

**Forestry Options for Developing Countries within the United Nations
Framework Convention on Climate Change
Mitigation and Adaptation as means for Sustainable Development**

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Abstract

Climate change is a human-induced phenomenon that affects tropical forests and forestry. After burning of fossil fuels deforestation, inappropriate land use, and land-use change are the second source of greenhouse gas emissions and a major concern for sustainable development.

The impacts of climate change on tropical forest ecosystems include variations in the availability of wood, reduction of water availability, increased pressure on agricultural land, biodiversity loss and socioeconomic stresses.

The strategies defined by the UNFCCC to address climate change, namely mitigation and adaptation, recognize the important role of tropical forestry. Mitigation offers interesting opportunities for tropical forestry through the Clean Development Mechanism (CDM), a mechanism designed at helping industrialized countries to achieve their commitments under the Kyoto Protocol and promoting sustainable development in developing countries. In the case of adaptation, forestry activities can be used to reduce vulnerability to climate change and variability of both natural and social systems. Furthermore non-sustainable forestry activities reduce resilience and increase the risks for livelihoods.

This background paper presents the framework for using both strategies. Regarding adaptation the background paper presents some of the most important advances in methods and tools for understanding vulnerabilities and preparing adaptation measures in the forestry sector. It includes also some guidance for designing a CDM project in the forest sector and explains the modalities and procedures to be considered in order to get such a project validated by the Executive Board of the CDM. Further, some potential forestry activities are presented that could be implemented by using the CDM.

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1 Introduction

The climate of the earth has never been stable, least of all since the appearance of the human species. Glacial periods have been 4 – 5 °C cooler than now, interglacials perhaps between 1 and 3°C warmer. These changes in climate were natural in origin. Today scientists believe that a new kind of climate change is under way. Its impacts on people and ecosystems might be more drastic than natural climate changes over long periods of time. Levels of carbon dioxide and other 'greenhouse gases'¹ in the atmosphere have risen steeply since the industrial revolution. Concentrations have increased mainly because of the use of fossil fuels, large-scale deforestation and other human activities, spurred on by economic and population growth. Like a blanket around the planet, greenhouse gases stop energy escaping from the Earth's surface and atmosphere. If levels rise too high, excessive warming can distort natural patterns of climate.

The Intergovernmental Panel on Climate Change (IPCC) confirmed in its Third Assessment Report (2001) that there was “new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities”. Although uncertainties in the process of projecting future trends create wide margins for error in the estimates, the IPCC predicted a rise of 1.4 to 5.8 °C in global mean surface temperatures over the next 100 years. The impact of warming, even at the lower end of this range, is likely to be dramatic (see table below). The impacts on humans will be certain and – in places – drastic. People in some areas may benefit from climate change. But the great majority will struggle to cope with its effects. Developing countries will suffer more than others, as they are generally situated in the area of most extreme climate hazards (tropics and subtropics). Their lack of resources makes them particularly vulnerable to adversity and emergencies on any major scale. Yet people in developing countries have created only a small proportion of greenhouse gas emissions.

Examples of climate variability and extreme climate events and their impacts	
Projected Changes	Projected Impacts
Higher maximum temperatures, more hot days and heat waves over nearly all land areas Prognosis: very likely	<ul style="list-style-type: none"> ▲ Incidence of death and serious illness in older people and urban poor ▲ Heat stress in livestock and wildlife ▲ Risk of damage to a number of crops ▲ Electric cooling demand ▼ Energy supply reliability
Higher minimum temperatures, and fewer cold days, frost days, and cold waves over nearly all land areas Prognosis: very likely	<ul style="list-style-type: none"> ▼ Cold-related human morbidity and mortality ▼ Risk of damage to a number of crops ■ Range and activity of some pests and disease vectors ▼ Heating energy demand
More intense precipitation events Prognosis: very likely, over many areas	<ul style="list-style-type: none"> ▲ Flood, landslide and avalanche damage ▲ Soil erosion ▲ Flood run off could increase recharge of some flood plain aquifers ▲ Pressure on government and private flood insurance systems and disaster relief
Increased summer drying over most mid-latitude continental interiors and associated risk of drought Prognosis: likely	<ul style="list-style-type: none"> ▼ Crop yields ▲ Damage to building foundations caused by ground shrinkage ▲ Risk of forest fire ▼ Water resource quantity and quality
Increase in tropical cyclone peak wind intensities, and mean and peak precipitation intensities Prognosis: likely, over some areas	<ul style="list-style-type: none"> ▲ Risks to human life, risk of infectious disease epidemics ▲ Coastal erosion and damage to coastal buildings and infrastructure ▲ Damage to coastal ecosystems such as coral reefs and mangroves
Intensified droughts and floods associated with El Niño events in many regions Prognosis: likely	<ul style="list-style-type: none"> ▼ Agricultural and rangeland productivity in regions prone to drought and flood ▼ Hydro-power potential in drought-prone regions
Increased variability of Asian summer monsoon precipitation Prognosis: likely	<ul style="list-style-type: none"> ▲ Flood and drought magnitude and damage in temperate and tropical Asia
Increased intensity of mid-latitude storms. Prognosis: little agreement between current models	<ul style="list-style-type: none"> ▲ Risks to human life and health ▲ Property and infrastructure losses ▲ Damage to coastal ecosystems

Key to symbols
▲ Increased
■ Extended
▼ Decreased

Source: UNFCCC (2003) Caring for climate

2 Climate Change and Forests

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

According to the IPCC, unprecedented changes in the climate system have taken place during the 20th century. These changes can be observed through three variables: increments in average temperatures; changes in rainfall patterns; and an increase in the intensity and frequency of extreme events. It is now

¹ Out of the six greenhouse gases, the most important for forestry are: carbon dioxide (CO₂); methane (CH₄); and laughing gas (N₂O).

widely accepted that these changes in the climate system are closely related to increased human-induced emissions of greenhouse gases (GHG), especially during the last 150 years.

The burning of fossil fuels is the most important source of GHG. The second source of GHG emissions are activities related to land use, primarily tropical deforestation and forest fires. GHG resulting from deforestation are mostly carbon dioxide with lesser amounts of methane and carbon monoxide. Besides its impacts on the climate system, deforestation is one of the most critical environmental problems facing developing countries today in terms of its long-term negative impact on biodiversity, loss of economic opportunities and increased social disparity.

Forests can contribute to solving climate change related problems. The role of forests in carbon sequestration as a result of photosynthesis has been demonstrated. Because trees have a much longer lifespan than agricultural crops, they act as long-term reservoirs, which lock up the carbon for decades, even centuries, in the form of cellulose and lignin. Therefore, enhancing carbon sinks and reducing deforestation can contribute substantially to mitigating climate change and its impacts on ecological and social systems.

Impacts on forests

The impacts of climate change are likely to affect all forest landscapes. Indeed, the predicted change in climate variables will place severe pressure on forests' ability to adapt to these and to survive. With rising temperatures, changes in water availability and expected double levels of carbon dioxide, it is expected that forests will change at two levels: physiology and metabolism; and ecosystem functioning (see table 1). These changes will impact the availability and quality of both forest goods and services.

Table 1: Summary of climate change impacts on forest ecosystems

Climate factor	Cell level	Organism level	Species level	Ecosystem level
CO ₂ increase	Photosynthetic rate increase Stomatal conductance reduction	Growth rate increase Water use efficiency increase Seed production increase	Decreased seed mortality Increased recruitment Period for individuals to reach maturity Changes in individual density?	Biomass production increase Alterations in species competitiveness Changes in species composition
Temperature increase	Photosynthesis increase or decrease Photosynthetic period can increase Transpiration increase	Primary production positive or negative changes Seed production changes	Regeneration rate changes Possible increase in tree mortality Negative consequences for species sensitive to temperature changes	Alterations in species competitiveness Species' composition changes Soil mineralization increase
Rainfall regime changes	Growth rate decrease	Seed mortality rate increase	Increase of mature individuals' mortality rate	Alterations in species competitiveness Species composition changes

Source: Meer, Kramek and Wjik, 2001.

The socioeconomic impacts of these changes in tropical forests have not been quantified yet. However, the following potential impacts on trade of forest goods and services can be listed:

- Decrease in timber production as a result of increased extreme events such as forest fires, hurricanes, flooding and droughts;
- Decrease in timber production due to changes in ecosystems and increased pests;
- Changes in the quality of timber;
- Changes in the regional distribution of timber species;
- Impacts on the ability of some species designed for productive plantations to maintain growth rate and wood quality over the next 30 - 50 years;
- Indirect impacts on the timber chain due to changes in quantity and quality of timber offer;
- Impacts on the availability and quality of forest ecosystem services;
- Impacts on forests-dependant livelihoods; and
- Changes in land use due to an increasing demand for agricultural land.

3 International Climate Policy

Evidence of human interference with the climate first emerged in 1979 at the First World Climate Conference. Increased scientific evidence, coupled with growing public concern over global environmental issues began to push climate change onto the political agenda in the mid-1980s. Recognizing the needs of policymakers for authoritative and up-to-date scientific information, the World Meteorological Organization (WMO) and the UN Environmental Programme (UNEP) established the Intergovernmental Panel on Climate Change (IPCC) in 1988².

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

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

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

The UNFCCC agreed on two main strategies to address climate change: mitigation and adaptation. These strategies are complementary and non-exclusive.

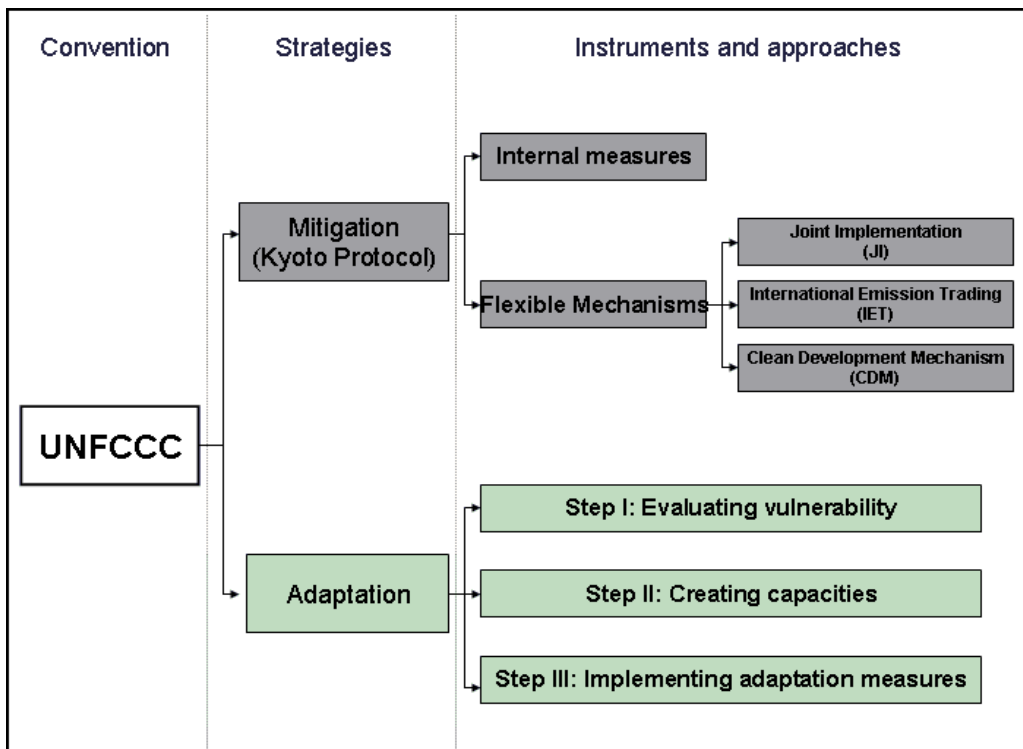
Mitigation refers to an anthropogenic intervention to reduce the emission of GHG at the source or to enhance sinks (IPCC, 2001). At the third COP, held in Kyoto in 1997, the Parties to the Convention adopted a protocol aimed at paving the way for emission reduction in Annex I countries until 2012³ (see figure 1). This instrument is known as the Kyoto Protocol (see figure 2).

Adaptation to climate change refers to adjustments in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderate, harm or exploit beneficial opportunities. Various types of adaptation can be distinguished, including anticipatory and reactive adaptation, private or public adaptation and autonomous or planned adaptation.

Fig 2: Strategies, Instruments and Approaches to tackle Climate Change

² Until now the IPCC has produced three assessment reports, a special report on Land Use Land Use Change and Forestry and several specific guidelines in respect to climate change and natural resources.

³ Annex I countries are Parties that have emission reduction commitments (mainly industrialized countries). A list of Annex I countries is provided in the annex to this publication.



4 Adaptation

Progress in addressing adaptation has been slower than for mitigation. As part of their First National Communication, Parties have defined their vulnerability to climate change, and many countries have established the vulnerability of the forestry sector.

At COP-9, the Subsidiary Body for Scientific and Technological Advice (SBSTA) was required to initiate work on scientific, technical and socioeconomic aspects of, and vulnerability and adaptation to, climate change. In response, the UNFCCC Secretariat planned a workshop held during the SBSTA meeting of June 2004. During this first meeting three themes were explored, namely vulnerability and risks, sustainable development, and solutions and opportunities. Forestry is among the sectors that will be included in the workshop. As the first workshop delivered important insights the Secretariat now organizes a workshop on vulnerability and adaptation as part of the usual agenda of the SBSTA. Other issues considered in these workshops over time are *is.a.* social issues in adapting, the role of technology transfer, costs of adapting to climate change (for more information see the corresponding web pages as http://unfccc.int/meetings/sb22/in_session_workshops/items/3443.php)

In parallel to the UNFCCC process, some multilateral organizations, research institutions and NGOs have been working on forests and adaptation to climate change (see Robledo and Forner 2005, IISD/IUCN/SEI-B/Intercooperation 2002, Robledo und Tipmann. 2004).

On one hand, tropical forests are likely to be subject to negative impacts from climate change. On the other hand, projects on sustainable forest management can reduce vulnerability to natural and social systems. Guidance, methodologies and tools for sustainable forestry and adaptation to climate change are being developed (see Compendium on methods and tools to evaluate the impacts of, vulnerability and adaptation to climate change).

With this regard the Food and Agriculture Organization of the United Nations (FAO) in a joint effort with Intercooperation and co-financed by the Swiss Agency for Development and Cooperation (SDC) have recently published the "Adaptation of forest ecosystems and the forest sector to climate change" (Robledo and Forner, 2005). This document summarizes information that facilitates the definition and formulation of policies and projects aimed at decreasing vulnerability to climate change, with special emphasis on forest

ecosystems and the social groups that depend on them. It emphasizes that adaptation to climate change must be part of a country's development process, and that every adaptation action should be framed within the national development policies.

Initially the document introduces the topic of climate change in the context of international policy-making, its relationship to sustainable development, and the most important environmental conventions of the United Nations organization. Following it provides a theoretical basis for responding to the problem of climate change, starting with a summary of the scientific knowledge accumulated so far. It also presents a description and analysis of positive and negative impacts deriving from a changing climate, with emphasis on forest ecosystems. This chapter includes a summary of methodologies for vulnerability analysis. The next chapter focus on the challenges for institutional development at the national level, including the importance of adaptation policy as the framework for actions aimed at decreasing vulnerability. Further, the document presents stages in the process of adapting to climate change and their concrete application in the forest sector. Following it focuses on projects for each stage of the adaptation process. It presents examples of potential projects that cover the national, sub-national and very local levels. A methodology for formulating such projects is also described. Finally it deals with financing. It considers the limitations of UNFCCC and widens the spectrum to include all those entities and financial mechanisms that are interested in sustainable forest management.

The linkage between mitigation and adaptation in forestry should also be considered. In addition to their role in mitigation, CDM projects in forestry can contribute to reduce vulnerability. However, in many areas, some species planted today could be highly vulnerable to climate change in some decades. CDM activities in forestry should therefore consider climate change scenarios.

5 The Clean Development Mechanism and Forestry

During the third COP, held in Kyoto in 1997, the Parties of the Convention adopted a protocol that aimed to pave the way for emission reduction in Annex I countries. This document is known as *The Kyoto Protocol*.

The Kyoto Protocol defines two main ways to achieve emission reductions: internal measures taken in the Annex I countries and the flexible mechanisms. The latest allow Annex I countries to "buy" part of their reductions commitments in other countries. There are three such Flexible Mechanisms: Joint Implementation, Clean Development Mechanism and International Emission Trading⁴.

The Clean Development Mechanism has a twofold objective: on one side emission reduction from CDM projects shall help Annex I countries in fulfilling their reduction commitments. On the other these projects have to promote sustainable development in the host countries. Criteria and indicators to demonstrate that shall be set by each host country and should be inline with its general development strategy.

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

- "Marrakesh Accords", COP-7, 2001 (FCCC/CP/2001/13):
 - o Dec. 11/CP.7: "Land Use, Land-Use Change and Forestry"
 - o Dec. 17/CP.7: "Modalities and procedures for a clean development mechanism as defined in Art. 12 of the Kyoto Protocol"
- COP-9, 2003 (FCCC/CP/2003/6):

⁴ Joint Implementation (Art. 6): "Any Party included in Annex I may transfer to, or acquire from, any other such Party emission reduction units resulting from projects aimed at reducing anthropogenic emissions by sources or enhancing anthropogenic removals by sinks of greenhouse gases in any sector of the economy..."

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

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

- Dec. 19/CP.9: “Modalities and procedures for afforestation and reforestation project activities under the clean development mechanism in the first commitment period of the Kyoto Protocol”
- COP-10, 2004 (FCCC/CP/2004/10)
 - 13/CP.10 “Incorporation of the modalities and procedures for afforestation and reforestation project activities under the clean development mechanism into the guidelines under Articles 7 and 8 of the Kyoto Protocol”
 - 14/CP.10 “Simplified modalities and procedures for small-scale afforestation and reforestation project activities under the clean development mechanism in the first commitment period of the Kyoto Protocol and measures to facilitate their implementation”
 - 15/CP.10 “Good practice guidance for land use, land-use change and forestry activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol”.
- COP-11, 2005 (FCCC/CP/2005/10)
 - Decision -/CMP.1 “Simplified modalities and procedures for small-scale afforestation and reforestation project activities under the clean development mechanism in the first commitment period of the Kyoto Protocol and measures to facilitate their implementation”

All these decisions were accepted by the first Meeting of the Parties (MOP), which took place in Montreal, Canada in December 2005

What are the implications of these decisions and guidance for participating in CDM projects?

The most important elements of these decisions are:

- Definition of the CDM market size for forestry activities;
- Definition of eligible forestry activities;
- Definition of the modalities and procedures for CDM projects in forestry; and
- Definition of small-scale projects and their first simplified methodology.

Market size

In the Marrakesh Accords, the participation of forestry activities in climate change mitigation was restricted for internal measures in Annex I countries as well as for the CDM. Regarding the CDM, the market demand during the first commitment period (2008-2012) is restricted to one per cent of the emissions of each Annex I country in 1990, multiplied by five⁵.

Eligibility

Several project activities are eligible under the CDM, both in the energy sector and LULUCF sector. Until 2012, eligible LULUCF activities under the CDM are restricted to afforestation and reforestation (see box 1). Activities in bioenergy are also eligible until 2012.

Box 1: Key definitions under the UNFCCC

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

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

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

⁵ For the first commitment period, the total of additions to a Party's assigned amount resulting from eligible LULUCF project activities under Article 12 shall not exceed one per cent of base year emissions of that Party, times five (FCCC/CP/2001/13, Marrakesh Accords, Dec. 11/CP.7).

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

Source: FCCC//CP/2001/13

According to UNFCCC definitions, following forestry activities could be interesting for reforestation and afforestation under the CDM:

- a) Plantations non-forest land by 1990, including:
 - monocultures
 - planting more species than planned without the carbon incentive;
 - extended rotation periods; and
 - bioenergy plantations.
- b) Forest land restoration and rehabilitation
- c) Agroforestry activities
- d) Silvopastoral activities

Modalities and procedures

The modalities and procedures for the CDM define the project cycle and the requirements for each of the steps of the cycle.

The CDM project cycle includes seven major steps: design; validation; registration; monitoring; verification; certification; and issuing of the CERs (see box 2).. The cycle involves the participation of a relatively wide range of actors, including project developers, the National Authority, the Operational Entity, the CDM Executive Board and the Working Group on Afforestation and Reforestation

Box 2 Steps of a CDM project activity

Validation is the process of independent evaluation of a proposed afforestation or reforestation project activity under the CDM by a designated operational entity (DOE) against the requirements of afforestation and reforestation project activities under the CDM.

Registration is the formal acceptance by the Executive Board of a validated project as an afforestation or reforestation project activity under the CDM. Registration is the prerequisite for the verification, certification and issuance of temporary CERs (tCERs) or long-term CERs (ICERs) relating to that project activity.

Monitoring is the activity to control the implementation of the project activity against the documentation provided in the project design document (PDD) and produced during the design step.

Verification is the periodic independent review and *ex post* determination by the DOE of the achieved net anthropogenic greenhouse gas removals by sinks, since the start of the project, by an afforestation or reforestation project activity under the CDM.

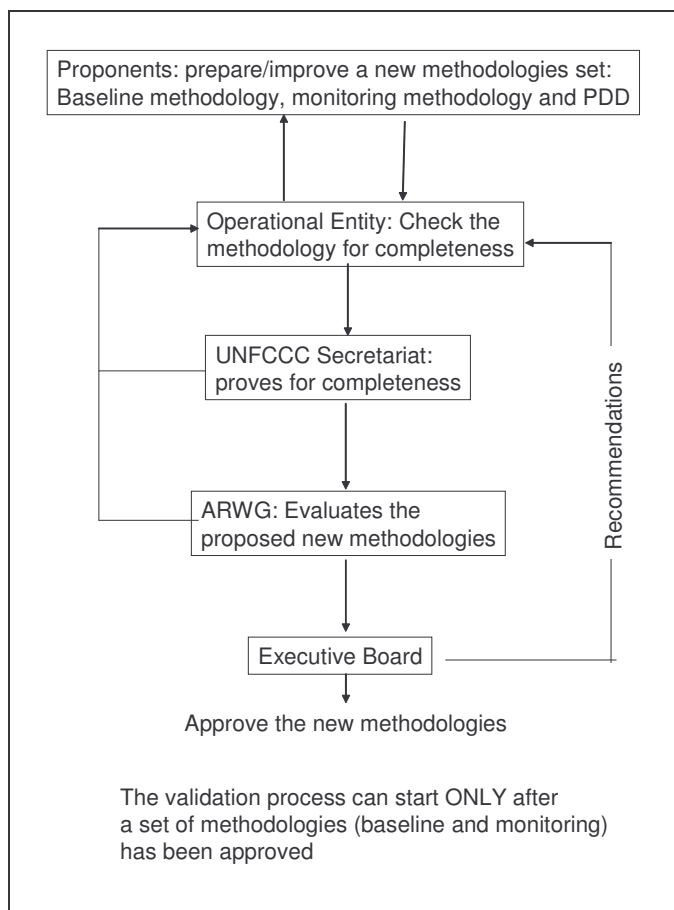
Certification is the written assurance by a DOE that an afforestation or reforestation project activity under the CDM achieved the net anthropogenic greenhouse gas removals by sinks since the start of the project, as verified.

Issuance refers to the actual emission of CERs.

Source FCCC/CP/2003/Add. 2, Dec 19/CP9

The CDM project cycle is very challenging. Experience has shown that due to complexity, CDM projects can have higher transaction costs than other activities related to forest products or services. Before a project can be validated the used methodologies for baseline and monitoring have to be approved by the Executive Board. The approval process involves the project proponents, one operational entity, the Working Group on Afforestation and Reforestation (ARWG) and the Executive Board (see figure 3)

Figure 3: Process for approving a set of AR-CDM methodologies



In order to be validated, project participants have to present a Project Design Document (PDD), which needs to provide enough information on additionality, permanence, leakage, definition of the carbon potential, and environmental and socioeconomic impacts (see box 3 and FCC/CP/2003/Add. 2).

Box 3: Some key elements to be included in the Project Design Document

Additionality means that a A/R CDM project has to be additional to any activity that would have taken place in the absence of the project. Additionality is the result of the carbon sinks created by the project (project scenario) minus those sinks that would exist in the absence of the project (baseline). Additionality refers only to the additional amount of CO₂e sequestered due to the project activity.

Permanence relates to the period of time that carbon can stay in the biosphere. Due to different risks, including fires and pests, carbon can be released into the atmosphere, thereby reducing the climate change mitigation effect of a project. To solve this problem, A/R CDM projects have to choose between temporary CERs (tCER) or long-term CERs (ICER).

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

The **carbon potential or net anthropogenic greenhouse gas removals by sinks** is the actual net GHG removals by sinks minus the baseline net GHG removals by sinks minus leakage;

Environmental and socioeconomic impacts. An A/R CDM project has to provide enough information on potential negative environmental and socioeconomic impacts. If any negative impact is considered significant by the project participants or the host Party, an impact assessment has to be conducted, and impacts have to be monitored during the project's implementation.

Besides, the PDD shall include information on the legal title to the land, rights of access to the carbon, a detailed monitoring plan and information on sources of public funding for the project activity. The monitoring plan shall include:

- Collection and archiving data on the GHG fluxes;
- Identification of potential leakages;
- Monitoring activities for potential socioeconomic and environmental impacts considered as significantly negative;
- Changes that affect legal title to the land or rights of access to the carbon pools; and
- Procedures for periodic calculations of GHG fluxes.

Small-scale projects

Small-scale project activities are defined as “those that are expected to result in net anthropogenic GHG removals by sinks of less than 8 Kilotonnes of CO₂ per year and are developed or implemented by low-income communities and individuals, as determined by the host Party. If a small-scale afforestation or reforestation project activity under the CDM results in net anthropogenic GHG removals by sinks greater than 8 Kilotonnes of CO₂ per year, the excess removals will not be eligible for the issuance of tCERs or ICERs” (FCC/CP/2003/Add. 2, Dec. 19/CP9 and Dec.14/CP.10).

Small-scale projects were defined to promote participation of small-scale farmers and local communities in the CDM. These projects aim to improve the socioeconomic and environmental conditions of poor communities, which are currently implementing unsustainable land use practices on degraded land due to lack of knowledge or opportunities. For this reason small scale projects won't pay the 2% foreseen for the Adaptation Fund.

Simplified methodologies for small-scale reforestation and afforestation activities under the CDM were prepared by the ARWG and the Executive Board and agreed during the first MOP in December 2005.

Table 2 Glimpse on CDM and forestry activities

Key issues	Explanation
Eligible activities in LULUCF until 2012	Afforestation and reforestation (as defined in the UNFCCC)
Units	Certified Emission Reduction (CER)
Size of the potential market	(1% Annex I emissions in 1990) * 5
Project cycle	<ol style="list-style-type: none"> 1. Design 2. Validation 3. Registration 4. Implementation and monitoring 5. Verification 6. Certification 7. Issuance of the CERs
Relevant decisions	Dec. 11/CP7 Dec. 17/CP7 Dec. 19/CP9 Dec. 14/CP10 Dec. 15/CP.10 Dec./CMP.1
Small-scale projects	Activities expected to result in carbon removals by sinks of less than 8 Kilotonnes of CO ₂ per year and developed or implemented by low-income communities and individuals

At the moment we write this paper some methodologies for the definition of the baseline and for monitoring for full size projects have been already approved. Project proponents can download the approved methodologies from the web page reporting the meetings of the CDM Executive Board (<http://cdm.unfccc.int/EB/Meetings>), specifically under issues related to procedures for afforestation and reforestation project activities.

Finally, it should be mentioned that during the last COP in Montreal discussions on “avoiding deforestation” in non-Annex I started again. Parties and observers have been invited to develop proposals on the issue, which will be discussed during the next two years.

Good Practice Guidance for Land Use, Land-Use Change and Forestry

An important document regarding mitigation activities in the forest sector is the *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (GPG-LULUCF), prepared by the IPCC. This document provides supplementary methods and good practice guidance for estimating, measuring, monitoring and reporting on changes in carbon stock and GHG emissions from LULUCF activities. The guidance is to be used for the definition of GHG national inventories and for the implementation of the Kyoto Protocol (IPCC, 2003).

The GPG-LULUCF is designed to be consistent with other guidance from the IPCC. In this regard, even if the GPG-LULUCF takes into account frameworks related to forest and forestry developed by other institutions (e.g. FAO, CIFOR or ITTO), it defines its own framework. In order to use this guidance successfully, it is necessary to understand differences and similarities between IPCC definitions and other definitions. Chapter 2 of the GPG-LULUCF is a good entry point, which defines six categories of land in relation to which the guidance can be applied. These are forest land, cropland, grassland, wetlands, settlements and other land (see box 4).

Box 4 Land use categories in the GPG-LULUCF

(i) Forest land

This category includes all land with woody vegetation, consistent with thresholds used to define forest land in the national GHG inventory, sub-divided at the national level into managed and unmanaged, and also by ecosystem type as specified in the *IPCC Guidelines* (since forest management has a particular meaning under the Marrakesh Accords, a subdivision of managed forests as described in Chapter 4 of the GPG-LULUCF may be required). The category also includes systems with vegetation that currently fall below, but are expected to exceed, the threshold of the forest land category.

(ii) Cropland

This category includes arable and tillage land, and agro-forestry systems where vegetation falls below the thresholds used for the forest land category, consistent with the selection of national definitions.

(iii) Grassland

This category includes rangelands and pasture land that is not considered as cropland. It also includes systems with vegetation that falls below the threshold used in the forest land category and are not expected to exceed, without human intervention, the threshold used in the forest land category. The category also includes all grassland from wild lands to recreational areas as well as agricultural and silvi-pastoral systems, subdivided into managed and unmanaged consistent with national definitions.

(iv) Wetlands

This category includes land that is covered or saturated by water for all or part of the year (e.g. peatland) and that does not fall into the forest land, cropland, grassland or settlements categories. The category can be subdivided into managed and unmanaged according to national definitions. It includes reservoirs as a managed sub-division and natural rivers and lakes as unmanaged sub-divisions.

(v) Settlements

This category includes all developed land, including transportation infrastructure and human settlements of any size, unless they are already included in other categories. This should be consistent with the selection of national definitions.

(vi) Other land

This category includes bare soil, rock, ice, and all unmanaged land areas that do not fall into any of the other five categories. It allows the total of identified land areas to match the national area, where data are available. Carbon pools would not need to be addressed for this category, but it is included for checking overall consistency of land area.

Source IPCC, 2003

Further, Chapter 2 outlines three approaches for categorizing land areas using the categories defined previously. The approaches are basic land-use data, survey of land use and land-use change and geographically explicit land-use data. These approaches are not mutually exclusive and a mix of approaches can be used.

Chapter 3 of the guidance provides advice on how to estimate emissions and removals of CO₂ and non-CO₂ GHG for two types of situations: those where land use remains the same over time; and those where land use changes to another category.

Chapter 4 deals with supplementary methods and good practice arising from the Kyoto Protocol. It covers all activities under the Protocol, such as afforestation, reforestation and deforestation since 1990 (Art. 3.3 of the Kyoto Protocol) as well as forest management, cropland management, management of grazing land and revegetation (Art. 3.4 of the Kyoto Protocol). Chapter 4 also provides advice on identifying project boundaries and sampling strategies for project activities under joint implementation as well as under the CDM. This makes Chapter 4 particularly important for designing, implementing and monitoring CDM project activities as well as for designing corresponding methodologies.

6 The situation of Africa

Africa as continent is highly vulnerable to climate change. An analysis made by Intercooperation on behalf of the Swiss Agency for Development and Cooperation (SDC) illustrates that on one side the biophysical direct impacts of climate change specially those related to dramatic changes in rain patterns will highly affect many of the African countries. Besides, and also for high relevance the study points out that both the socio-economic and institutional structures in Africa are also highly vulnerable to changes in the climatic system (Intercooperation, 2005). More detailed studies in i.e. Mali and Tanzania fully confirmed these results.

In response to this dramatic situation some African countries are preparing their National Adaptation Programmes of Action (NAPA) with support of different multilateral institutions⁶. These NAPAs should identify priority activities that respond to their urgent and immediate needs with regard to adaptation to climate change. The rationale for NAPAs rests on the limited ability of LDCs to adapt to the adverse effects of climate change. In order to address the urgent adaptation needs of LDCs, a new approach was needed that would focus on enhancing adaptive capacity to climate variability, which itself would help address the adverse effects of climate change. The NAPA takes into account existing coping strategies at the grassroots level, and builds upon that to identify priority activities, rather than focusing on scenario-based modeling to assess future vulnerability and long-term policy at state level. In the NAPA process, prominence is given to community-level input as an important source of information, recognizing that grassroots communities are the main stakeholders. <http://unfccc.int/adaptation/napas/items/2679.php>

With regard of the potential of the A/R CDM in Africa the situation changes from country to country. In general terms the major challenges are on the institutional side as follows: for the DNAs there is a challenge in preparing the requirements for approving projects, in defining forest thresholds for each country and in defining “poor communities or individuals” for participating in the small scale projects (as required by Dec. 19/CP.9 and 14 CP.10). Further, issues related to land tenure can affect the participation of Africa in the A/R CDM as tenure and access to the carbon pools has to be clear in the PDD. This issue is of especial attention as in many countries the offices responsible for the CDM do not belong to the same Ministry as the offices responsible for forest law enforcement. Therefore it is relevant to assist African countries in creating a coordinated institutional framework that promotes A/R CDM project activities.

Some new and positive developments are worth to be mentioned here. In the past months A/R CDM projects activities in 7 African countries have been included in the short list of the BioCarbon Fund (DR Congo, Madagascar, Niger, Ethiopia, Mali and Uganda). One project in Uganda has already signed the ERPA contract with the BCF.

Further the first validation process for 5 small-scale projects is going to take place very soon in Uganda. The Nile Basin Reforestation Project, which is an associated project to ENCOFOR, will serve to meet the objective of expansion of the wood resources of Uganda. This expansion is crucial for the country to meet the growing national demand of wood resources and to reduce the pressure on the remaining natural forests in the region. Currently only a few thousand hectares of

⁶ The following are the African countries included as LDC and therefore those that can formulate a NAPA: Angola, Benin, Burkina Faso, Burundi, Cape Verde, Central African Republic, Chad, Comoros, Democratic Republic of Congo, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Lesotho, Liberia, Madagascar, Mali, Mauritania, Mozambique, Niger, Ruanda, São Tomé and Príncipe, Senegal, Sierra Leone, Somalia, Sudan, Togo, Uganda and the United Republic of Tanzania.

timber plantations remain in Uganda. The project will establish a plantation of pine and mixed native species in grassland areas within Rwoho Central Forest Reserve (for more information see <http://www.joanneum.at/encofor/casestudies/uganda.html>)

7 Looking forward

Regarding adaptation and forest ecosystem, there are new developments on the ground. A fast overview includes e.g. the “Tropical forest, Climate Change and Adaptation” (TroFCCA). The project, which is implemented by CIFOR and CATIE is a research initiative on adaptation to climate change and the forest sector. During its four years (2005 – 2009), it expects to produce research relevant for policy processes in the countries where it will be implemented by:

- Focusing its activities on development topics of regional/national priority and for which forests play a substantial role; these topics will be chosen in consultation with national governments and as part of a policy dialogue implemented through workshops.
- Developing methodologies to assess vulnerability relating to the topics identified above.
- Applying these methodologies to assess vulnerability to identify adaptation priorities.
- Developing work on adaptation in conjunction with national partners, aimed at specifying adaptation needs and strategies in the context of the above development topics.
- Identifying and developing ways to incorporate adaptation concerns into national policies, including sectorial ones.
- Triggering innovative mechanisms to finance adaptation, like the participation of the private sector.
- Establishing a regional policy dialogue to enhance regional cooperation on adaptation

Other initiatives as the project on “Livelihoods and Climate Change” (IISD, Intercooperation, IUCN, SEI-B), are more focused on adaptation at the local level. This project is aimed at strengthening the role of ecosystem management and restoration (EM&R) activities in reducing the vulnerability of communities to climate-related hazards and climate change. A main output of this project is a community-based risk screening tool (CRiSTAL), which relates the livelihood approach and adaptation to climate change. In order to help project planners and managers to understand and enhance their project’s impacts on adaptive capacity, the tool is structured to:

- 1) Set the climate context: Identify the impacts of current climate hazards and climate change in the project area, particularly on local livelihoods
- 2) Set the livelihood context: Identify the resources needed to help people conduct their livelihoods and cope with these impacts
- 3) Screen project activities: Assess how project activities affect the availability and access to resources that are central to livelihoods and coping strategies
- 4) Manage climate risk: Adjust the project so that opportunities to enhance resource availability / access are strengthened, and activities that undermine activities/access are adjusted

These are just starting steps in the long way of enhancing adaptation of forest ecosystems and forest depending people to the impacts of climate change. All these efforts should be undertaken under a clear guidance of the principles and plan for sustainable development of each country as well as considering the specificities of each livelihood. Only through coordination of intersectoral policies and under understanding of macro-micro linkages it will be possible to increase resilience and adaptation capacities of natural and social systems.

Regarding the potentialities for forestry due to the mitigation strategy it is important to recognise the development opportunities through the CDM. On one side considering the difficulties to demonstrate the requirement of additionality, A/R CDM projects may not be large-scale traditional plantations. However, or perhaps because of it other activities should be considered whereby opportunities to create strategic

partnerships between forest industry and local communities could result in win-win situations (Robledo and Tipper, 2004). The following examples illustrate some of these opportunities:

- a) **Multi-component projects** combining different activities and aimed at restoring or rehabilitating forest land;
- b) **Diversification of local income** through payment for the environmental service of mitigating climate change
- c) **Bioenergy** to increase productivity of the timber industry through the use of waste wood and/or reduction of fuel wood consumption from natural forests as well as promoting bioenergy plantations on non forest land;
- d) **Reduction of conflicts with local communities** through the promotion of partnerships between local communities (e.g. farmers, municipalities, indigenous peoples, etc...) and the timber industry.);
- e) **Contribution to food security** through activities in agroforestry and silvopasture on degraded land that can deliver important nutritional complements to local communities; and
- f) **Watersheds management:** CDM payments could leverage projects for forests rehabilitation and restoration that have beneficial impacts on degraded watersheds.

The San Nicolas project in Colombia is a good example of a project with multiple positive effects. This project, financed by ITTO, CORNARE and EMPA⁷ is aimed to promote sustainable forest management in an area of 72.000 ha. The projects cover a CDM component (reforestation) and a non CDM component (forest restoration). A forest management plan has been agreed with the local community through a participative decision making over three years. The project has developed all the information required by the CDM and is currently presenting its own methodologies for approval. Besides, the project has implemented a capacity building programme that covers matters related to the CDM (e.g. biomass measuring or monitoring by community members) as well as techniques aimed to produce and commercialize many timber and non timber forest products (many NTFP have been included due to their improvement in food sources for the local community). As a legal entity the project created the Corporation MASBOSQUES. This is a public-private partnership that reunites private sector, municipalities, research institutions, the local Catholic Church (with a high credibility in the region for conflict resolution matters) and more than 40.000 small farmers. MASBOSQUES developed a representation structure, agreed by all parties, which ensure that small farmers are key players in all decision-making processes. Additionally each single farmer (without to take into account the size of its farm) can independently decide to participate in the CDM. This participation scheme used in the San Nicolas project has proved to reduce tensions in an area seriously affected by violence. The project has been included in the short list of candidates of the BioCarbon Fund.

Even under the present situation, in which no project has being registered yet, the CERs market is slowly starting specially due to the activities undertaken by some potential investors as the funds developed by the World Bank (namently the Community Development Fund and the BioCarbon Fund). Additionally, it is expected that the CERs market will grow significantly before the end of the first commitment period in 2012. That let think that the CDM can still represent an alternative for forestry projects that otherwise could never be implemented.

An important fact in the development of A/R CDM projects is that the Executive Board (EB) of the CDM has already approved 4 methodologies for "full-scale" projects and the COP11 accepted the methodology for small-scale project activities. Further, the EB has approved some important clarifications on key issues as eligibility tool, additionality tool, afforestation and reforestation in the baseline, etc prepared by the Afforestation/reforestation Working Group. This methodologies and clarifications provide a framework for designing projects faster and easier than years before. For more information see <http://cdm.unfccc.int/Panels/ar>

Pilot project should systematically search for and use synergies between mitigation and adaptation activities in such a way, so that projects have a measurable impact.

⁷ ITTO: International Tropical Timber Organisation
CORNARE: Autonomous Regional Corporation OF the Rionegro-Nare Region
EMPA: Swiss Federal Laboratory for Material Testing and Research

8 Abbreviations

ARWG	Afforestation and Reforestation Working Group of the Executive Board of the CDM
CDM	Clean Development Mechanisms
CER	Certifies Emission Reductions
COP	Conference of the Parties
EB	Executive Board of the CDM
GEF	Global Environmental Facility
GHG	Greenhouse Gases
IPCC	Intergovernmental Panel on Climate Change
JI	Joint Implementation
KP	Kyoto Protocol
LULUCF	Land Use Land Use Change and Forestry
MOP	Meeting of the Parties of the Kyoto Protocol
PCF	Prototype Carbon Fund (World Bank)
PDD	Project Design Document
SBI	Subsidiary Body for Implementation
SBSTA	Subsidiary Body for Scientific and Technological Advice
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change

9 Glossary

Mitigation

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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