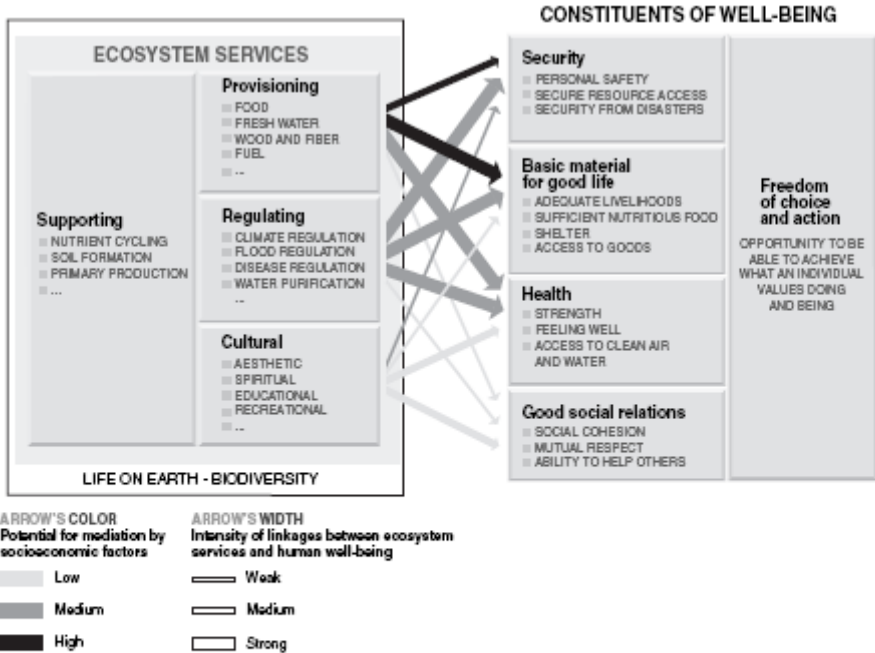


Figure 1.1. Linkages between Ecosystem Services and Human Well-being. This Figure depicts the strength of linkages between categories of ecosystem services and components of human well-being that are commonly encountered and includes indications of the extent to which it is possible for socioeconomic factors to mediate the linkage. (For example, if it is possible to purchase a substitute for a degraded ecosystem service, then there is a high potential for mediation.) The strength of the linkages and the potential for mediation differ in different ecosystems and regions. In addition to the influence of ecosystem services on human well-being depicted here, other factors—including other environmental factors as well as economic, social, technological, and cultural factors—influence human well-being, and ecosystems are in turn affected by changes in human well-being. (Millennium Ecosystem Assessment)

Estimates of the value of ecosystem services loss vary. The most comprehensive overview is found in the COPI study. These data were used to calculate the cost to society of the changes in biodiversity set out in Figure 1 of Annex 2 above. The relevant estimates are presented in the table below.

Annual cost in 2050 from not having halted biodiversity loss at 2000 levels

Biomes	Billion (10 ⁹) EUR
Tropical forest	From 536 to 3362
Tropical woodland	From 0 to 707
Warm mixed forest	From 249 to 2332
World Total (land-based ecosystems excluding ice and hot deserts)	From 1891 to 13938

Source: adapted from COPI study, chap.6, p. 131

Most relevant EC policies and instruments

1/ Development Cooperation

The Commission's Communication on a new EU Development Policy⁷¹ elevated environment and natural resources from a cross-cutting issue to a key theme for EU development cooperation – both for the Community and for Member States. Provisions requiring systematically the development of Country Environmental Profiles are assisting the integration of forest and biodiversity conservation needs into Country and Regional Strategy Papers. In September 2007, the European Commission adopted the first report on Policy Coherence for Development (PCD). PCD plays a central role in reinforcing the EU's contribution to developing countries' progress towards the Millennium Development Goals. The aim is to maximise the positive impact of these policies on partner countries and to avoid incoherencies; its importance is reflected in the European Consensus on Development.

The PCD report highlights the interaction and complementarity between development policy and twelve other internal and external EU policies that have an impact on developing countries: trade, environment, climate change, security, agriculture, fisheries, social dimension of globalisation, employment and decent work, migration, research and innovation, information society, transport, and energy. The overall conclusion was that coherence between EU policies and development objectives has improved but more can be achieved. Progress was identified in a number of areas, including:

trade - especially the negotiation of the economic partnership agreements with ACP countries (fostering trade and regional integration).

agriculture - recent reforms of the Common Agricultural Policy are sharply reducing the trade-distorting effects of EU farm support and producing positive social and environmental effects.

Climate change, energy and biofuels were indicated as areas with room to improve development potential⁷². As policy formulation in these three areas is an ongoing process, there is a recognised need for continued policy dialogue with developing countries as well as support for capacity-building and dissemination of information and good practices.

Although the EU remains the leading donor and the developing countries' most important partner, the amount of financial aid fell in 2007 for the first time since 2000, dropping from €47.7 billion in 2006 to €43.1 billion. Increased development aid, aid effectiveness and a more coherent EU policy approach overall are some of the recommendations contained in the recent Communication "The EU - a global partner for development"⁷³. The document informs the development of a common EU position in light of the High-Level Forum on Aid Effectiveness planned in Accra, in September 2008, and paves the way for the International Conference on Financing for Development which will be organised in Doha in December 2008. Of particular interest for the REDD debate is that Member States are invited to find

⁷¹ COM(2005) 311 final

⁷² Commission Staff Working Paper, SEC(2008) 434, accompanying COM (2008) 177 final.

⁷³ COM(2008) 177 final, 09.04.2008. The EU - a global partner for development. Speeding up progress towards the Millennium Development Goals.

innovative sources of financing for appropriate measures to deal with the effects of climate change.

The Action Plan on Climate Change in the Context of Development Cooperation puts forward a concrete set of proposals to better integrate climate change into the EU's development cooperation activities. These commitments were consolidated at the World Summit on Sustainable Development (WSSD)⁷⁴ and at the 2005 UN Summit⁷⁵. Close coordination between the Commission and Member States is already foreseen under the GCCA⁷⁶, to help poor developing countries most vulnerable to climate change - in particular Least Developed Countries (LDCs) and Small Island Developing States (SIDS)⁷⁷ - to increase their capabilities to adapt to the effects of climate change. This is also in line with the MDG of developing a global partnership for development⁷⁸.

The Commission aims to promote sustainability and better governance in the negotiation of Economic Partnership Agreements (EPA) to succeed the Cotonou Agreement with ACP countries and to make efforts to promote, as much as possible, a regional approach for the implementation of FLEGT. The Commission Country Strategy Programmes and Country Environmental Profiling are programming instruments that can contribute towards the identification of shortcomings in the management of natural resources such as forests.

With regard to the **forest sector**, the Commission has supported rainforest conservation for many years, including major programmes in Indonesia, Brazil, Central Africa, Sierra Leone and Guyana, to mention just a few. It is also considering contributing to the World Bank Forest Carbon Partnership Facility (80% funded by EU Member States).

A specific EC Budget Line for Forests was available until 2006, with a total budget of €249 million for the period 2000-2006. Based on the Communication from the Commission of 25 January 2006 on External Action⁷⁹, this budget line was integrated into the **Thematic Programme for Environment and Natural Resources (ENRTP)**. The basic act for the ENRTP is the Development Cooperation Instrument (DCI). It sets aside an indicative amount of €804 million for the ENRTP for the period 2007-2013. The indicative amount for the period 2007-2010 is €469.7 million. This includes €85.5 million for two new initiatives related to climate change and renewable energy, with multiannual implications, announced by the Commission in its 2008 Annual Policy Strategy, namely an increase of €50 million for the Global Climate Change Alliance, and an increase of €35.5 million for the Global Energy Efficiency and Renewable Energy Fund (GEEREF). The Instrument states in Article 134 that the objective of this thematic programme is "to integrate environmental protection requirements into the Community's development and other external policies as well as to help promote the Community's environmental and energy policies abroad in the common interest of the Community and partner countries and regions".

⁷⁴ New York, Summit on Sustainable Development in September 2005

⁷⁵ Johannesburg, September 2002

⁷⁶ The Global Climate Change Alliance (GCCA) is an alliance between the EU and developing countries to work jointly to integrate climate change into poverty reduction strategies

⁷⁷ This includes only those island states which are recipients of Official Development Assistance (ODA)

⁷⁸ Target 12. Develop further an open, rule-based, predictable, non-discriminatory trading and financial system. Includes a commitment to good governance, development, and poverty reduction — both nationally and internationally; Target 13. Address the special needs of the least developed countries; Target 14. Address the special needs of landlocked countries and small island developing States

⁷⁹ COM(2006) 20 final of 25.1.2006

The multiannual programme for ENRTP⁸⁰ provides for indicative amounts [in brackets] for the first ENRTP period (2007-2010) targeting:

- support for "activities that influence national, regional or international policy development affecting forests and promote lesson learning between decision-makers(...)". [€71.8 mio]
- support for the "implementation of voluntary partnership agreements (VPAs); fund activities which underpin the development of VPAs, such as regional FLEG processes (...)" [€34.8 mio]
- actions to raise the policy profile of climate change (...) [€23.3 mio]

As described in chapter 2.2, many underlying and direct causes of deforestation are generated outside the forest sector. However, in a number of countries, illegal and uncontrolled forest exploitation can be a relevant cause of forest loss and degradation. From the EU side, the policy response to this has been the FLEGT Action Plan, adopted in 2003, which sets out a series of actions to address illegal logging, with a particular emphasis on trade. The Plan has a range of objectives and outlines a number of policy instruments aimed at combating illegal logging and creating markets for verified legal and certified sustainable products. Bilateral *Voluntary Partnership Agreements* (VPAs) between the EU and timber-producing country governments are at the core of the FLEGT Action Plan. These commit both parties to develop a timber licensing scheme under which only legally-produced licensed timber from FLEGT Partner Countries will be allowed into EU markets. By the end of 2008, conclusion of the VPAs with Ghana, Malaysia and Cameroun is expected. Ongoing and recent VPA processes are also taking place with Indonesia, Liberia and Congo Brazzaville. More countries are expected to start negotiations in the near future.

Under FLEGT VPAs, there is an explicit recognition that some partner countries will require considerable institutional strengthening and capacity building to meet commitments in regard to enforcing forest law and licensing legal timber. The Commission has highlighted the need for 'capacity building and training in producing countries, including support for governance institutions in the implementation of new governance procedures'. As well as agreeing the technical and legal aspects of VPAs, negotiations are being used to identify specific areas where partner countries need financial assistance. Over the longer term, it is envisaged that the increased resource revenue from legal timber production will enable the control systems introduced to become self-funding.

The final and crucial element in the FLEGT Action Plan is the *development of "additional options" to deter trade in illegally harvested timber products*. The Commission will adopt⁸¹ a legislative initiative which would rely on the due diligence principle and which would require operators to exercise care in ensuring that they only place products derived from legally harvested timber on the market.

Public procurement can shape production and consumption trends and influence market and trade trends. If significant demand from public authorities for legal and sustainable wood and

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http://ec.europa.eu/europeaid/where/worldwide/environment/documents/multi_annual_progra_mme_enrtp_en.pdf

81 Due for adoption in September

wood products is generated, this could reduce the impact of timber production on worldwide deforestation.

The European Commission proposes to facilitate the exchange of experiences among Member States in developing guidelines for application of the Public Procurement Directive to forest products. More recently, the Commission Communication: "An Action Plan for more and better Green public procurement in the EU"⁸² initiates a series of actions to ensure EU-wide harmonised uptake of Green public procurement. With respect to wood and wood products the Communication identifies four priority sectors in which wood is (one of) the base material(s): i) construction; ii) energy; iii) paper and printing services; and iv) furniture. The Commission aims to develop a process of consultation with the Member States with the aim of developing common procurement criteria for each of these sectors and product categories. If fully implemented across the EU, public contracts would cover between 10% and 20% of the total EU wood products market.

2/ Trade policy

The EU has promoted the integration of the environmental dimension into international trade (for instance through its work on trade-related sustainability impact assessments - SIA) and in global efforts to curb unsustainable production and consumption patterns – but with few concrete results for tropical forest conservation to date.

As described above, a useful start has been made on efforts to address the impact of the timber trade on tropical forests, but little has been done to tackle other trade-related causes of deforestation – such as the trade in palm oil and soy bean. Some progress has been achieved on wildlife trade through active engagement in the Convention on International Trade in Endangered Species (CITES). The Trade SIA on forestry undertaken with financial support from the Commission⁸³ indicates that, globally, any impact on wood harvesting is likely to be small compared to the effects of economic growth, population growth and price rises. Trade liberalisation would affect sustainability but in most contexts increased trade alone would be unlikely to cause any significant direct negative sustainability impact. However, trade liberalisation could accentuate negative sustainability trends unless appropriate forest governance systems are in place and enforced. In biodiversity hotspot countries such as Brazil, Indonesia, the Congo Basin countries and Papua New Guinea, possible negative effects could be irreversible. Developing countries whose forest industries are protected by high import tariffs could incur considerable environmental and social costs due to downsizing of industrial capacity and closure. Social costs may outweigh short-term economic gains unless adequate safeguards were to be adopted. In such countries, a cautious approach to trade liberalisation is recommended, e.g. using a phased approach and/or mitigation measures. Many of the developing and emerging countries that would gain from trade liberalisation in economic terms are the same ones that suffer from deforestation and forest degradation. In terms of sustainability, agricultural trade liberalisation will possibly have a much greater impact than forest product trade liberalisation because the protection rates and subsidies in agriculture are much higher than in forestry. In Brazil, a forecast increase in soybean production could cause an expansion of land farmed on the margins of the Amazon and increase pressure on areas with high biodiversity. Expansion of beef exports is also expected to accelerate deforestation. Therefore, the SIA suggests that mitigation and enhancement

⁸² adopted on 16 July

⁸³ http://europa.eu.int/comm/trade/issues/global/sia/studies_wto.htm#dda

measures proposed in the Trade SIA of agricultural trade liberalisation should address cross-sectoral linkages with forestry. As regards mitigation measures, it should also be borne in mind that liberalisation of trade affecting in particular edible oils, beef and animal feed, cocoa and coffee is likely to pose risks particularly to forests in Brazil, Indonesia and West Africa.

3/ Agriculture (food and non-food commodities)

In the Communication "Tackling the challenge of rising food prices. Directions for EU action"⁸⁴, the Commission acknowledges that demand for agricultural commodities is also influenced by the emergence of alternative market outlets, such as biofuels market. Nevertheless, Commission analyses indicate that current EU biofuel production has little impact on current global food prices, as biofuels use less than 1 per cent of EU cereal production. The European Council has agreed a target of 10% biofuels in transport fuel by 2020: such a long lead-time makes it unlikely that this can have had an impact on prices today and the sustainability criteria proposed by the Commission will mitigate the impact for the future.

The Commission's proposal for a Renewable Energy Directive⁸⁵ envisages a biofuel sustainability scheme, covering greenhouse gas effects, biodiversity and land use. It will apply to both EU-produced and imported biofuels and is WTO-compatible. The commitment to develop renewable energy sources beyond 2010 as a key element in the EU's strategy regarding climate change was reaffirmed by the European Council of March 2007. Among renewable energies, biofuels are considered to be of particular relevance to the Policy Coherence for Development perspectives. The Presidency Conclusions of 14 March 2008 state "In meeting the ambitious target for the use of biofuels it is essential to develop and fulfil effective sustainability criteria to ensure the commercial availability of second-generation biofuels, which in the future could also be considered for the use of other forms of biomass for energy in line with the conclusions of the 2007 Spring European Council." The enhanced support to second generation biofuels can further contribute to reducing the impact on natural resources. Second generation biofuels are produced from feedstocks other than food crops and can be produced not only from wood and dedicated energy crops but also from sources such as recycled vegetable oils, animal fat, by products of forest based industries, solid waste and grasses.

UNFCCC negotiations: the views of major developing countries

At the UNFCCC 12th Conference of the Parties (COP12) in Montreal in November 2005, a group of 41 developing countries⁸⁶, the **Rainforest Coalition**, proposed an approach to tackle emissions from deforestation through the international regime to combat climate change. The Rainforest Coalition offers voluntary carbon emission reductions by conserving forests in exchange for access to international markets for emissions trading. The approach is based on the elaboration of country reference scenarios, with quantification, monitoring and verification of efforts made by the country to reduce emissions from deforestation and

⁸⁴ COM(2008) 321

⁸⁵ COM(2008) 19, 23.1.2008 Directive on the use of energy from renewable sources, including biofuels

⁸⁶ *Bangladesh, Belize, Bolivia, Central African Republic, Cameroon, Congo, Colombia, Costa Rica, DR Congo, Dominican Republic, Ecuador, Equatorial Guinea, El Salvador, Fiji, Gabon, Ghana, Guatemala, Guyana, Honduras, Indonesia, Kenya, Lesotho, Liberia, Madagascar, Malaysia, Nicaragua, Nigeria, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Samoa, Sierra Leone, Solomon Islands, Suriname, Thailand, Uruguay, Uganda Vanuatu and Viet Nam.*

crediting of the reductions achieved in comparison to the reference scenario. From offering emission reductions units that could be paid by the global market⁸⁷, the Rainforest Coalition's approach has evolved over time to asking for a "basket of incentives" that encompasses support for capacity-building as well as the creation of funds to support the conservation of forests. Initially targeted at deforestation *sensu stricto* (i.e. leading to land-use change), the Rainforest Coalition's approach has also evolved over time towards including emissions from forest degradation (i.e. depletion of forest carbon stocks that do not lead to land-use change) and issues like forest conservation.

The majority of developing countries are supportive of the general features of the Rainforest Coalition's approach. However, groups of countries have developed specific regional approaches for this concept: the **Congo Basin** countries, grouped in the COMIFAC⁸⁸, insist on the importance of including forest degradation and, to a lesser extent, forest conservation in the scope of a future mechanism for Reduction of Emissions from Deforestation and forest Degradation (REDD). **Latin American** countries (Brazil excluded) seek to maintain a CDM-like project-based stream as a progressive way to expand the implementation of a future mechanism to their whole national territory. **India and China** are seeking the introduction of forest conservation and forest management in the scope of a future REDD mechanism as a way to recognise the efforts already made to stop deforestation and increase the area of forest in both countries.

At the 13th Conference of the Parties (COP13) in Nairobi, in December 2006, **Brazil** tabled its own approach to combat deforestation under the UNFCCC. The Brazilian approach is also voluntary and would be implemented on a national basis. As for the Rainforest Coalition proposal, it is based on verified performance of a country to reduce emissions from deforestation assessed by comparison with a reference scenario. The country would be financially rewarded for the emissions reductions achieved in comparison to the reference scenario. The Brazilian approach, however, differs from the Rainforest Coalition's one on two key features:

- the scope: the Brazilian proposal targets deforestation *sensu stricto* (i.e. land-use changes only) and does not contemplate any incentive for countries that also take action against forest degradation or forest conservation; and
- the origin of the carbon payments: the Brazilian proposal relies on additional funding by developed countries but excludes any direct payment from the carbon market.

UN CBD negotiations

The CBD's COP has adopted a statement from the Convention to the IPF on biological diversity and forests (decision II/9), endorsed a work programme for forest biological diversity (decision IV/7), adopted an expanded programme of work on forest biological diversity (decision VI/22), urged the Collaborative Partnership on Forests to consider the Secretariat of the CBD to be its focal point for forest biological diversity (decision VI/22), and agreed that unregulated and unsustainable use of forest products, climate change,

⁸⁷ It is to be noted that, at present, there is no single 'global carbon market', but rather a range of sources of funding. States may buy credits under the Kyoto Protocol to comply with their commitments. The EU has established a company-based emissions trading system and allows companies in this system to use certain types of external credits up to certain levels. Other countries are considering the establishment of emissions trading systems.

⁸⁸ Commission des Forêts d'Afrique Centrale.

desertification, land conversion, habitat fragmentation, environmental degradation, forest fires and invasive alien species are major human-induced threats to forest biodiversity that should be tackled as a matter of priority (decision IX/5). The EC and EU delegations played crucial roles in all of these negotiations.

Estimates of the costs of monitoring

The costs of operational monitoring systems using satellite data range from 0.25 US\$/km² in Brazil, to 25 US\$/km² in Vanuatu, the latter including costs for developing the system, the former reflecting a long tradition and routine system in place at institutional level (Achard, 2008⁸⁹). The planned global FAO FRA 2010 Remote Sensing Survey will cost 0.15 US\$/km², which includes development of the system.

Satellite monitoring needs to be integrated with on-site measures for data validation and compliance checking. Additional costs for ground survey show a wide variation, depending on plot size and the targeted accuracy level, from about 330 US\$/ha in plots smaller than 10 ha to less than 1 US\$/ha in plots larger than 10,000 ha (Brown, 2008)⁹⁰.

Some further cost estimates at the national level are provided below.

Examples of cost estimates at national level**Vanuatu Remote sensing survey**

~ 300,000 US\$ for 1.2 million ha of Land (80 Islands)

i.e. ~ 25 US\$ / km² (includes development of the system)

French Guyana Remote sensing survey

~ €70,000 for 8.5 million ha of Land (Biomass assessment: €30,000; area assessment: €40,000. It includes development of the system. It is a sampling system with the interpretation of 17,000 'sites')

i.e. ~ 8.4 € / km² (Most of the costs for area assessment are due to the purchase of SPOT imagery for year 2006).

Indian bi-annual surveys

~ 1 + 1 M US\$ / survey for 330 million ha of Land (1 M US\$ for field survey; 1 M US\$ for RS-based area assessment)

i.e. ~ 0.60 US\$ / km² (routine system which does not include cost of development of the system but includes field survey)

Brazilian annual satellite surveys (PRODES):

~ 1 M US\$ / year for 400 million ha Forest

⁸⁹ Deforestation in Tropical countries: use of satellite remote sensing in detecting and monitoring forest area change. JRC, presentation at UNFCCC Workshop on Methodological issues relating to Reducing emissions from deforestation and forest degradation in developing countries. Tokyo, June 2008

⁹⁰ Assessment of the advantages and limitations of ground based surveys and inventories. UNFCCC Workshop on Methodological issues relating to Reducing emissions from deforestation and forest degradation in developing countries. Tokyo, June 2008

i.e. ~ 0.25 US\$ / km² (routine system which does not include cost of development of the system)

FAO FRA 2010 Remote Sensing Survey

~ 5 M US\$ for 3 billion ha of Land area (corresponding to 30 million ha of analyzed satellite imagery i.e. a sampling of 1% of the Tropics)

i.e. ~ 0.15 US\$ / km² (includes development of the system)

State of play in relation to monitoring at national and international level

At world level, the results of the FAO global forest resources assessments (FRA) process constitute the main source of global data on forest resources, and are widely used by countries and international organisations for policy development and implementation. FAO has carried out these assessments at 5 to 10 year intervals since 1946. Since the first assessments, the scope has expanded and comprises today more than 40 variables related to the status and trends of forest resources and the goods and services they provide⁹¹. In particular, FRA data are used for monitoring progress towards the Millennium Development Goals by the international environmental conventions: UNFCCC, UNCCD and CBD, as well as by the UNFF and the ITTO.

At EC level, the JRC has longstanding expertise in the use of remote sensing techniques for estimating tropical forest cover changes. Initiated in the early 1990s, the JRC TREES (Tropical Ecosystem Environment observation by Satellite) project was designed to develop forest cover assessment throughout the tropics. The second phase of the TREES project (TREES II, 1996-2002) developed a new remote sensing-based approach and produced more accurate estimates than previously available, on the state of humid tropical forest ecosystems (Achard et al., 2002).

JRC and FAO are now collaborating to carry out the Global Remote Sensing Survey in the framework of FRA 2010 (so called FAO FRA 2010 RSS) and JRC will carry out the survey over the Tropics and Eurasia⁹². The programme will lead to scientific and technical outcomes (e.g. estimates of forest cover changes at global and regional level) by 2011. The methodology and results will be made available to developing countries for capacity-building and will be submitted to national experts for peer review. However, it has to be noted that FAO has an UN institutional mandate to collect national data on forest resources and their changes but not to perform the task of forest cover monitoring. This remains the responsibility of individual Governments.

In addition to these initiatives, GEOSS⁹³ (Global Earth Observation System of Systems) is an ambitious programme of information for ecological security and durable development. It is geared to the monitoring and understanding of environmental features, the extent of disasters due to human activities, the impact of global warming, desertification, erosion and deforestation. Regarding monitoring of deforestation and forest degradation, GEOSS is planning to launch "GEOSS Forest mapping for Carbon tracking", probably based on advanced satellite radar technology. GMES⁹⁴ (Global Monitoring for Environment and Security) is the main European contribution to GEOSS.

An example of successful EU support⁹⁵ that could be promoted to other tropical regions is OFAC (*Observatoire des Forest d'Afrique Centrale*), a monitoring centre to reinforce monitoring of Congo basin forests. The EC is also actively participating in the work of the

⁹¹ www.fao.org/forestry/fra2005

⁹² Three JRC specific projects are involved: TREES-3, MONDE and FOREST.

⁹³ <http://www.earthobservations.org/>

⁹⁴ <http://www.gmes.info/>

⁹⁵ EC together with France, US, Germany and several international NGOs in the framework of Congo Basin Forest Partnership

Global Observations of Forest and Land Cover Dynamics (GOFc/GOLD), an international technical panel of remote sensing experts within GTOS⁹⁶. An ad-hoc group on the REDD theme started at the end of 2005 and led to a sourcebook of methodologies for REDD⁹⁷, of which the first version was presented at the UNFCCC COP 13 in Bali.

⁹⁶ GTOS: Global terrestrial Observing System, programme for observations, modelling, and analysis of terrestrial ecosystems to support sustainable development. <http://www.fao.org/gtos/>

⁹⁷ <http://www.fao.org/gtos/gofc-gold/>

Summary of land-use models

Global Timber Model (GTM)

The global timber model was developed over a number of years and is used widely for policy analysis, including conservation policy, carbon policy, and exchange rates. The model maximises the net present value of consumer's plus producer's surplus in timber markets. Because forestry land competes with agriculture for land, it models the interaction between the two markets via land supply functions that account for the costs of renting forestland. These land supply functions are specified for each of the 13 timber supply regions in the model. They either are constant (for temperate regions) or shift over time (tropical regions), depending on assumptions about future development of agriculture in each region.

DIMA (Dynamic Integrated Model of Forestry and Alternative Land Use)

The model is based mainly on a global afforestation model and calculates the net present value of forestry compared to the net present value of agriculture with equation. The main drivers for the net present value of forestry are income from carbon sequestration, wood increments (timber sales), rotation period length, discount rates, planting costs and wood prices. Main drivers for the net present value of agriculture on current forest land are population density, agricultural suitability and risk adjusted discount rates. These two values are compared against each other and deforestation is subsequently predicted to occur when the agricultural value exceeds the forest value by a certain margin. If deforestation occurs the speed of deforestation is constrained. The speed of deforestation is a function of sub-grid (0.5° x 0.5°) forest share, agricultural suitability, population density and economic wealth of the country.

GCOMAP Model Description

GCOMAP is a dynamic partial equilibrium model (Generalized Comprehensive Mitigation Assessment Process, GCOMAP) built to simulate the response of the forestry sector to changes in future carbon prices. GCOMAP's major goal is to make use of detailed country-specific activity, demand and cost data available, mitigation options and land-use change by region. The model permits explicit analysis of the carbon benefits of reducing deforestation in tropical countries. It establishes a reference case level of land use based on historical trends and government plans, absent carbon prices, for the period from 2000 to 2100. It then simulates the response of forest land users (farmers) to changes in prices in forest land and products, and prices emerging in carbon markets. The objective is to estimate the land area that land users would plant above the reference case level, or prevent from being deforested, in response to carbon prices. The model then estimates the net changes in carbon stocks while meeting the annual demand for five timber and non-timber products. Table 1 provides a list of the key features of the model, which covers ten world regions.

⁹⁸ Source: Appendices of Kindermann et al (2008)