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FINANCING MECHANISMS TO REDUCE EMISSIONS FROM DEFORESTATION: ISSUES IN DESIGN AND IMPLEMENTATION

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FOREWORD

This document was prepared by the OECD and IEA Secretariats in Autumn 2007 in response to the Annex I Expert Group on the United Nations Framework Convention on Climate Change (UNFCCC). The Annex I Expert Group oversees development of analytical papers for the purpose of providing useful and timely input to the climate change negotiations. These papers may also be useful to national policy-makers and other decision-makers. In a collaborative effort, authors work with the Annex I Expert Group to develop these papers. However, the papers do not necessarily represent the views of the OECD or the IEA, nor are they intended to prejudge the views of countries participating in the Annex I Expert Group. Rather, they are Secretariat information papers intended to inform Member countries, as well as the UNFCCC audience.

The Annex I Parties or countries referred to in this document are those listed in Annex I of the UNFCCC (as amended at the 3rd Conference of the Parties in December 1997): Australia, Austria, Belarus, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, the European Community, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Liechtenstein, Lithuania, Luxembourg, Monaco, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom of Great Britain and Northern Ireland, and United States of America. Korea and Mexico, as OECD member countries, also participate in the Annex I Expert Group. Where this document refers to "countries" or "governments", it is also intended to include "regional economic organisations", if appropriate.

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All OECD and IEA information papers for the Annex I Expert Group on the UNFCCC can be downloaded from: **www.oecd.org/env/cc/aixg**

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Executive Summary

An international financing mechanism to reduce emissions from deforestation (and degradation) – RED(D) -- in developing countries could address a significant fraction of global anthropogenic greenhouse gas (GHG) emissions. Emissions from deforestation in recent years are estimated to be in the range of 6-16% of global greenhouse gas (GHG) emissions (IPCC 2007c, d). In a post-2012 framework, such a mechanism could provide financial incentives for developing countries to take actions to reduce GHG emissions and could help to lower the economic costs of achieving global emissions reductions, making an important contribution to the achievement of stringent long-term mitigation goals.

This paper identifies key features and examines performance issues pertinent to the design and implementation of a fund- or market-based mechanism to RED(D). Four key features relevant to an environmentally-effective and economically-efficient financing mechanism are:

- Establishing clear goals and objectives
- Ensuring sufficient and long-term sources of funding
- Developing eligibility and prioritisation criteria
- Ensuring accurate and consistent monitoring and performance evaluation

The paper reviews and assesses the recent proposals for RED(D) financing mechanisms under the UN Framework Convention on Climate Change (UNFCCC) to consider how they address these features. The proposals vary significantly in terms of their goals (capacity building vs. RED), their scope (deforestation only or with forest degradation), and the types of mechanisms that would be used (national vs. project-level).

The objective of the UNFCCC would be a logical starting point for the definition of specific goals for financing mechanisms to RED(D). Ideally the mechanism would contribute to stabilisation of atmospheric concentrations of GHG (Article 2) through a reduction in global emissions from deforestation over time. Article 2 of the UNFCCC also refers to "sustainable" economic development and thus one goal of any mechanism for RED(D) might be to lower the global costs of mitigation. To achieve this goal, a financing mechanism would need to ensure that emissions reductions are additional, measurable and long-term.

In order to be able to meet such goals and objectives, sources of RED(D) financing need to be sufficient and long-term. In the case of fund-based mechanisms, it is often difficult to assess whether proposed sources of funding would be sufficient because: i) objectives in the proposals are not always clearly specified; ii) existing estimates of financing needs vary widely; and iii) pledges for funding (e.g. voluntary contributions) are not always fulfilled. Under the right conditions, a market-based mechanism would be able to mobilise the financial resources necessary, including from the private sector, and would be able to achieve emissions reductions where they are economically efficient. Market-based mechanisms can take the form of a cap-and-trade or baseline-and-credit schemes. While either type of mechanism is possible, to date none of the proposals suggest a cap-and-trade scheme.

The minimum eligibility requirements for participation in a financing mechanism for RED(D) need to be defined in order to ensure environmental performance. In the case of both fund- and market-based mechanisms, further work is necessary to identify eligibility criteria, especially regarding monitoring and reporting requirements that would be required to support the mechanism. In the case of fund mechanisms to support capacity building, eligibility criteria and priorities for fund allocation need to be established *ex ante* so that funds can be disbursed in a cost-effective manner. Developing countries could assess and prioritise their capacity building needs (based on e.g., a guidance document provided by an international body). Alternatively, financial resources could be distributed based on a host country's ability to contribute to low cost emissions reductions. Further work would also be required in terms of clarifying definitional issues on deforestation and degradation.

The ability of a financing mechanism for RED(D) to deliver environmental and economic performance will also depend crucially on the design of the mechanism. The design issues considered in this paper, and key conclusions for each, are outlined below.

Monitoring

A key priority is to establish accurate and consistent monitoring of emissions from deforestation (and degradation). Margins of error for changes in carbon emissions are currently too large to support implementation of a market mechanism where baselines depend upon accurate understanding of past emissions and where credits from RED(D) could be used inter-changeably with existing credits in the international carbon market. If a financial mechanism for RED(D) is to move forward, monitoring methods require the urgent attention of the international community. Reliable monitoring is necessary to underpin management of emissions from deforestation, baseline development (or target setting) as well as detection of leakage and permanence. Inevitably, national governments need to have the capacity to monitor and report performance of national-scale activity. At the international level, there will also be a need for capacity to compare, review and assess performance across nations and/or projects. Thus institutional capacity is necessary both internationally and at the national level to implement a mechanism for RED(D).

Using the pre-existing framework under the Convention and Protocol, it should be possible to build new functions and responsibility for monitoring of emissions from deforestation in developing countries. Integrating the monitoring function for any new RED(D) mechanism into this framework will ultimately enhance the ability of Parties to assess overall mitigation performance across the international climate regime. It will require some work and time to determine what is necessary and to put it in place as an integral part of the institutional apparatus under the Convention. The harmonisation of accounting methods and the development of comparable baselines and national data on emissions from deforestation will be a necessary starting point for any financial mechanism for RED. The IPCC Inventory Guidelines and Good Practice Guidance establishes the groundwork for improved national monitoring including data collection, inventory preparation and reporting.

Baselines, Leakage and Permanence

Baselines (or caps) are necessary to assess mitigation performance and provide a means to determine whether emission reductions achieved are additional to what would have occurred anyway. In principal, estimates of past trends of deforestation emissions are required in order to assess whether an emissions baseline is appropriate when assessed against past experience. It is also desirable to consider expectations about the future in the development of baselines. Minimum data requirements are time-series for forest areas and for carbon stocks associated with these areas (together with corresponding uncertainty levels), ideally over a decade or more. Though data on forest area is widely available and more reliable, most developing countries do not have accurate or complete data on emissions from deforestation. There are also likely to be high levels of uncertainty in estimating baselines and thus the need to be conservative in choice of assumptions or interpretation of the data used for their development.

Leakage can occur in both fund and market-based mechanisms. Leakage refers to deforestation activities that move from one area to another. Given the large potential magnitudes of intra-national leakage, a national baseline would significantly promote the environmental integrity of a mechanism for RED. Leakage across country boundaries (i.e. international leakage) could be accounted for by broad international participation, for example, indicating that a RED(D) mechanism could only come into effect once X developing countries representing Y% of total emissions from deforestation are included (similar to requirements for the Kyoto protocol to come into effect).

Ensuring permanence of emissions reductions is also an issue common to both fund and market-based mechanisms for RED. There is a risk that the amount of carbon emissions avoided (and paid for) in a period may be reduced if deforestation occurs in the future. Options to address this issue in RED(D) mechanisms include temporary crediting, insurance mechanisms, and reserves with debits from future credits. Further work is needed to evaluate how to implement these proposals in practice e.g., the size of the reserves, how to evaluate the amount of debits to be deducted. An expert review process and/or guidelines would need to

be established to ensure that any methods developed for these purposes are applied consistently across countries.

Addressing environmental risk

The foregoing highlights a number of important environmental risks that need to be addressed in the design and implementation of a mechanism for RED. Table ES1 provides an overview of different approaches to address the different risks associated with: 1) high uncertainty in inventory estimates (and hence uncertainty in emission reductions for a given baseline); 2) leakage; 3) permanence. The need for these approaches will vary with the type of mechanism -- fund or market mechanism -- and also with the form of the mechanism e.g. if market, baseline or cap. For example, for a market mechanism, it would be possible to conservatively discount estimated RED, in proportion to the estimated uncertainty or relative to choice of monitoring method, so that 1 ton of RED(D) is exchangeable with 1 ton of emissions reductions from an energy project. Where a baseline derived from historical trends is an issue, similar techniques may also be needed to establish a "conservative" baseline that explicitly takes into account the uncertainty about historical emissions. The degree of monitoring accuracy required for a separate RED(D) market or fund based mechanism (where credits would not be fungible with those of the existing international carbon market) could perhaps be less stringent, but would still need to be consistent across countries. Independent third party verification is key and could be used to support decision-making. The approaches outlined in Table ES1 could help to improve the environmental integrity of the mechanism.

Payments to governments versus forest owners/users

Payments for RED(D) (either via a fund- or market-based mechanism) should ideally be made to forest owners/users making the individual land use decisions, so as to compensate them directly for the global carbon benefits they provide. Monitoring and institutional capacities in developing countries would determine whether RED(D) payments could be made directly to the governments, or whether international payments could also be made directly to forest landowners and users. Ex-post performance based payments made at the government level could also provide developing county governments with incentives to address government and domestic market imperfections that adversely affect deforestation.

Addressing the potential for a market-based RED(D) mechanism to flood the existing carbon market

A concern frequently raised is the possibility for RED(D) credits to flood the international carbon market and thus significantly weaken incentives for abatement elsewhere (and/or delay investment decisions in GHG abatement). Any increase in the potential supply of credits from RED(D) would need to be countered by an increase in the demand for credits which would be generated by the stringency of any post-2012 emission reduction commitments. The purpose of a market mechanism is to attain the emissions reduction commitment at least cost. Until reliable emissions data on RED(D) are more widely available and consistent at a scale that is relevant to international market-based approaches, fungible RED(D) credits in the international carbon market could however undermine the objectives of the Convention. Possible options are available to address potential price uncertainty that may result if RED(D) credits from a market based mechanism were introduced into the existing carbon market. One method is to introduce a price floor on tradable allowances/credits in the international carbon market. Another option is to introduce a maximum limit on the volume of RED(D) credits that could flow into the international carbon market. Alternatively, an offset safety valve could be incorporated whereby the maximum limit on the volume of RED(D) credits that could flow into the international carbon market would depend on the international market price of an allowance. Any such limits imposed on RED(D) credits could be revised accordingly in a subsequent commitment period, once better information is available.

Table ES1. Addressing environmental risk

Risk issue	Monitoring, Accounting, Review Approaches	Explanation
Uncertainty in inventory estimates	Eligibility to participate in the mechanism hinges upon demonstration of IPCC Good Practice Guidance – e.g. QA/QC and use of IPCC higher-Tier methods	IPCC Inventory Guidelines and GPG provide a common structure for reporting on LULUCF. Higher Tier methodologies and QA/QC assessment ensures that local, context specific data are gathered and used to improve inventory estimates.
	Discount estimated emission reductions, e.g. by 50% to limit risk that emission reductions are not "real"	Eg: If difference between baseline and estimated emissions is 50 Mt CO_2, only 25 Mt CO_2 of emission reductions are accounted for (and credited) –in proportion to the uncertainties associated with the monitoring methods used.
	Third-party verification of inventories	Once the rules or guidance is in place for a mechanism, UNFCCC or another 3rd party (e.g. FAO) could be asked to review national information (inventories) and comment on their accuracy and appropriateness.
	Ex-post monitoring, with 3rd party verification, for performance assessment.	Accounts for emission reductions only after they have been delivered and verified; emission reduction estimates are credited ex-post.
Uncertainty in historical trend data (or missing data) to support baseline estimation	Use lower bound of 95% confidence interval of historical emissions as the basis for baselines	Quantify uncertainty and identify the 95% confidence interval associated with historical trends; setting baselines according to lower bound ensures that the estimates are conservative given uncertainty.
	Minimum 10 years of historical data – require full LULUCF inventory with separate category for emissions from deforestation	This allows tracking of trends, provides a basis for baseline estimates and assessment of leakage (see below).
Leakage	Conservative crediting; monitoring leakage and creating set-asides; extending project boundaries, to address project-based leakage	Options for addressing national leakage in project based mechanisms.
	National baselines required to address in-country leakage	Intra-national leakage detected through national scale monitoring; project level activity could occur under a national baseline.
	Minimum participation threshold for entry into force to address international leakage	Minimum of XX Parties accounting for at least YY% of emissions from deforestation (and degradation).
Permanence	Temporary credits	As with temporary Certified Emission Reductions (CERs) and long-term CERs.
	Insurance mechanisms	Formal risk sharing for possible loss of crediting due to permanence problems through insurance markets
	Third party monitoring (according to an agreed set of definitions/rules) and debiting from future credits	3rd party monitoring to detect and quantify permanence; deduction from future credits.
Avoiding perverse incentives	Incentives differ by type of participant i.e. those with low or no deforestation rates versus those with high deforestation	Ensure that incentives exist for "good behaviour" such that rewards for the avoided "bad behaviour" do not provide perverse incentives for deforestation in new locations.

Concluding remarks

The key features identified and discussed in this paper apply to both fund based and market based proposals. The building blocks necessary are the same under each, and would be similar to the building blocks necessary to establish any alternative options for RED(D).

A market-based mechanism is better able to address the challenge of sustainable financing for RED(D) than a fund mechanism. A market-based mechanism has the potential to engage the private sector in the financing of RED(D), which would significantly increase available funding beyond what is currently available. Given high uncertainty surrounding available emissions estimates from deforestation in developing countries, the creation of markets for RED(D) by 2013 would be premature without significantly more effort to establish reliable systems for monitoring, review and verification of performance. Such systems are essential to support the creation of new "property rights" in environmental markets (i.e. in this case the property is the carbon uptake value of forests) and their enforcement.

Interest in the creation of environmental markets is often an incentive in itself for governmental attention and resources to flow to improve information to better manage a problem. To ensure the "value" of environmental services flowing from avoided deforestation in a market context, it will be necessary for the international community to turn its attention to the problem of harmonising definitions, monitoring methods and baseline development or target setting at national scale. Early action today to develop the necessary framework for reliable monitoring and baseline development could enable the implementation of an international market-based mechanism for RED(D) in the future.

1. Introduction

Deforestation is estimated to account for 6% to 16% of global GHG emissions (IPCC, 2007d).[1] A number of studies have recently drawn attention to the role of tropical deforestation as a driver of climate change and in particular to the high rates of deforestation occurring in tropical regions of the world (Baumert, Herzog and Pershing 2004; IPCC 2007d; Stern 2007). For example, the Stern Review pointed to the high level of current and future greenhouse gas emissions from deforestation and underscored the need for "early" international attention to this issue and outlined a range of possible approaches.

International climate change discussions have recently turned their attention to the challenge of reducing emissions from deforestation. In 2005, the Conference of the Parties launched a process intended to facilitate an exchange of information and discussion amongst Parties on approaches to reduce emissions from deforestation (RED) in developing countries. The Conference of Parties (COP) 13 in Bali will mark the culmination of a two year process to exchange information and experiences on incentives and policy approaches to RED in developing countries. The ongoing negotiations on RED have indicated that there are a broad range of approaches to be considered for mitigating emissions from deforestation. These include financing mechanisms to reduce emissions from deforestation, adjustments to national policies - in line with the responsibilities of forested countries to sustainably manage their forests and enforce their forest-related laws, as well as the sharing of knowledge, methodological assistance, and technology by both Annex I and non-Annex I countries with other forested countries.

This paper examines economic and environmental performance issues pertinent to the design and implementation of an international financing mechanism to reduce emissions from deforestation in developing countries. It reviews only the existing proposals received to date in the UNFCCC policy process in an effort to develop an initial set of recommendations on what features of a possible financing mechanism are important to move towards "good performance".

1.1 Background

Deforestation rates have been a concern in the environment and development area for many years and a variety of national and international measures have been proposed and established to finance reductions in deforestation. In addition to releasing large fluxes of carbon (and other greenhouse gases) to the atmosphere, deforestation is also a main driver of global biodiversity loss and contributes to a range of regional environmental problems including water scarcity, soil degradation, and desertification. Previous efforts to mitigate global deforestation trends have been largely unsuccessful, which suggests a need for new and innovative approaches to address this issue. With this as a backdrop, the climate change negotiations have begun to consider whether it is possible to develop a new mechanism to cooperate internationally to reap climate change benefits from mitigating deforestation in the future.

At COP-11/[COP/MOP1] in December 2005, Parties were invited to consider issues "…relating to reducing emissions from deforestation in developing countries, focusing on relevant scientific, technical and methodological issues, and the exchange of information and experiences, including policy approaches and positive incentives" for potential recommendations to the UNFCCC at COP-13 (December, 2007). Two workshops were held to facilitate this process, the first in August 2006 in Rome, Italy, and the second in March 2007 in Cairns, Australia.

At the end of the second workshop on RED in developing countries, several key questions were identified by participants linked to the financing options that have been proposed to date[2]. These are:

[1] There is broad uncertainty about emissions from terrestrial sources and deforestation emissions are a sub-set of this larger set of emissions sources. These estimates are derived from the IPCC Synthesis Report (2007d) and the sources cited in the core chapter that develops these estimates (Holger-Rogner et al. 2007; Nabuurs et al. 2007).

[2] FCCC/SBSTA/2007/3 available at http://maindb.unfccc.int/library/view_pdf.pl?url=http://unfccc.int/resource/docs/2007/sbsta/eng/03.pdf

a) "Whether credits from reducing emissions from deforestation can be used by Annex I Parties in meeting their reduction commitments;

b) Whether market-based mechanisms should be used to provide positive incentives (as stand-alone mechanisms or in combination with non-market-based financial resources) and whether they can ensure real and sustainable financing of actions to reduce emissions from deforestation in developing countries;

c) Whether any future arrangement on reducing emissions from deforestation in developing countries should also compensate countries that have made efforts to conserve and stabilize their forests and carbon stocks;

d) Whether any carbon savings as a result of early action projects could be used under a future market or other related mechanism."

A draft decision text on RED[3] was released at the twenty-sixth meeting of the Subsidiary Bodies (May 2006), with a revised text to be agreed upon at COP-13 in Bali[4]. Expectations for COP-13 include:

- A decision on a mandate on possible options for addressing RED and direction on a range of activities that could be immediately initiated (based on the adoption of the draft text);

- The release of a UNFCCC report outlining the outcome of the two-year dialogue under the Convention.

Until recently, the UNFCCC discussion on RED in developing countries has focused on sharing experiences and lessons learned on policy approaches and incentive options in order to generate ideas on the types of international mechanisms that could achieve the goal of reducing emissions from deforestation or build capacity to that end. Discussion is now evolving towards providing concrete proposals to stimulate action. Future agreement on any such mechanism, however, will require clarification of the specific goals of such a mechanism. It will also, ideally, be guided by agreed principles and criteria for performance. Finally and perhaps most importantly, any agreement will need to identify key design features to ensure delivery of economic and environmental performance over time.

1.2 Scope, aim and approach

The scope of this paper is largely determined by the framing of the discussions to date on RED(D) under the Convention process. These discussions assume that some countries will have emission reduction targets, and that these countries can possibly purchase credits for emission reductions in deforestation elsewhere. This is a particular "property right" scheme that is currently found in the Kyoto Protocol, generating the main type of incentive found in the climate regime today. This pre-existing Kyoto market for carbon was created through a cap and trade system for Annex I Parties combined with a "voluntary" credit market for mitigation projects in non-Annex I Parties (i.e., the CDM). Alternative policy frames are possible. For example, it would be possible to simply quantify all emissions and tax these, or to establish an emissions cap for all Parties. In this case, issues such as the quality and the availability of reliable historical emission data and the construction of baselines would not be a concern. Thus the choice of a particular policy scenario that roughly corresponds to a continuation of the current structure of mitigation commitments under the Kyoto Protocol defines the key issues for design and implementation of a mechanism for RED(D). The scope of this paper is not meant to pre-suppose an outcome about the

[3] See Annex I for the current draft decision text. This text is contained in Annex III, FCCC/SBSTA/2007/4.

[4] SBSTA invited Parties to submit their views, by 15 August 2007, on issues related to further steps under the Convention in relation to reducing emissions from deforestation in developing countries: approaches to stimulate action. The SBSTA will consider the views submitted by Parties on these issues in Bali.

appropriateness of this policy scenario. Alternative policy scenarios are possible and may be equally valuable to explore, however, they are outside of the scope of this paper.[5]

The purpose of this paper is to advance understanding of possible environmental and economic performance goals and criteria for a possible future financing mechanism for RED(D) and to suggest a range of practical implementation approaches for delivering on these. To do this, the paper:

- Identifies key design features of a financing mechanism to reduce emissions from deforestation, drawing on the proposals received by the FCCC to date and on experience with similar mechanisms under the Convention or more broadly in the field of environmental management.

- Provides an overview of available proposals and a critical review of their content and potential to contribute to global GHG mitigation objectives in a cost-effective manner;

The paper therefore also serves to address some of the key questions linked to the financing options identified by participants at the end of the Cairns workshop (listed above).

The paper is structured as follows. Section 2 briefly introduces the key features that need to be considered for an effective environmental financing mechanism. An overview of the needs and flows of financial resources to the forest sector is provided in section 3. Section 4 reviews the existing institutional structure for monitoring, with a focus on the forest sector. Section 5 examines the issues of baselines, leakage and permanence. Section 6 examines financing issues. Section 7 summarises the recent fund and market based mechanisms that have been proposed to address RED(D). Section 8 evaluates the financing mechanisms proposed and section 9 provides a discussion.

2. Key Features of Effective Environmental Financing Mechanisms

Significant experience exists with the use of financing mechanisms for environmental purposes, offering a range of lessons for the design of such a mechanism for RED(D). There is also broad experience and many parallels that exist within the UNFCCC. It is useful to consider fund (or non-market) based financing mechanisms separately from market mechanisms.

Environmental funds have been set up in many countries during the past decade as a way to provide long-term financing for biodiversity conservation and other environmental activities. They are typically created in and managed by private or non-governmental organisations, and are capitalised by grants from governments and donor agencies, the proceeds of debt-for-nature swaps, and from taxes and fees specifically designated for conservation. In general, environmental funds are able to mobilise additional financial resources in areas where these are insufficient (a problem that is often pervasive in the provision of public environmental goods and services).

UNFCCC Parties also have some direct experience with an (international) fund mechanism through the Global Environment Facility (GEF). The GEF is the principal financial mechanism under the Convention, providing the conduit for financial transfers from Annex II Parties to developing countries to support the latter's efforts to implement their obligations under the Convention. Within the Convention itself, there may therefore be valuable understanding of how to operate an effective fund mechanism based on the ongoing GEF review process[6].

Environmental funds have been criticised for misallocation of resources, bias towards large projects, slow project cycles, being cumbersome, and for insufficient funds to address needs. Other problems identified include insufficient private sector involvement and power asymmetries (Streck, 2001). Moreover, where a

[5] The authors would like to thank reviewer Brent Sohngen for pointing this out.

[6] See Section 8 and Annex II for a discussion. Ideally one would want to assess how other organisations/funds are addressing deforestation, including experience within the GEF, and to evaluate their strengths and weaknesses. This lies beyond the scope of the current study.

market-based approach is feasible, environmental protection objectives will generally be more cost-effective than a funds approach.

In contrast to funds, market based mechanisms have demonstrated an ability to engage both private and public sector financial resources directly. Under the Kyoto Protocol for example, the flexibility mechanisms use a system of allowances/credits or offsets to achieve an agreed target-level of performance; allowances/credits are fungible in the international carbon market and demand is driven by the emission reduction targets in Annex I countries. Market-based approaches can attain emission reductions at lower cost than through non-market approaches, though the degree of difference will depend on design and implementation features of each and on the characteristics of the market.

Market based mechanisms are best suited to environmental problems where there are a sufficiently large number of emission sources or actors with heterogeneous abatement costs; legal jurisdiction over the geographic area where the programme would be implemented to allow strong compliance and enforcement; and a secure and clearly-defined system of private contracts and property rights (or the possibility to establish one). In the case of deforestation, the use of market based approaches would also be facilitated through a private sector that makes land-use decisions based on the desire to lower costs and raise profits.

Key features that would need to be considered in the establishment of any type of financing mechanism (i.e., fund or market based) for RED(D) include:

- Identifying clear goals and objectives of the mechanism;
- Identifying eligibility criteria and priorities (i.e. for disbursement of funds or for participation in the mechanism);
- Securing sufficient and long-term sources of financing for RED(D) -including from the private sector;
- Monitoring and evaluation of performance to ensure that the objectives of the mechanism are being met.

2.1 Clear goals and objectives

Identifying clear goals and objectives for financing mechanisms for RED(D) are important to guide the design of the instrument. In the case of environmental funds, experience has shown that a lack of clearly defined goals can lead to larger numbers of grant-seeking proposals, and thus higher administrative and transaction costs, as well as delays in the disbursement of funds (Norris, 2000). This implies fewer resources available for activities or projects that directly benefit the environment and greater difficulty for the poor to access funds. Similarly for market-based mechanisms, if the goals are ambiguous, the rules and resulting outcomes may diverge from desired objectives (at least for some participants). A recent example with respect to climate change is the expectation (or hope) that the Clean Development Mechanism would lead to significant new investment in the area of renewable energy and energy efficient technologies, yet this has not materialised in large part because the market principles of the mechanism led to a focus on least-cost mitigation options which often was not renewable or energy efficiency projects (Ellis et al. 2007).

The objective of the UNFCCC would be a logical starting point for definition of specific goals for mechanisms to RED(D). Ideally the mechanism(s) would contribute to stabilisation of atmospheric concentrations of GHG (Article 2) through a reduction in global emissions from deforestation over time. Article 2 of the UNFCCC also refers to "sustainable" economic development and thus one goal of any mechanism for RED(D) might be to lower global costs of mitigation while also improving the effectiveness of overall efforts under the Convention to mitigate (and adapt) to climate change. Adaptation is relevant since mitigating deforestation will deliver local adaptation benefits as well as mitigation benefits (IPCC, 2007). Finally, reducing deforestation can also deliver a range of other sustainability benefits from biodiversity to water conservation, among others, and attention should be made to ensure that a mechanism for RED(D) does not create perverse incentives in these other areas. The effectiveness of a financing

mechanism for RED(D) over time will necessarily be its ability to deliver real and measurable emission reductions at global scale.

2.2 Identifying eligibility criteria and priorities

Eligibility criteria and methodologies to grant access to the mechanism are necessary and, in the case of funds, priorities for fund allocation are needed. Clear criteria would help make the selection process transparent. The notion of eligibility criteria will differ depending upon whether the mechanism has mitigation or capacity building as the goal.

If the goal of a financial mechanism is specifically mitigation, then the eligibility requirements for access to financing would presumably be based in part on the ability to document historical GHG emission trends and demonstrate real reductions in emissions from deforestation. In this case, a RED(D) financing mechanism could be designed to have similar eligibility requirements as for Annex I country participation in the Kyoto mechanisms (UNFCCC 2007b). If so, they might need to include:

a) Annual inventories and reporting of emissions and removals of greenhouse gases, in this case for a minimum of 10 years;

b) A national system[7] for estimating and reporting emissions and removals of greenhouse gases;

c) Calculation of a historical baseline and/or a future reference scenario, in terms of tonnes of CO_2-equivalent emissions (similar to assigned amount) for emissions from deforestation.[8]

d) For a market based mechanism, a national registry for tracking the transfer of any assigned amount (this will only be necessary if it is a sector cap and trade programme since allowances would be distributed ex-ante; if it is a baseline and credit system, a single registry, similar to the CDM registry managed by the Executive Board, could be used instead[9]).

In the case of a fund, it is likely that a number of developing countries will wish to benefit from such funds, whether they are for capacity building or for mitigation purposes,[10] and that the financial resources available will not be able to meet all the needs. Without a clear spending strategy and eligibility and selection criteria based on cost-effective solutions to environmental priorities, the allocation of financial resources becomes sub-optimal and wasteful. This is also raised in the OECD Council Recommendation on Good Practices for Public Environment Expenditure Management which highlights the need for expenditure programmes, including the appraisal, scoring, ranking and selection of projects (OECD, 2006). Such criteria and priorities also enhance transparency and accountability in the operation of environmental funds, which are essential for avoiding ad-hoc political influence and mismanagement of public funds (e.g., safeguarding against corruption and fraud, and identifying and eliminating conflicts of interest).

If the ultimate objective of the mechanism is capacity building to mitigate emissions from deforestation, priorities should include a range of needs from the development of inventories to the creation and refinement of national systems for monitoring, reporting and review. However, a number of legal issues

[7] A national system under the Kyoto Protocol (Article 5.1) is defined to include for each Party: 1) a designate national entity with responsibility for the national inventory; 2) definition and allocation of specific inventory responsibilities such as data collection and processing, data and methods selection; 3) development and implementation of an inventory quality assurance/quality control (QA/QC) plan and procedures; 4) use of the IPCC methodologies and good practice guidance to prepare the inventory; 5) archiving of all inventory information (see p. 34; *Kyoto Protocol Reference Manual on Accounting of Emissions and Assigned Amounts*, Feb 2007, FCCC).

[8] Note the historical calculation should be linked to the national inventory of all emissions/removals from land use, land use change and forestry at national level as this will enable assessment of leakage.

[9] This would reduce costs and would also remove a step since some international body would have to accredit the actual reductions, and accept credits ex-post, so then single registry is more appropriate.

[10] For example, at least 14 developing countries have expressed interest in the Readiness Mechanism being established by the Forest Carbon Partnership Facility of the World Bank.

may also be relevant. These include building capacity to ensure sufficient jurisdiction over the geographic area where the programme would be implemented as well as the development of a system of private contracts and property rights. Both monitoring and legal capacity are critical ingredients for the ability to enforce a law or regulation; both are necessary to support implementation of a market mechanism.

An additional eligibility criterion that may be worth considering given the multiple services that derive from forests, is some form of sustainability criteria to avoid perverse social/equity outcomes in the disbursement of funds. The international body could include sustainability criteria in prioritization of fund allocation.

2.3 Securing sufficient and long-term sources of financing

Identifying sufficient, long-term, and predictable/stable sources of financing is important in order to ensure that the financial resources necessary to carry out the desired objectives can be met in practice. This entails (i) a financial needs assessment; and (ii) a resource mobilisation strategy.

With regard to a resource mobilisation strategy, experience indicates that securing sufficient sources of funding is a common problem in environmental funds, and can undermine the ability of a financing mechanism to achieve its goals and objectives. Mobilizing long-term funding is also important to ensure that any improvements made in the present can be maintained over the longer-term, if this is the nature of the environmental problem. Environmental funds have successfully used special taxes and fees as well as other national sources to generate both recurrent and endowment income. Broadly, the possibilities include earmarked or sinking funds, and capital or endowment funds (Norris, 2000).

Market based mechanisms provide a solution to the issue of mobilising financing, as they create incentives for abatement via the market. Depending on how emissions reduction commitments are devolved, market based mechanisms are able to completely engage the private sector (either under the polluter pays or the beneficiary pays principle). Moreover, investment is directed to least-cost mitigation solutions. The broader the coverage of the market based mechanism, the lower the costs are likely to be. This is the economic argument for broadening the coverage of the current Kyoto markets to include all sources and sinks as far as possible. Fungibility across sources and sinks provides a mechanism to deliver mitigation at lowest possible cost.

2.4 Monitoring and evaluation of performance

Monitoring and evaluation of performance will need to be tailored to the objective of the mechanism as well as to the type of mechanism that is adopted. In the case of fund based mechanisms, two issues arise: (1) monitoring the financial flows, (i.e., how much money is spent and for what); and (2) if funds are directly intended to RED(D), the need to estimate emission reductions and verify that these are additional (analogous to market based mechanisms). Accurate and consistent monitoring is needed to assess the achievement of any environmental goal under any type of mechanism however the degree of rigour may vary depending upon whether there is a market for emission reductions or not.

For market based mechanisms, a sound compliance and enforcement system is a pre-requisite that creates the conditions for emergence of a market unit of exchange and "property rights" that have value. Similarly, a fund that aims to achieve a given environmental objective, such as RED(D), will also benefit from compliance provisions that lay out a means to assess performance. With regular assessment of performance it will be possible to learn from experience and adjust financing decisions and investment practices to improve performance over time.

Compliance and enforcement assessment requires good quality data from an internationally harmonised system for monitoring and verification of emissions from deforestation. This may be especially important to ensure the value of a credit (or allowance) in a market based mechanism. Historical national emission trends are a necessary starting point to refine the emission reduction objectives (e.g. caps or baselines, at national or project scale). Projections of future emissions will also be necessary both for the construction

of baselines and, in the case of establishment of an emissions reduction cap, to allow a comparison against which to assess the rigour of the cap.

It is useful to recall here the contentious debate from 2001 (COP7) on reporting on land use and forestry emissions and removals from Annex I countries and why inventories became a central eligibility requirement (Corfee-Morlot and Ellis, 2001; Hoehne et al. 2007). A key issue was whether the reporting of removals by sinks would constitute an eligibility requirement for participation in Kyoto mechanisms (JI, CDM and/or emissions trading). Some countries argued against this because setting up an inventory for land use and forestry activities is expensive, and may be especially difficult for those with large land areas and little historical data or experience in this area. However, this was rejected in the Ministerial decision at COP7 because the Bonn Agreement had clearly stated that Kyoto mechanisms eligibility "shall" be dependent on fulfilling monitoring and reporting commitments (Articles 5 and 7) of the Protocol.

PART I: Stock-taking and Design Issues

3. Forest Sector Financial Needs and Flows

A key issue for the evaluation of financing proposals to reduce emissions from deforestation is to conduct a financial needs assessment. This section reviews the literature on financial needs for the forest sector in order to mitigate deforestation, and the current levels and sources of financial flows.

From an economic perspective[11], evaluating the financing needs of forest preservation in developing countries is a challenging task. For example, it implies determining the "optimal" stock of forest that the world community should protect in order to maximise the present value of global welfare. The optimal forest stock size is determined by taking into account the total economic value of forests, and comparing the social returns of different land uses. The total economic value includes the direct, indirect, and non-use values of forests such as non-timber forest products, watershed protection, soil erosion control, biodiversity, carbon sequestration benefits, and existence values, among others. The optimal stock of forest will vary from country to country and over time and there are to date very few studies that have examined what these optimal stocks may be.[12]

A RED(D) mechanism would provide compensation to nations and/or forest owners/users directly, for the global public good benefits provided by the carbon stocks preserved in forest areas. Such a mechanism would serve to internalise at least a portion of the external environmental costs stemming from loss of carbon sequestration and emission of other greenhouse gases deriving from deforestation. Though it would not result in the socially optimal level of forest area, such a mechanism has the potential to bring the level of preservation closer to optimum levels compared to a no new policy scenario.

It is important to note that financing mechanisms for environmental purposes will be effective only if the underlying reasons for the environmental problems are simultaneously tackled at the policy level (World Bank, 1998). Most environmental problems are the result of regulatory and market failures such as price subsidies for energy and fertilisers, under-priced natural resources, undefined property rights, and the failure of environmental regulations and enforcement to force the internalisation of the social costs caused by environmental damage (for an overview of such regulatory and market failures in the forest sector, see Karousakis, 2006). Without policy reform to accompany the operation of environmental financing mechanisms, environmental problems re-create themselves, and environmental funds postpone the introduction of sustainable solutions. This principle/concept is reaffirmed in the OECD Council Recommendation on Good Practices for Public Environment Expenditure Management (OECD, 2006) which states that "public funds cannot and should not substitute for weak environmental policies".

3.1 Financial needs

A number of studies conducted at the national, regional and global scale estimate the total costs (i.e., financial resources) required to mitigate tropical deforestation. These estimates vary widely due to different assumptions regarding carbon accounting, costs, land areas, baselines and other major parameters (IPCC, 2007c). For example, Obersteiner et al. (2006) evaluate the aim to reduce the deforestation rate by 50% until 2025. They estimate the financial resources required to balance out net present value differences on exactly those forests that would otherwise be converted to other uses rise from USD 0.16 billion in 2006 to USD 2.9 billion in 2025 due to increasing geographic coverage of the carbon incentive scheme (Obersteiner et al. 2006). The lack of precise information on forest areas that are about to be cut and principal-agent problems[13] make it difficult to design a perfectly targeted instrument. In the case of complete absence of

[11] This includes social and environmental considerations, as opposed to just a financial perspective.

[12] For examples, see Bulte et al. (2002); Ehui and Hertel (1989).

[13] This refers to problems that arise as a result of incomplete and asymmetric information when a principle hires an agent.

information on deforestation pressure, the financial resources required would be much higher, in the order of USD 197 bn in 2006 and USD 188 bn in 2025 (i.e. on average USD 6/tC/5years). More realistic assumptions of targeted payments to identifiable deforestation agents in areas of high deforestation pressure would cut average annual cost to an estimated USD 33.5 bn per year (Obersteiner et al. 2006). Sohngen and Sedjo (2006) estimate that for USD 27.2/tCO_2, deforestation could be virtually eliminated. Over 50 years, this could represent a net cumulative gain of 278,000 $MtCO_2$ relative to the baseline and 422 million additional hectares of forest. For lower prices of 1.36 USD/tCO_2, only about 18,000 $MtCO_2$ additional could be sequestered over 50 years. Research carried out for the Stern review (Grieg-Gran, 2004) indicates that the opportunity cost of forest protection (net present value of returns from land uses that are prevented) in 8 tropical countries responsible for 70 per cent of emissions from land use could be around USD 5 billion per annum initially, although over time marginal costs would rise (Stern 2007).[14] Averaging the results of different studies, the IPCC (Nabuurs, Masera et al. 2007) suggests that for a price of 100 USD/tCO2, global emissions from deforestation could be reduced by 3950 $MtCO_2$. Of this amount, roughly 50% could be achieved for a price under USD 20 and an additional 28% for a cost under USD 50. Studies differ widely however, and focusing on the more conservative estimates from the bottom-up models of forestry would suggest estimates that are of an order of magnitude lower than this (see footnote 19).

Other costs are associated with the necessary capacity building that would be necessary to support a fund or market based mechanism for RED(D) in developing countries. Key capacity building needs are likely to include data availability, measurement and monitoring capacity and technical assistance (e.g., satellite data access; data storage; data analysis/validation; and data dissemination). Estimates on the costs of current satellite imagery indicate these range from 0.02 €/km^2 for high sensor resolution (10-60m) to 2-33 €/km^2 for very high sensor resolution (<5m) (Table 1) (Achard et al. 2006).

Table 1. Comparison of remote sensing platforms

Category	Sensor	Spatial Resolution	Costs of Data and Analysis	Applicability to type of forest disturbance	Overall status
Fine spatial resolution	IKONOS, Quickbird, Aerial Photographs, Digital aerial imagery	15cm-5m	Highest 2 to 33 €/km^2	Forest degradation, selective logging, small scale clearing	Acquired on request
Medium spatial resolution	Landsat 5-TM, Landsat 7-ETM+, IRS-2-Resource-SAT, CBERS-2, Terra-ASTER, SPOT-MSS, ERS, RadarSAT	6m-100m, average 30m	High Recent: 0.02€/km^2 Historical: low or free	Clearings and logging ≥0.05 ha, small scale agriculture	Landsat 5 aging but widely available, Landsat 7 sensor failure, others acquired on request

Source: Adapted from Herold et al. 2006; Achard and Eva, 2006

[14] Opportunity costs refer to the notion that maintaining a forest rather than the alternative land use (i.e. other than as a forest) represents a cost, in this case it is the cost of preservation; for example if deforestation occurs because the land is converted to farmland then the opportunity cost is the discounted present value of the farmland revenues that would have accrued to the land owner had she or he cut down the forest.

3.2 Financial flows

Turning to the issue of actual financial flows to the forest sector, the UNFCCC (2007) has summarized recent data on these flows, indicating that available estimates vary substantially. For example, the OECD ENV-Linkages model estimates that total new investment in the forestry sector worldwide in 2005 amounted to about USD 23 billion (2001 dollars).[15] According to Tomaselli (2006) direct private investment amounted to about USD 63 billion in 2004 (1.5% of global direct investment).[16] About 90% of it is domestic --possibly 5-10% of total forest finance goes to developing and so-called transition economy countries (EITs). Moreover, private funding is estimated to account for 90% of total forest finance. Overall there is a lack of systematic data on direct private investment in forestry, and much less for Sustainable Forest Management (Tomaselli, 2006).

Table 2. Overview of estimates on financial needs and flows to the forest sector

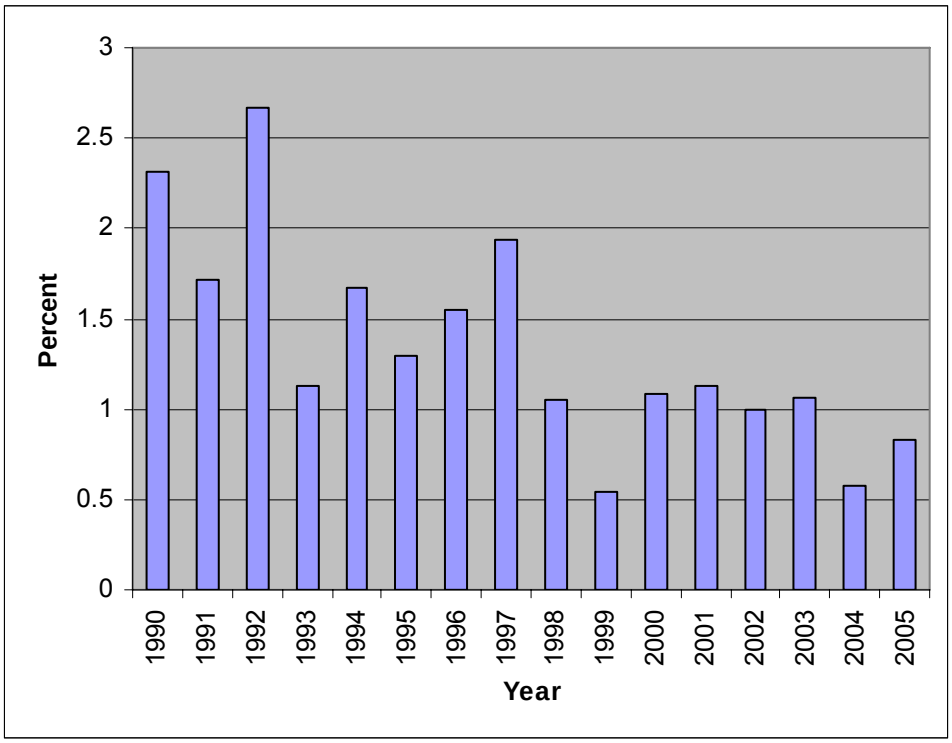
Financial Needs		
Reduced deforestation target	Needs	Source
50% by 2025 with perfect information 50% by 2025 with no information 50% by 2025 with targeting	USD 2.9 billion USD 188 billion USD 5 billion	Obersteiner et al. 2006
12.9 m ha/yr	12.2 billion	UNFCCC 2007
Virtual elimination of deforestation	27.2 USD/tCO_2	Sohngen and Sedjo (2006)
8 countries, 70% emissions	USD 5 billion per year	Grieg-Gran (2004)
3950 $MtCO_2$[17] 3239 $MtCO_2$ 2133 $MtCO_2$	USD 100/tCO_2 USD 50/tCO_2 USD 20/tCO_2	IPCC (Nabuurs et al. 2007)
Financial Flows		
Purpose	Flows	Source
Total new investment in forestry sector	USD 23 billion (2001 dollars)	OECD ENV Linkages model (i.e. forestry and logging products)
Direct private investment 2004	USD 63 billion per year	Tomaselli (2006)
ODA to forestry (average annual spending 2000-2005)	USD 528 million	OECD CRS (2006) (i.e. policy and administration, development, education/training, research, and services)

[15] These are estimated from Purdue University's Global Trade and Analysis Programme (GTAP) version 6 database. Forestry is defined as forestry and logging products under the CPC classification system.

[16] According to the UNFCCC report, this figure could include investments to purchase existing assets such as forest land and investments in wood products industries, which might help to explain why it is so much larger than the OECD model estimate.

[17] Note that these are point estimates reported across an averaging of different studies. Use of the bottom-up estimates from forestry modelling studies suggest estimates that are an order of magnitude smaller than this. See discussion in Nabuurs et al 2007 and IPCC 2007c.

Figure 1. Forestry as a proportion of ODA



The OECD Creditor Reporting System (CRS) database collects information on sources and levels of Official Development Assistance (ODA) financial flows to the forest sector. These data indicate that the proportion of total ODA financial flows to the forest sector (consisting of policy and administration, development, education/training, research, and services) has been on a general decline over the past 15 years (Figure 1) dropping from over 2% in 1990 to less than 1% of all ODA in 2005. Average spending between 2000 and 2005 on the forestry sector was USD 528 million with absolute levels of ODA funds to the forest sector also on a downward trend since 1990. Estimates on financial flows vary widely, and it is not always clear what the sources of data are and which definitions of forestry are used. There is however a general consensus that foreign direct investment (FDI) to the sector considerably exceeds ODA.

4. Monitoring Issues

This section briefly assesses of the state of the current knowledge base and institutional capacity, focusing in particular on official information and institutional systems in the Convention and Protocol process. It considers current capacity for monitoring and the size and nature of the capacity "gap" that would need to be filled to implement a mechanism for RED(D). Monitoring systems will provide information from which to establish baselines and/or to detect leakage or permanence problems. Monitoring systems will also provide information on performance assessment once the mechanism is put in place (i.e. relative to baselines or possibly to other rules established to control leakage or permanence). A significant international monitoring framework is already in place under the Convention and the Kyoto Protocol, however, it is currently insufficient to support a new financing mechanism to RED(D), without considerable progress in this area.

A first priority is to define a forest and what constitutes deforestation (see Box 1). This pertains not only to past, observable states of forest area or activity but also to expectations about the future. Quantifying emissions from avoided deforestation is an elusive exercise. Mitigating emissions through avoided deforestation involves preservation of an existing forest area and forest biomass and carbon stocks which are presumed to be at risk of deforestation. Definition of "avoided deforestation" or "avoided degradation" therefore will also require attention if a financing mechanism for RED(D) or is to be put in place.

Box 1. Definitions of deforestation

Deforestation, as defined by the Marrakech Accords, is the direct human-induced conversion of forested land to non-forested land. A forest is defined as a minimum area of land of 0.05-1 hectares with tree crown cover (or equivalent stocking level) of more than 10-30 percent with trees with the potential to reach a minimum height of 2-5 metres at maturity in situ. Actual definitions can vary from country to country as the Kyoto Protocol permits countries to specify the precise definition within these parameters to be used for national accounting of emissions (UNFCCC 2007). In contrast, deforestation as defined by the FAO is "the conversion of forest to another land use or the long-term reduction of the tree canopy cover below the minimum 10 percent threshold."

Carbon loss occurs not only from deforestation but also from forest degradation (e.g. via thinning or logging) however. A definition for forest degradation has not yet been agreed upon. The IPCC has defined forest degradation as "a direct human-induced long-term loss (persisting for X years or more) of at least Y% of forest carbon stocks (and forest values) since time T and not qualifying as deforestation or an elected activity under Article 3.4 of the Kyoto Protocol" where X, Y and T remain to be determined. Forest degradation is the depletion of forest to tree crown cover at a level above 10 percent, however beyond this general statement, the IPCC has not provided a specific definition (Penman et al. 2003b).

If forest degradation is not included in an accounting framework for RED, there is the possibility of payments being made for RED, while emissions from forest degradation grow significantly (i.e., with tree crown cover declining from 100% to as low as 10-30%). To ensure strong environmental performance across the sector, it is important to account for both deforestation and forest degradation in any fund or market based mechanism. This effort would therefore need to be supported by adequate monitoring capabilities across different nations and suggests the need for more comprehensive accounting for changes in forest areas and forest cover.

4.1 Existing institutional infrastructure for monitoring

The purpose of the current institutional infrastructure is to deliver high quality, comparable and consistent data as the basis for international decision-making under the Convention and the Protocol (UNFCCC 2007b; Yamin and Depledge 2004). Under the Kyoto Protocol, many new and specific functions of the monitoring framework pertain to Annex I countries. These include a range of national reporting obligations and centralised expert review processes to assess eligibility for participation in the Kyoto mechanisms and overall "performance" or compliance with various obligations specified in the Protocol, most notably the Kyoto targets (UNFCCC 2002c).

High quality national GHG inventories are the backbone of the international climate regime, providing a means to monitor progress internationally with respect to national obligations laid out in the Convention and the Protocol. After roughly a 10 to 15 year start up period,[18] comprehensive time-series inventory data are available today for Annex I Parties covering a 15 year historical period (1990-2005). While the data are not flawless, and gaps and uncertainties do remain, on the whole however, Annex I countries are reporting consistent and comparable data on national GHG emissions and removals, covering LULUCF along with other sources of emissions.

All Parties to the Convention and the Protocol are required to prepare national GHG inventories with the use of IPCC or comparable methods (1996 Guidelines) (UNFCCC 2002a; UNFCCC 2002b), however it is only Annex I Parties that report in a standard manner and that are required to use the IPCC good practice guidance. IPCC Good Practice Guidance for Land Use, Land Use Change and Forestry (Penman et al. 2003a-b) provides tools for comparable and consistent reporting on emissions and removals from "Kyoto

[18] In the lead up to drafting and eventual signature of the UNFCCC, countries began to work with the IPCC to design an internationally harmonized inventory system (working in partnership with the OECD through what eventually became the first set of IPCC inventory guidelines). The OECD's programme, which brought attention to the need for internationally harmonized GHG inventory data and approaches, was initiated in 1989. Thus the time required to build such a system from the start was at least ten years.

Forests" (see Box). Through the submission of a "National Inventory Report," Annex I Parties report and document inventories methods and assumptions as well as quality control and assessment (UNFCCC 2002d; UNFCCC 2007b). Parties are also requested to quantify uncertainty associated with estimates. There is also an elaborate multilateral peer-review and expert process to assess performance of Annex I Parties under the Kyoto Protocol based on inventory information (i.e. through expert inventory review).

Emissions from deforestation and from other land use, land use change and forestry (LULUCF) activities more generally are treated differently than emissions from other sources under the Kyoto Protocol. They are not a comprehensive part of the agreement to limit emissions. Countries are required to identify lands that are afforested, reforested and deforested in the period 1990 to 2005 and to report separately on emission fluxes from these (see Box 2) (Hoehne et al. 2007; UNFCCC 2007b). Emission fluxes from these lands are to be monitored through the Kyoto commitment period. There is no requirement however to identify and report comprehensively on additional land that may be deforested in the period 2006-2012. Although emission reductions achieved through Kyoto forests are fungible, the market does not have comprehensive treatment of emissions from deforestation even within Annex I countries.[19] The constrained treatment of LULUCF in the Kyoto Protocol is largely "… *a result of the concerns of some Parties regarding the uncertainties and technical difficulties of estimating emissions and removals from LULUCF*" (UNFCCC 2007b).

Annex I countries under the Kyoto Protocol are therefore required to report inventory estimates on net emissions from deforested land (since 1990). The 2003 IPCC Good Practice Guidance, combined with the 2006 Guidelines provide tools for the development of comprehensive inventories across LULUCF (Penman et al. 2003a; Penman et al. 2003b; Paustian et al. 2006). The Good Practice Guidance (Chapter 4) also lays out procedures to identify and separately report emissions and removals from deforested land. Thus the IPCC methods can and are being used to report on a category of "emissions from deforestation" starting in 1990. However no specific IPCC guidance exists to guide accounting for "reducing" emissions from deforestation (i.e. either relative to historical or to projected trends) or to guide baseline development in this area. Implementation of a policy instrument targeting RED(D) would therefore require adapting IPCC inventory methods and good practice guidance to serve this purpose.

Since developing countries do not have quantitative targets under the Protocol, their monitoring and reporting requirements are less stringent and less standardised (i.e. there is no common reporting format), making it more difficult to compare inventory results. Further there is no procedure in place for in-depth review of individual non-Annex I emission inventories and emissions "performance, "along the lines of the review structure for Annex I national greenhouse gas inventories."

[19] Of course this accounting also does not cover changes in non-Annex I countries.

Box 2. Kyoto Protocol treatment of deforestation

Under the Kyoto Protocol Annex I countries are required to identify lands that are afforested, reforested and deforested (ARD) over the period 1990 to 2005 and to account separately for net emissions and removals from each of these land areas throughout the Kyoto commitment period (i.e. to 2012). Accounting for net removals from land and forest management on other, unaccounted for land areas is optional. This option will only be chosen by a country if accounting is expected to lead to a net sink for CO_2 in the first commitment period. Where there are net removals from either the mandatory (ARD) and optional (land and forest management) activities, removal units (RMUs) are issued. RMUs increase allowable emissions[20] for the country in which the activity occurred, in other words they loosen the stringency of the target on other emission sources. To the extent that emissions from deforestation occur in the "Kyoto forest," the reporting country is required to deduct these emissions from its initial assigned amount. In other words, emissions from land determined to be deforested in the period leading up to the commitment period will lead to a more stringent national emission target (UNFCCC 2007b).

Emissions from deforestation can be offset by removals from managed land and forests but these offsets are subject to a strict (absolute) limit (as set out in the Marrakech accords) that varies by country. RMUs are fully fungible, but unlike other units, they are not bankable for future periods. RMUs can also be exchanged for emission reduction units (ERUs) if a country has decided to create a Joint Implementation project from the LULUCF activities that are being monitored under the Protocol (UNFCCC 2007b).

In contrast, deforestation activity (and in particular RED) was excluded from eligibility in the project-based Clean Development Mechanism, where credits from mitigation projects in developing countries are used to offset emissions in Annex I countries. Thus there is currently no international market for project based credits associated with RED(D) and no experience exists under the Protocol with monitoring emissions from projects in developing countries that aim to avoid deforestation. Proposals to formalise financing mechanisms for RED(D) in a post-2012 framework would therefore considerably extend the scope of activity targeted by the international climate regime. They would also extend the monitoring and, potentially, the market framework to include reducing emissions from deforestation (and possibly also from degradation).

4.2 How much do we know about emissions from deforestation in developing countries?

Though many developing countries are already reporting land use change and forestry inventories under the Convention, available data are relatively limited compared to what is available in industrialized countries. In their first national communications, Non-Annex I Parties (other than least developed countries) are required to provide data for 1994, or alternatively for 1990 (Yamin and Depledge 2004). RED(D)

At present, 133 developing countries are reporting at least a single year of inventory data, largely for 1990 or 1994.[21] Only 9 of the 126 countries in the GHG inventory database lack estimates for emissions and removals from the land use and forestry sector (UNFCCC 2007a). Twenty-four of these countries have at least two years of inventory data on land use and forestry, and of half of these countries (12) have inventories for three different years, thus allowing a clearer indication of trends in this sector.[22]

Amongst the countries with the highest rates of deforestation (see Table 3), only Brazil, Indonesia and Tanzania provide two years of data, barely enough to assess a trend in emissions. The paucity of official data in the area of land use change and forestry, or more specifically on emissions from deforestation in

[20] National inventories of greenhouse gas emissions, without inclusion of land use change and forestry fluxes, are the basis for the initial assigned amount which in turn is used to issue assigned amount units (AAU).

[21] However the FCCC GHG inventory database only contains data from 126 countries due to data difficulties for 6 of the 133 inventory submissions.

[22] The 12 countries are: Argentina, Bolivia, Cuba, Georgia, Ghana, Guyana, Kyrgyzstan, Malta, Republic of Moldova, Tajikistan, Macedonia, and Uruguay.

developing countries, suggests that much work and time may be required to establish a data set that can support comparable monitoring of changes in emissions from deforestation[23].

A recent review of information relevant to RED(D) in national communications highlighted that many countries are reporting some information on deforestation and its causes but that there is little consistency or structure for this reporting (UNFCCC 2006b). This includes some description of the drivers of deforestation and therefore provides some insights into possible management strategies. Where information on annual deforestation rates (ha/yr) is available, it tends to be of a similar magnitude as that reported by the FAO.

Table 3. Top 10 countries with highest annual deforestation rates and availability of national inventories

Country	Deforested area 1000 ha/y (Average 1990-2000) (FAO)	Deforested area 1000 ha/y (Average 2000-2005) (FAO)[24]	UNFCCC inventory submission – year(s) covered	LUCF GHG emissions most recent year (% change from previous estimate) (UNFCCC) Mt CO^2e	LUCF GHG emissions (CAIT) $MtCO_2$ most recent year
Brazil	2,681	3,103	1990, 1994	818(+3%)	1,550.1
Indonesia	1,872	1,871	1990, 1994	164(-1.2%)	2,554.7
Sudan	589	589	1995	17.8	29.6
Myanmar	467	466	NA	NA	424
DR Congo	532	319	1994	-176.8	303.1
Zambia	445	445	1994	3.6	224.9
Tanzania	412	412	1990, 1994	913.6(no chg)	13.9
Nigeria	410	410	1994	105.0	186
Zimbabwe	313	313	1994	-62.2	45.3
Venezuela	288	288	1999	-14.3	146.1
Top 10 Total	**8,009**	**8,216**			

Source: FAO (2006); CAIT (2007) version 4.0 of WRI using data for latest inventory indicated in FCCC submission. CAIT estimates of GHG from land use change are developed by Houghton (2003) and are for CO_2 only whereas FCCC submissions should contain all gases. According to CAIT, the errors associated with these national estimates may be substantial. The full description of methods and results are provided on the CAIT website: http//cait.wri.org. FCCC data are from the FCCC GHG data website, and these compiled from official national submissions (national communications). UNFCCC data from http://unfccc.int/ghg_emissions_data/predefined_queries/items/3838print.php

Uncertainty associated with available estimates of CO_2 fluxes from LULUCF is thought by experts to be high, much higher than uncertainty associated with CO_2 from energy. A comparison of national inventory estimates with estimates available from CAIT (WRI/CAIT 2007; see also Houghton 2003b) shows large

[23] One exception to this is Brazil where consistent time series data are available on forests and changes in forest areas as well as estimated carbon fluxes (e.g. INPE 2005). There is also a detailed description of emission trends from LULUCF in the latest national communication to the UNFCCC. Much of the background data have not been submitted to the UNFCCC and are therefore not part of the official data set for decision-making in that context. However it should be noted that these data are publicly available on the internet and that data of this type, in any case, are not part of the UNFCCC reporting requirements for non-Annex I countries.

[24] Data from FAO-FRA 2005 includes only extrapolated data for the year 2005 for all countries. For some countries the assumption was 'no change', in particular for African countries, which is reflected in the table. In summary, there is no information about current changes (Anke Herold, pers. comm.. 2007).

discrepancies.[25] The CAIT data are not derived from bottom up national inventory methods but from land use and forestry statistics (FAO data) that are widely available in the literature (Houghton 2003a and 2003b). This comparison of top-down and bottom-up estimates shows broad uncertainty about the magnitude of land use and forestry emissions/sinks in developing countries (see Table 3) and suggests that broad uncertainty around emission estimates in this area would hinder early development of an effective market to manage emissions from this sector (Box 3).

More than 100 developing countries are currently preparing national inventories for 2000, as part of their 2nd national communication submission where developing counties are required to submit inventories for 2000 and have the option to revise historical inventory estimates (UNFCCC 2007c). The guidance for these submissions recommends the use of standard reporting based on the IPCC Good Practice Guidance (2000 or 2003) (UNFCCC 2007c). This guidance outlines procedures for quality control and quality assessment of inventories, including estimation of uncertainty related to emission estimates. The 2003 Guidance also has explicit methods and an update of default data to estimate emissions from deforested lands. Importantly, it also provides an approach to separate out and monitor emissions/removals from lands that have been deforested. More work would still be required in terms of defining the meaning of avoided or reducing emissions from deforestation (or degradation) but the current IPCC guidance establishes the groundwork for improved national monitoring including data collection, inventory preparation and reporting (Paustian et al. 2006).

The Convention Secretariat is hopeful that data for the 2nd National Communications from non-Annex I Parties will be significantly more complete, consistent and comparable than what was submitted in the first round.[26] GEF support for this reporting, which is already in place, will go some ways towards establishing a strong basis within developing country governments for future work to consistently monitor emissions from deforestation.

With respect to international institutional capacity, two key needs remain. These include the need for standardised reporting approaches. To support a mechanism for RED(D) new guidelines will be needed to identify minimum data requirements for monitoring of emissions from deforestation and underlying data. Thorough and transparent documentation of inventory methods and assumptions is also necessary to permit external review and assessment. Finally procedures will also be needed to establish a process formal expert review, or third-party review, as a means to ensure good quality data and raise confidence in inventories as a basis for decision-making.

Forest area data are readily available from low and medium resolution remote sensing satellite imagery archives for developing countries at continental regional scale and smaller scales (FAO 2006; DeFries et al. 2006; UNFCCC 2006). For example, Landsat 5 data with medium spatial resolution are available for free (see Table 1). However it is generally not possible from these data to distinguish changes amongst types of biomes Only higher resolution satellite imagery or field work, or preferably a combination of both, can provide information for ground-truthing, and the necessary estimates of area change by biome and information on carbon stock. This type of satellite data is only recently becoming available; such satellite data remains relatively expensive and coverage of developing countries is much more scarce than for lower resolution imagery which can be used, for example, to track and estimate changes in forest areas (or deforestation) (UNFCCC 2006). Importantly for the purpose of baseline construction, most satellite data are not available as annual time-series, but only for periodic intervals (i.e. 1990, 2000, 2005) (Herold et al. 2007).

FAO recently summarised the quality and availability of data on forest area and carbon stock change by country. This survey suggests data are available on changes in forest area for the majority of the world's developing country regions but that data is lacking on changes in carbon stocks (see Figure 3).

[25] The comparison is problematic due to differences in coverage all relevant gases (CO_2, CH_4 and N_2O). However, contrary to what one would expect to find, the CAIT estimates are consistently higher, sometimes by a factor of two or more, even though they omit the non-CO_2 gases.

[26] Personal communication, Dominique Reveil, UNFCCC Secretariat, 20 September 2007

National monitoring systems for forests are also largely absent. There are two important exceptions with respect to national monitoring systems. Brazil and India have comprehensive forest surveys operated by the national government, potentially providing a strong national data set as a basis for national inventories and estimates of emissions from deforestation (DeFries et al. 2006; India 2007; INPE 2005).

Although satellite data are widely available and many expert studies (and much expert capacity) exist to contribute useful information, there is a lack of national capacity in most developing countries to access and use available data and expertise (FAO 2006a; DeFries et al. 2006). The lack of such capacity within governments hinders the ability of national governments to effectively manage deforestation emission sources and makes it difficult for these same governments to work through the UNFCCC to develop and implement an effective financial mechanism for RED(D). Interest to develop such capacity could be driven by agreement to establish a specific mechanism under the Convention to address emissions from deforestation.

Box 3. Uncertainty in emissions from deforestation

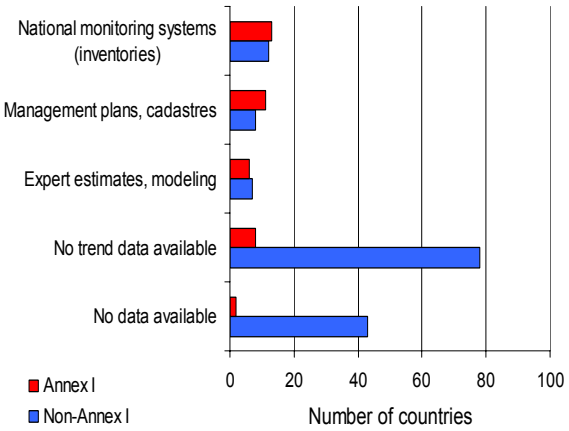
At least two types of studies are relevant to understanding emissions from deforestation and the uncertainty associated with them. First are global "top-down" analyses and second are national "bottom-up" inventories of emissions. Looking across the literature on global estimates, the IPCC chose not to update its global estimate of emissions from land use in the most recent Fourth Assessment (IPCC 2007a). Instead, the IPCC restates the range of estimates outlined in the TAR for the 1990s with a central estimate of 1.6 Gt C per year, and a range of 0.5 to 2.7 GtC (corresponding to +/- 68%). Taking into account only anthropogenic fluxes of carbon (i.e. from energy and from land and excluding other greenhouse gases) leads to the conclusion that deforestation contributes roughly 20% of emissions in the 1990s. If accurate, this would make it the second largest source of anthropogenic CO_2 emissions, following only emissions from the power sector (Baumert, Herzog and Pershing 2004). However, a residual land sink is also relevant to the global carbon budget; the IPCC central estimate is -2.6 GtC with a range of -4.9 to -0.9 (+/- 65%) (IPCC 2007a). This residual sink, which is unaccounted for by known physical processes, introduces an additional factor of uncertainty into the estimates of emissions from deforestation.

A handful of top-down expert studies provide global estimates for carbon emissions from deforestation accompanied by comparable regional or national estimates (e.g. (Fearnside 2001; Houghton 2003a)). The World Resources Institute uses Houghton's work (2003a and 2003b) to develop time-series national estimates of carbon fluxes from land use change and forestry. It is unique in that is allows comparative analysis of emissions at national scale and easy (internet) access and querying of emission data by country and region over time. These data have been widely used and quoted in policy analysis of this issue, e.g. they are the basis of Stern Review's analysis of deforestation (Stern 2007). Yet the CAIT estimates in this area are highly uncertain. Houghton (2003b) states that the CAIT national estimates for emissions of carbon from forests may be uncertain on the order of +/- 150% for large fluxes and +/- 50 MtC/yr for estimates near zero, i.e. for those nations with the smallest of forest areas.

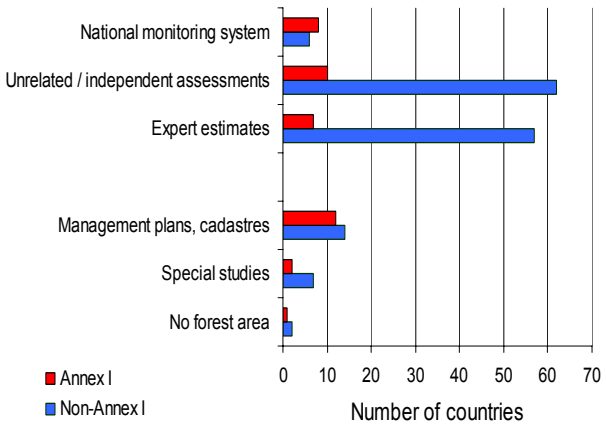
It is instructive to also consider what nations with comprehensive LULUCF inventories report with respect to uncertainties of inventory estimates. Canada, for example, reports large uncertainty with respect to deforestation rates, estimating a +/- 38% range of error for area (Canada 2005). Due to a lack of guidance for estimating uncertainty when using IPCC Tier 3 approaches in the LULUCF sector, they do not provide an estimate of uncertainty for the 2005 estimate of emissions. An expert analysis of the Austrian national inventory estimates the total uncertainty associated with carbon fluxes from forests to be 35% (Winiwarter and Rypdal 2001). Australia, using ecosystem models (Tier 3) and full spatial enumeration methods (Approach 3) for representing land, has narrowed uncertainty related to land cover to between 2 and 6% and has managed to reduce uncertainty concerning carbon stock fluxes down to 10% for forest conversion to cropland and grasslands (deforestation) and 30% for forest remaining forest (similar requirements as degradation monitoring) (95%CI) (Australia 2005) .

Figure 2. Data Quality and Availability

a) Forest Area Change



b) Carbon Stock Changes or Trends



Source (Braatz 2007; Wilkie 2006)

To promote achievement of sustainable forest management (see Box 4) and the common goals across various forest instruments, the FAO has developed a reporting framework to monitor progress in quantitative terms. The FAO's reporting framework includes monitoring across six different functions: extent of forest resources; biological diversity; forest health and vitality; productive functions of forest resources; protective functions of forest resources; socio-economic functions. FAO has competence to monitor and publishes time-series data at national and regional scale across these areas of interest. As part of this effort, the FAO gathers data on variables relevant to estimation of emissions from deforestation at national scale by not by ecosystem type or biome (FAO 2006a; Marklund and Schoene 2006).

Box 4. Institutional overlap and capacity for monitoring

The only ongoing and institutionalised international effort to work with national governments in developing countries and elsewhere to establish consistent national data on the state of the world's forests is located at FAO. FAO works not only with governments but also with non-organisations and stakeholders to advance common understanding and methodological approaches to assessment of forest resources. Since the middle of the 20th century FAO has regularly published a global forest resource assessment and this assessment is the main data source for many expert studies (FAO 2006). As a result of its expertise and capacity building mission, the FAO might be a powerful partner in any effort to establish a monitoring mechanism for RED(D) under the Convention.

A large number of international and regional forest related legal instruments or agreements are already in place and any effort to address forests under the UNFCCC will need to recognise the multiple uses of forest.[27] Perhaps three of the most relevant with respect to monitoring issues are: the International Tropical Timber Agreement, the FAO Committee on Forestry, and the United National Forum on Forests. These three bodies promote "sustainable forest management" where "management, conservation and sustainable development of all types of forests to provide for their multiple functions and uses" (FAO 2007; see also FAO 2006).

Drawing in part on the FAO data, the IPCC Guidelines and Good Practice Guidance (IPCC 1997; Penman et al. 2003; Paustian et al. 2006) provide default data for key assumptions for areas, area conversion rates and biomass rates (tonne/ha). These data are further refined by ecosystem type and by country. The IPCC

[27] FAO 2007 submission cites 40 legally-binding instruments and 25 non-legally binding instruments.

also supplies a carbon content default factor of 0.5 (with a range of 0.43-0.58). Combined, these IPCC assumptions can be used to derive national, ecosystem specific carbon stock estimates at a "Tier 1" level.[28]

5. Baselines, Leakage and Permanence

This section outlines a range of key design issues associated with baseline development or estimation of reference (emission and/or deforestation) levels. It also identifies the risk of leakage and permanence problems as related issues that need to be addressed in the design of any mechanism for RED(D).

The discussion here focuses on the issue of baselines as opposed to caps, because this is the approach that has been proposed in most recent submissions. It is important to caveat that other approaches are available, including the introduction of emissions caps on deforestation (which would also eliminate the additionality issue) or a tax on emissions. There is to date, one example of a national cap and trade programme that incorporates emissions from deforestation, namely that of New Zealand. This programme is briefly outlined below.

[28] Tier-1 in the IPCC good practice guidance and methods corresponds to the most aggregate level of estimation and relying on the use of IPCC "default" assumptions rather than locally generated data (see Annex III for a full explanation).

Box 5. Forestry Emissions in the New Zealand ETS

New Zealand is the first country to incorporate forestry emissions and removals in its proposed emissions trading scheme (NZ ETS).[29] As noted above, the Kyoto Protocol rules for the treatment of forestry depend on whether a stand was first established before or after 1 January 1990.

Pre-1990 Forest

Starting on 1 January 2008, owners of pre-1990 exotic forest will be liable for emissions from deforestation. Upon application, pre-1990 exotic forest owners will be freely allocated emission units (New Zealand Units, or NZUs) equivalent to 55 million tCO2 (1NZU=1tCO2) which they can use to help cover their liabilities[30]. This total of 55 million tCO2 is equivalent to slightly over 5 percent of the total pre-1990 forest estate – the average rate of deforestation over recent years. The government is currently proposing to distribute these units to landowners on a pro rata basis. Preliminary estimates suggest that allocation would be in the order of 39 units per ha, worth approximately NZ$585 per hectare, assuming a carbon price of NZ$15 per tCO2. A portion of these units – 34 million tCO2 – will be 'post dated' and unable to be surrendered to cover emissions until after 2013. Effectively this approach provides incentives to forest owners to cap or to decrease emissions from deforestation compared to past trends.

To help ensure that compliance and administration costs of the regime are not disproportionate, a de facto exemption will be granted for deforestation of pre-1990 forest of less than 2 ha during each five-year phase of the scheme. Land owners with less than 50 ha of pre-1990 forest can be exempted upon request. Removal of invading weed trees (1250ha of deforestation) will also be exempt. The 50ha and 2ha exemptions will be deducted from the overall pool of 55 million NZUs allocated, and are currently estimated to lead to emissions of 11.5 MtCO2.

It is undetermined whether pre-1990 indigenous forests will be included in the ETS, If so, an additional 8.1 million units will be made available to owners over the period from 2008 to 2020.[31] Harvesting of pre-1990 trees followed by replanting or natural regeneration will not incur deforestation liabilities, as New Zealand has chosen not to account for forest management activities under Article 3.4 during the first commitment period.

Post-1989 Forest

The owners of post-1989 forests can opt voluntarily to enter the scheme from 1 January 2008. On entry to the scheme these forest owners will assume responsibility for all changes in their forests' net carbon stocks, receiving credits where stocks increase and facing liabilities where they decrease. The government has agreed that liabilities for carbon stock reductions will never be greater than the total credits received for a given area of forest.

Forest owners who wish to establish new post-1989 forests but who do not wish to enter into the NZ ETS can also apply for government grants under the Afforestation Grants Scheme; participants will own the new forests and earn income from the timber, while the Crown will retain the sink credits and take responsibility for future emission liabilities. The government also operates a Permanent Forest Sink Initiative which enables forest owners to receive Kyoto assigned amount units on the basis of a land-use covenant between the landowner and the Crown.

[29] Although this system is conceived and integrated into the NZ mitigation strategy, accounting internationally for performance under this system will be consistent with Kyoto rules which functionally separates accounting for emissions and sinks forests from emissions from other sources (see Box 2).

[30] Forest owners will also be able to buy NZUs and Kyoto emission units on the market in order to meet their obligation.

[31] The available data suggest very low deforestation rates of indigenous forest and scrub land (less than 0.05%).

Box 5. Continued

Compliance Issues

An important distinction should be made between the treatment of deforestation and afforestation under the NZ ETS and the range of issues under discussion with regard to reduced emissions from deforestation and degradation for developing countries. Because New Zealand bears obligations for its land use, land-use change and forestry emissions and removals under the Kyoto Protocol, emission liabilities and credits can be devolved to forest owners under the NZ ETS without the need for project-based additionality assessments or permanence provisions in order to ensure the environmental integrity of the scheme. The New Zealand government is not crediting avoided deforestation activities. Rather, it is imposing a liability for deforestation emissions on all pre-1990 forest owners, and providing a limited amount of transitional assistance to forest owners through free allocation.

If forest owners fail to meet their obligations under the scheme they will be subject to binding consequences including penalties and make-good provisions in the case of non-compliance.

Participants will prepare their emission returns on a 'self assessment' basis, but face the possibility of an audit at any stage. In addition, the New Zealand Land Use and Carbon Analysis System (LUCAS) used for reporting national carbon stock changes under the Kyoto Protocol[32] will provide information for monitoring purposes. This system will use aerial photography and high resolution satellite imagery or airborne LiDAR[33], as well as site visits. Areas that are identified as being harvested will be monitored to see if they have been replanted and, if not, the administering agency will follow up to see if liabilities have been paid. The LUCAS system should be fully operational in 2010.

Emissions and sequestration will be assessed from January 1, 2008. Owners will be required to report any deforestation activities annually and surrender units to cover emissions. Owners may, at their election, report carbon stock changes for afforestation activities annually or up to five-yearly. Methodologies for assessing emissions from deforestation and carbon stock changes from afforestation activities will be provided by the government. Options include standardised tables or forest-specific modelling.

Sources: New Zealand National Inventory Report for 2005 (submitted May 4, 2007); Forestry in a New Zealand Emissions Trading Scheme. Engagement document. Ministry of Agriculture and Forestry, New Zealand. September 2007. www.maf.govt.nz; Bryan Smith, personal communication, Nov. 2007

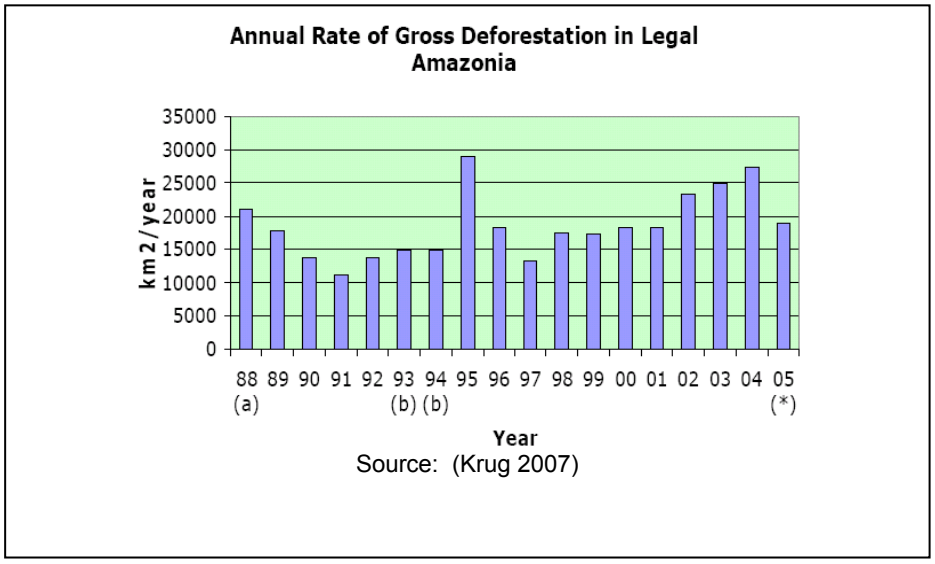
5.1 Baseline/reference levels

Baselines are an essential part of any mechanism aiming to RED(D) as they provide a reference against which performance can be assessed. Any baseline or target reference level will need to be anchored in past developments and experience with respect to deforestation. Historical trend data on deforestation are a starting point. If the goal of the mechanism is to reduce emissions, historical data must be available to document not only rates of deforestation (i.e. area data) but also emissions or changes in C stocks. The selection of a baseline will determine whether emissions reductions from avoided deforestation will be additional or not. Conservative baselines would therefore help to ensure the environmental integrity of the mechanism.

[32] So far GHG emission have been estimated through analysis of two existing land-cover maps of New Zealand – the Land Cover Databases 1 and 2 using SPOT and Landsat 7 ETM+ satellite imagery. LUCAS will integrate ground-truthing and remote sensing information in an integrated dataset introducing more complete and robust measurement, reporting and monitoring methods.

[33] Light Detection And Ranging

Figure 2.



There are large uncertainties associated with estimating fluxes of CO_2 from land use change and forestry. Direct measurement is not feasible, but a first order approximation is to assess changes in carbon stocks in biomass and soils for a given change in land use, e.g. deforestation due to conversion of a forest to cropland, or degradation due to a thinning of previously unmanaged forest area.

Two types of data are required to estimate this change in carbon fluxes: changes in forest area and changes in carbon stock data. A relatively long time period is necessary for averaging, since land use changes, and therefore emissions, can swing significantly from year to year. Figure 2 illustrates an example from Brazil of changes in forest area over a 17-year period. Averaging across longer time periods can avoid significant under- or over-estimation of change in any given year or in the future (DeFries et al. 2006; Krug 2007). However the choice of averaging period and the intervals of data across which averaging occurs will significantly influence the estimated trend. If historical data are the basis for baseline development, averaging times and the intervals for measurement will alter the suggested level of the baseline (Herold et al. 2007 forthcoming). As noted above, with the exception of Brazil and India, time series data of the type needed to do relevant averaging (i.e. annual data) are also essentially non-existent in most non-Annex I countries.

Data sources tend to be more widely available to monitor changes in forest areas than for carbon stocks. However accurate estimates of emissions from deforestation will also require accounting for these changes at a detailed spatial and temporal level to take into account wide variation of carbon stocks by region and/or ecosystem or biome type (i.e. a broad-leafed forest has a much different above-ground carbon stock than does a coniferous forest).[34] Improving the quality and availability of forest area and carbon stock data, by region and biome, could help to significantly improve inventories and baseline estimates of deforestation emissions. Beyond the expert-driven exercise of improving the quality and the availability of relevant data is the need to ensure that available data are accepted and acknowledged by national governments, with whom lies the ultimate responsibility to implement any mechanism under the Convention (see above for a discussion of the institutional requirements for national monitoring systems).

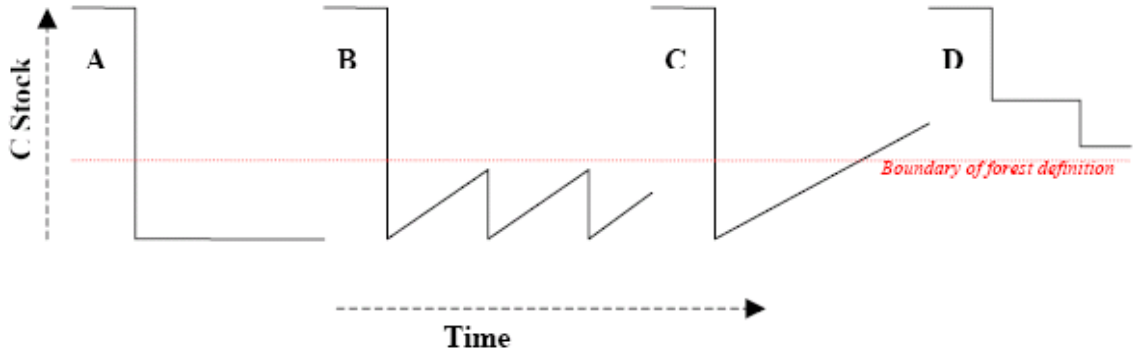
[34] For example, the IPCC 1996 Guidelines, which are currently in place for reporting under the Kyoto Protocol, provide information on forest types for tropical areas in general. These categories are: wet (mainly evergreen); moist with short dry season (mainly deciduous); moist with long dry season; dry; montane moist; montane dry. They also provide more specific guidance for tropical forests by continent (Africa, Latin America, Asia). Of course the guidelines also encourage the use of country and context specific and more detailed categories and data to describe forest areas, however these categories should correspond to the more general ones identified by the IPCC (IPCC 1997, Reference Manual, LUCF, pp 3-10).

Three different scales of baseline may be relevant to a RED(D) mechanism: local or project scale; national or sector scale; and global scale (Olander et al. 2006). Global scale baselines may be useful in particular as a means to assess international leakage (see below) and also possibly to provide a benchmark for assessment of performance. Some authors suggest the use of a global baseline as a way to identify groups of countries with high versus low deforestation (Olander et al. 2006; Mollicone et al. 2007). Design of incentives, baseline rules and monitoring requirements could be differentiated for each country grouping, with the aim to encourage future or ongoing emission reductions. National scale baselines are a minimum requirement if intranational leakage is to be identified and addressed (see section 5.2).

Regardless of whether a baseline is constructed at the national level or the project level, it will be important to ensure that a baseline is constructed with methods that are consistent across countries and conservative in their assumptions and outcomes, given the recognition of broad uncertainties. For comprehensive inventories of LULUCF and in particular to meet the reporting needs of the Kyoto Protocol and its coverage of forests and land use change, IPCC Good Practice Guidance was designed to serve this purpose (e.g. Penman et al. 2003a). A similar set of guidance, focused on the monitoring of emissions from deforestation in tropical countries, could be particularly useful to advance consistent data collection and conservative baseline development to support a mechanism for RED(D).[35] Such guidance would ideally be designed to pertain to both project and national scale monitoring of emissions. In this way, any project level activity would be monitored using comparable data and approaches to those supporting the national monitoring effort. Even if not immediately traceable to national emission trends, in the long-run linkage could provide a means to verify and improve estimates of national emissions from deforestation and a means to assess leakage over time.

Beyond current and historical emission estimates from deforestation is the question of future reference projections for emissions from deforestation. Baselines should be devised on the basis of understanding of regrowth regimes and other issues, such as land use, which will vary by local context (see Figure)(see also Penman et al. 2003a and b; Paustian et al. 2006). Other factors of relevance include soil and climatic conditions. The more there is vegetation regrowth after deforestation, the lower the baseline and the lower will be the avoided emissions from a policy, programme or project aiming to mitigate or halt deforestation. A wide variety of regrowth scenarios are possible (Figure 3) (UNFCCC 2006) and assumptions about these will determine the level of future baseline emission against which performance can be assessed. One option suggested by some authors is that the regrowth scenario could be ignored to focus uniquely on the avoided emissions at the point of deforestation (Herold et al., forthcoming 2007). While this would greatly simplify the task of baseline construction it would not necessarily be consistent with the principal of conservative baseline assumptions, as it could inflate the "avoided emission" performance associated with action.

Figure 3. Changes in carbon stocks for deforestation under four different land-use change scenarios



Source: FCCC 2006 (Rome background paper Part I)

[35] Note that the IPCC guidelines do provide coverage of emissions from deforestation but not necessarily in a manner that facilitates aggregation across all relevant drivers. For example in the current (2006) guidelines, identifying the aggregate emissions from deforestation would require adding across several main categories of activity of end uses of land (i.e. cropland, grassland, settlements, wetlands and other lands) as well as emissions from biomass burning. In all of the land use categories, forest land conversion is a sub-sub category.

Note: Scenarios are described as follows: (A) complete and permanent conversion from forest to non-forest; (B) conversion from forest to a shifting cultivation agricultural system; (C) temporary conversion from forest to an alternative land-use followed by regrowth; (D) degradation from undisturbed forest to marginal forest. [FCCC – background paper Rome, Part I]

Modelling future carbon fluxes from forestry at national scale is desirable but limited by lack of historic time series data (with the exception of Brazil and India), and poor understanding about the driving forces behind deforestation (Herold et al. 2007 forthcoming; Bird 2005). The difficulty of projecting future emissions from deforestation (or degradation) at national scale is compounded by the need for countries to advance credible scenarios for how deforestation is expected to evolve over time in relationship to other drivers in the global and national economy (e.g. global development and national development trends, agricultural policy and land tenure reforms, etc). Modelling capacity is especially important in terms of understanding how pressures on the whole of forest resources might evolve and in predicting the risk of leakage within and across national boundaries. Given the uncertainties and limited capacities to undertake quantitative projections at national scale at the present time, it might be useful to begin efforts to describe future risks to forest carbon stocks and drivers of deforestation in a consistent and comparable qualitative manner, and to develop these to quantitative methods over time (Herold et al. 2007 forthcoming).

Global modelling of greenhouse gas emissions has recently begun to include land use change and forestry (IPCC 2007c). Results show generally high emissions in the near future that decline over time, with some scenarios showing net sequestration at global scale by the end of the century. Thus while global emissions from this sector are significant, mainly due to tropical deforestation, emissions are expected to slow as deforestation driving forces equilibrate and forests are depleted. Of course regional or national scale trends will differ from these global trends. These scenarios suggest that the scope for effective international action will be greatest in the nearer-term.

5.2 Leakage

Leakage refers to changes in anthropogenic emissions by GHG sources which occur outside the project or national boundary. Leakage can occur at the intra-national or international (i.e., transnational) level but it is only an issue if emissions fall outside an accounting framework.

Though empirical studies on national leakage in the forestry sector are relatively limited, these indicate that national leakage can be substantial. A study of carbon leakage in the United States by Murray et al. (2004) suggests that the carbon leakage from afforestation or reduced deforestation projects could range from 10% to 90%, depending on the region where the project is undertaken. Sohngen and Brown (2004) estimate the leakage from forest-based carbon projects that seek to reduce carbon emissions from timber harvesting in tropical forests, using a case study of Bolivia. Their results suggest that leakage could range from 2% to 40%. They find that leakage is lowest when demand for timber is more elastic and dead wood decomposition rates are faster. According to Sohngen (2006), leakage ranges from 5-93% and most estimate of leakage in tropical countries are in excess of 50%.

The IPCC (2000) discusses two approaches to monitor leakage in avoided deforestation projects: The first involves determining the appropriate spatial area in which to monitor projects; the other involves identifying key indicators of leakage on the basis of demand that drives land-use change and management. The IPCC has categorised different activities potential for leakage in terms of high and moderate (Table 2).

Project estimates could be adjusted by coefficients depending on project types. To evaluate whether this approach is feasible in practice, further work is needed to assess how accurately leakage can be estimated including the uncertainty errors that are associated with these estimates. Under a project based mechanism, options for addressing national leakage include: i) the use of discounting (or conservative crediting); ii) monitoring leakage and creating set-asides to offset leakage if it seems to be a problem in the future; and iii) extending project-boundaries to the regional level. National leakage can be fully addressed via the use of a national cap/baseline since this type of accounting framework is national. Moreoever, a national approach would also significantly reduce the transaction costs of establishing baselines on a project-by-project basis.

Table 4. Factors contributing to project-based leakage and potential options

Project components for emission avoidance	Activity being replaced	Conditions signalling leakage	Leakage potential	Management strategies
Forest preservation	Conventional timber harvest practices	Decrease or halt in timber output	High	Develop alternative timber sources such as plantations on marginal land; introduce sustainable harvest in buffer areas; re-estimate projects GHG benefits
	Conversion to Agriculture	Decrease in agricultural output	High	Create alternative income source such as sustainable forestry; add agricultural productivity component
Sustainable forestry, reduced impact logging, natural forest management	Conventional timber harvest practices	Decrease in short-term output, but increase over long term	Moderate	Re-estimate GHG benefits over short term; develop alternative timber sources
		Decrease in timber output	High	Re-estimate GHG benefits

Source: IPCC Land use land use change and forestry, 2000

There has been less empirical work to examine the potential and size of transnational leakage of forest conservation. Employing a computable general equilibrium model, the Global Trade Analysis model, Gan and McCarl (2007) estimate leakage in the global economy context. They find that the magnitude of leakage depends upon price elasticities of supply and of demand for forest products across the countries and degree of cooperation in forest conservation. Transnational leakage ranges between 42% and 95%. Further, leakage generally diminishes as more countries cooperate, but cooperation among only a few countries does not always dramatically reduce leakage. Based on these findings, they conclude that forest conservation efforts and associated environmental performance gains in a country or group of countries can be seriously undermined in terms of global net conservation gain in the absence of effective global cooperation. In other words, the broader the scope of cooperation and more inclusive the agreement or mechanism, the lower the risk of widespread leakage.

5.3 Permanence

Leakage can also occur over a temporal scale and is referred to as the issue of “permanence”. Forests may burn, be cut or destroyed by pests. There is a risk therefore that the amount of carbon emissions avoided (and paid for) in period t may be reduced if deforestation occurs in the future. A financing mechanism that aims to RED(D) in an environmentally effective and economically efficient manner will need to manage and account for this type of risk. The risk of forest loss will vary depending on location. Risk can be assessed, and measures can be put in place to mitigate and manage risk (Ellis, 2001). It is possible to reduce the likelihood of carbon stock reduction and to manage the economic risk of carbon stock reduction – this should be undertaken at the international level in order to ensure transparent and consistent approaches.

It is also important to recognise the difference between emissions reductions from forestry and the energy sector. In forestry, carbon is sequestered only while the forest exists and hence there is a risk of reversal

greater than zero. In energy, when a new clean technology is adopted, the emissions avoided are prevented from entering the atmosphere in perpetuity. Therefore if one tonne of carbon sequestered in forestry is to offset a tonne of industrial emissions, the forest would need to exist in perpetuity. This requirement however may not always be consistent with a host country's development objectives, particularly if political, market, and social conditions change (Smith et al. 2000).

The concept of tonne-years has been proposed as an alternative to long-term obligations (Fearnside, 1997; Chomitz, 1998). Applying this concept, Moura Costa and Wilson (1999) calculated that a tonne of carbon sequestered in a forestry project is equivalent to 0.02 of a tonne of emissions avoided in an energy project. Another approach is to calculate conversion factors between forestry and energy projects as the ratio of the Present Value (PV) of a tonne of carbon displaced for the duration of the forestry project to the PV of a tonne of carbon displaced in perpetuity (Pearce et al. 1998).

The permanence issue also arose in CDM afforestation/reforestation projects (see Ellis, 2001) and has subsequently been addressed via the use of temporary credits[36]. Other options for addressing permanence include insurance mechanisms, and/or reserves with debit from future credits. The possibility of implementing these will also depend on whether a RED(D) mechanism adopted is fund or market based.

6. Financing Issues

6.1 Payments to governments versus forest owners/users

Payments for RED(D) should ideally be made directly to the forest owners/users making the land-use decisions. This would provide an incentive to individual forest owner/users to make informed decisions on the land use choices, given full information on the opportunity costs of alternative land uses. The transaction costs associated with engaging individuals are likely to be higher than making payments at the government level. Examples from Payments for Environmental Services programmes in Costa Rica/Mexico which compensate land users directly indicate that transaction costs are about 18% of total costs. The possibility of bundling smaller land parcels may help to reduce these costs[37]. The level at which emissions reduction incentives may be devolved however will depend crucially on the monitoring abilities of a particular country. If there is accurate monitoring at the forest owner/user level, then payments could be made directly to these individuals (or communities).

To ensure that a financing mechanism is performance-based, payments would need to be made ex-post. This is especially true for a baseline and credit mechanism, rather than a cap and trade mechanism with adequate non-compliance measures. Though ex-post payments may disadvantage small-landholders who are poorer, ex-post payments increase the environmental integrity of the mechanism. Ex-post payments is the methodology used in the Mexican Payments for Environmental Services schemes, the CDM and JI, among others.

Table 5 summarises landownership regimes of forests in some key developing countries. The first 10 countries are those with the highest rates of annual deforestation. With the exception of Brazil, all of the countries are dominated by public ownership of the forests. Three of the 10 countries do not have data reported on the land ownership regimes (the data on Brazil is from FRA 2000). The remaining set of 10 countries illustrate that there is in fact significant variability in ownership regimes of forests across different countries.

[36] Temporary CERs expire at the end of the commitment period subsequent to the commitment period for which they were issued. Lon-term CERs are valid until the end of the project's crediting period up to a maximum of 60 years (UNFCCC SBSTA, 2003).

[37] See Karousakis (2007) for a discussion on this.

Table 5. Ownership of forest land 2000

Country	Total area (1000 ha)	Public (%)	Private (%)	Other (%)
Top 10 countries with highest annual deforestation rates				
Brazil	493 213	-	80*	-
Indonesia	97 852	100	-	-
Sudan	70 491	97.7	2.3	-
Myanmar	34 554	100	0	0
DR Congo	135 207	100	0	0
Zambia	44 676	100	-	-
Tanzania	37 318	99.8	0.2	-
Nigeria	13 137	100	0	0
Zimbabwe	19 105	-	-	-
Venezuela	49 151	-	-	-
Other				
Mexico	65 540	58.8	-	41.2
Peru	69 213	83.1	15.2	1.7
Bolivia	60 091	-	-	-
Papua New Guinea	30 132	3.1	0	96.9
Cameroon	22 345	100	0	0
Chile	15 834	24.9	73.1	2.0
Panama	4 307	9.6	90.4	0
Costa Rica	2 376	24.3	75.7	-
Uruguay	1 409	2.7	97.3	0
Togo	486	27.0	73.0	-

Source: FAO (2006); * FRA (2000).

Note on FAO definitions: Public ownership: Land owned by the state (national, state, and regional governments) or government-owned institutions or corporations or other public bodies including cities, municipalities and villages. Private ownership: Land owned by individuals, families, private cooperatives, corporations, industries, private religious and educational institutions, pension or investment funds and other private institutions. Other ownership: Land that is classified neither as public nor as private ownership. Includes land for which ownership is not defined or unknown. NB: In some countries there is a distinction between ownership of forest land and ownership of trees. The FAO data summarizes the former (Marklund, pers. comm.).

Data on ownership of forest land does not necessarily provide an indication of who the actual land users/managers of the forest are. Forest owners frequently grant access and user rights to other parties. Governments in countries with large amounts of forests have traditionally chosen to transfer access rights and management authority to large scale private forest industry through logging concessions (White and Martin, 2002)[38].

Any transfer of rights and responsibilities needs to be qualified in terms of the accompanying security of tenure and management capacity in order fully to understand its impact. For example, private property might not necessarily entail the right to manage or even use resources (e.g., Pakistan), while some well-established long-term exclusive use rights (individual or communal) might be as secure as private, individually titled property (e.g., Viet Nam) (UNDP/UNEP/World Bank/WRI, 2005).

[38] For example, data available from South and South East Asia, suggest that 65 percent of publicly owned forests are managed directly and exclusively by the owner (central or local government). Although user rights for home consumption are granted in many (41 percent) of these forests, this category comprises mainly open-access, non-protected forests that are often left unmanaged owing to lack of government capacity. Agreements with limited devolution of management rights and responsibilities (such as joint forest management [JFM], community timber and private logging concessions) are prevailing over longer, more secure, tenure agreements (such as community forest management and private forest management concessions), regardless of whether they involve local communities, individual households or private companies. Local communities manage about 12 percent of public forests through either JFM agreements, longer-term community forestry (CF) agreements or individual/household leases, while 13 percent are granted to private companies, mainly through logging concessions.

Ex-post payments based on performance made to governments directly may provide the necessary incentives for developing country governments to address the wider regulatory and market imperfections that adversely affect deforestation. Moreover, given that more than two thirds of the developing countries with the 10 highest annual deforestation rates have nearly 100% public ownership of forest land (see Table 4), payments made at the national government level may be a reasonable starting point.

The choice of a national or project, fund or market based mechanism will affect whether payments for emissions reductions are made to developing country governments, directly to individual forest owners/ users, or to both. If payments for RED(D) were made exclusively to national governments (i.e. baselines/ reference levels are national and no international payments to individual forest owners/users are allowed), the developing country governments would need to establish a financing mechanism to manage and allocate the funds[39]. The national government would likely need to establish how to distribute funds most effectively (e.g. establish criteria and priorities) which could presumably include policies and measures, payments to forest owners/users based on deforestation risk (i.e., similar to domestic Payments for Environmental Services programmes) - or via inverse auctions, or other methods. This would not require international oversight given that national monitoring and reporting methodologies meet the eligibility requirements established at the international level.

6.2 The potential for RED(D) credits to flood the carbon market

A concern frequently raised is the possibility for RED(D) credits to flood the international carbon market and thus significantly weaken incentives for abatement elsewhere (and/or delay investment decisions in GHG abatement). Any increase in potential supply of credits from RED(D) would need to be countered by an increase in the demand for credits (to be generated by the stringency of any post-2012 emissions reduction commitments). However, experience from the EU ETS phase I provides an indication of the uncertainty inherent in predicting emissions and abatement responses – and hence, of prices and costs (Hepburn et al. 2006).

One way to prevent the international carbon market from being inundated by new RED(D) credits would be to impose a maximum limit on the supply of RED(D) credits that could enter into the international carbon market. This is not economically efficient however, as it does not allow the market to seek out the lowest cost emission reductions.

Another option to address this concern is to introduce a price floor on the permit price (Weitzman, 1976; Baumol and Oates 1988). If abatement costs are lower than expected, such a system would pay polluters to continue to reduce emissions and hold excess licenses unused in return for subsidy payments i.e., governments have to buy back allowances, or confiscate excess allowances. Hepburn et al. (2006) suggest a price floor via the use of a minimum bid auction to prevent a price collapse in the case where the supply of CDM/JI credits is large. Governments could agree that part of the allowances held back for auction (e.g., 10% under the EU Trading Directive) would be sold above a reserve price (e.g. €15/tCO_2.). Applying their example to RED(D), if the supply of RED(D) credits increase significantly beyond predicted, then the allowance price could drop below the reserve price of the auction, as illustrated in Figure 4 below. The auction reserve price would serve to increase the allowance price from P* to Pa*, because the withdrawal of the 10% of the allowances from the market ensures that the price is higher than it would have been otherwise[40].

[39] For example, the National Forestry Financing Fund (FONAFIFO) in Costa Rica manages the Payments for Environmental Services funds (see Karousakis, 2007).

[40] Setting an auction reserve price would have no impact in two unlikely situations: 1) very weak targets where price drops to zero, even if only 90% of allowances are available; 2) if ETS prices are already well above the reserve price, Pmin (still would have greater price stability ex ante, which induces increased investment in low-carbon technologies).

Figure 4. Auctions when JI/CDM supply is important

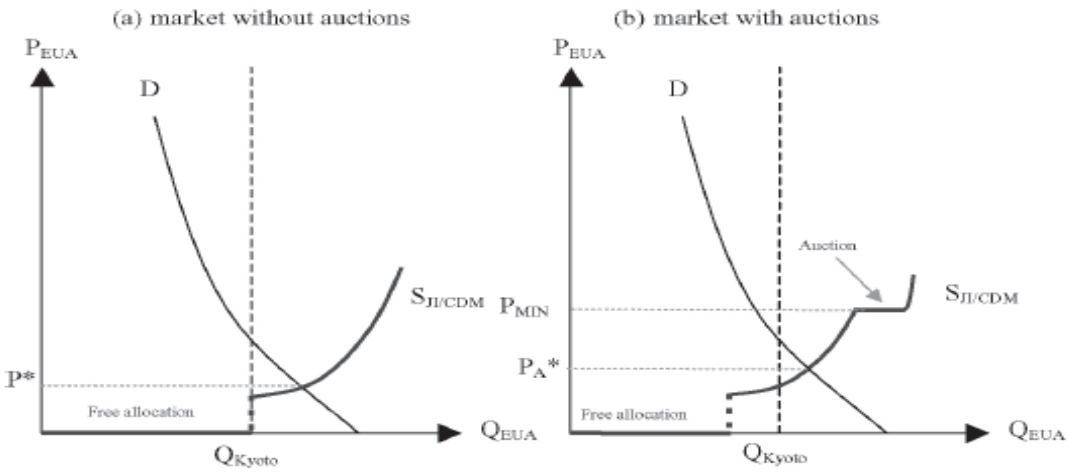


Figure 4. Auctions when JI/CDM supply is important.

Source: Hepburn et al. 2006

The use of a price floor to control the supply of RED(D) credits in the market could be complicated to administer in practice. A mechanism to ensure minimum allowance price might not be necessary to ensure near-term allowance scarcity if there is a banking mechanism and a general expectation that abatement cost increases and allocation decline in the future (Evans and Kruger, 2006).

Another option, recently introduced in the Regional Greenhouse Gas Initiative (RGGI) programme in the U.S., is an offset safety valve. The purpose of the RGGI offset safety valve is to help insure that the burden of reducing emissions is not exceedingly high (thus, if the price for CO_2 allowances equals or exceeds a certain amount, then the percentage of offsets that a source may use to cover its emissions shall increase). Some form of offset safety valve approach could also be used in the initial period assuming RED(D) is introduced into the market, to help insure that credits from RED(D) do not flood the international carbon market. To illustrate, a hypothetical example is provided below:

If price of international carbon credit > €10/tCO_2e, allow 5% RED(D) into market; If price of international carbon credit > €15/tCO_2e, allow 8% RED(D) into market; If price of international carbon credit > €20/tCO_2e, allow 10% RED(D) into market.

PART II: Proposed Financing Mechanisms for RED(D)

7. Overview of Fund and Market-Based Mechanisms for RED(D)

Several of the fund and market based mechanisms proposed for RED(D) are described below[41]. The key characteristics/features of the proposals are summarised in Table 6.

7.1 Fund based mechanisms

Voluntary RED fund (Brazil) – Under this proposal, funds for RED are proposed to come from voluntary contributions from developed countries and to be distributed to developing countries in proportion to the total (aggregate) emissions reductions achieved based on a reference emission rate. The reference emission rate (RER) is derived from the ten year historical average rate of deforestation in the country, using a carbon stock factor (tonne per hectare) and a biome-based assessment (e.g., Amazon: 90 tonnes C/ha). Payments for performance are based on a comparison between the RER and the actual (current year) rate of emissions from deforestation. The amount of incentive payment (per tonne of carbon) is agreed and reviewed periodically. An assessment of annual (or periodical) emissions from deforestation for comparison with the reference is required. If emissions from deforestation have decreased, the difference is converted into a financial incentive to be received (credit). Funding is therefore ex-post. If emissions have increased, the difference is converted into an amount to be subtracted (debit) from future financial incentives. The emissions reductions over a certain period for all countries would be added, with Annex II countries voluntarily sharing the bill (taking into account e.g. ODA commitments towards developing countries). The collected amount is then divided among the participating developing countries based on the ratio of the emissions reductions they achieved.

"All the reduced emissions of a country are to be added together for an agreed period, and the total reduced carbon tonnes are to be converted into a monetary sum, divided among the participating developing countries in the same ratio as the emissions reductions they have achieved. Financial incentives should be received only when this net accounting results in a number below the RER. In this case, this number should be converted into a monetary sum. The positive incentives will be provided by developed country Parties, taking into account their obligations under the UNFCCC."

Stabilisation Fund (COMIFAC[42]): To support efforts for the conservation and sustainable management of forests, the COMIFAC countries propose a fund for the remuneration of carbon stocks. Funding sources proposed are:

- Taxes on sale of REDD credits;
- Additional Annex II funding;
- Taxes on carbon intensive goods and services;
- Other financial instruments.

The utilisation of this fund could be subjected to a scale based not only on carbon stocks but also on criteria such as surface area sustainably managed and surface area protected, which recognize the efforts made in ensuring the sustainable management of forest ecosystems. Weighting systems will be developed with a view to prioritising some of the criteria mentioned above.

[41] This distinction may not be entirely mutually exclusive. Some of the fund based proposals for example suggest the use of market-based instruments, namely environmental/carbon/emissions taxes, to earn revenues that can then be earmarked for RED. This in effect is very similar to the way in which some Payments for Environmental Services programmes work – e.g. national water tax to fund forest conservation, as a means to preserve the watershed benefit services provided by the forests (e.g. Mexico).

[42] COMIFAC countries are: Burundi, Cameroon, Congo, Gabon, Equatorial Guinea, Central African Republic, Democratic Republic of Congo, Rwanda, Sao Tome and Principle and Chad.

Multilateral Fund[43] – Aimed at creating enabling conditions, including institutional and technical capacities, the fund is proposed to include an enabling window and an activity window. The former is to be distributed on a grant basis, and part of its task is to develop reliable forest inventory data. The latter may enable early action activities implemented prior to 2012 and any posterior pilot activity designed to test the effectiveness of capacities and measures to RED. In addition to voluntary contributions, sources of funds could include *inter alia*:

- An X% levy on Assigned Amounts first traded in the carbon market, similar to that on CERs, and/or
- Fees on carbon intensive commodities and services in Annex I countries, and/or
- A levy on international transport emissions, and/or
- Revenues from auctioning of credits in emissions trading, and/or
- Where emission trading systems have price caps, revenues from selling credits at the price-cap level.

Compensated Conservation[44] (India) – The proposal aims to compensate countries for maintaining and increasing carbon stocks as a result of conservation and for increasing and improvement in forest cover (such as China, India, and Vietnam). The determination of change in forest cover is proposed at the national level where the baseline would be established from some predetermined base year or cutoff year, such as 1990. It proposes the establishment of a new financial mechanism linked to verifiable C increments and proposes the use of ODA, GEF, and the Adaptation Fund to be made available for such incentives.

7.2 Market-based mechanisms

N24 Proposal[45] - This approach proposes a national approach to RED(D) that is based on 2003 IPCC Good Practice Guidance. The national approach should assess RED(D) on a conservative basis relative to a national emissions reference level (NERL). The NERL is to use activity data over a reference period that is as long as possible but not shorter than 5 years. The NERL is based on historical emissions including a development adjustment factor. Emissions reductions relative to NERL may encompass sub-national and project approaches for implementation. Payments are based on performance and independent peer review. In order to finance emissions reduction from deforestation of around 50%, financing mechanisms could include:

- Compliance Markets: Deepen Annex-B targets by around 9%.
- Inter-sectoral Linkages: Introduce a voluntary user-fee on emissions from air transport within
- Annex-1 countries of around $22/ton.
- Emissions Compliance Fees: Auction Annex-B emissions allowances in a post-2012 framework and allocate around $0.30/tCO2e from the proceeds.
- Tax on Oil Consumption: Apply an additional tax of $0.30 per barrel of oil equivalent consumed in the EU and US.
- Energy Subsidies: Reduce distorting energy subsidies within industrialized countries by around 12.5%.
- Additional ODA: Increase Official Development Assistance (ODA) by 12.5%.
- Voluntary Markets: Expand voluntary emissions markets by 100 times to be used exclusively for this purpose.

Nested Approach[46] – The Nested Approach proposes a double baseline-and-credit mechanism consisting of a national and sub-national (i.e. project-based) approach. This would enable countries to start immediately

[43] As part of the Nested Approach submission supported by Paraguay, Mexico, Honduras, Panama, Peru, and Chile (see below).

[44] This proposal is from previous submissions UNFCCC/SBSTA/MISC.02

[45] Belize, Bolivia, Central African Republic, Congo (Brazaville), Costa Rica, Dominican Republic, Equatorial Guinea, Gabon, Ghana, Guatemala, Honduras, Kenya, Lesotho, Liberia, Madagascar, Panama, Papua New Guinea, Sierra Leone, Solomon Islands, Thailand, Uganda, Vanuatu, and Vietnam.

[46] Supported by Paraguay, Mexico, Honduras, Panama, Peru, and Chile.

with the sub-national approach and to progress to a national approach once they are ready. Countries would be required to evolve to a national approach once the total area of a participating country reaches XX% of its forest territory or, more than YY years have elapsed since the start of the first sub-national activity or alternatively, voluntarily at any time before the time limit proposed. The approach should also provide incentives for participation in national level initiatives. For example, national level accounting might use Tier-1 methods while project level accounting would use Tier-2 or higher. Another incentive is that national level initiatives would not have to assess leakage, while project level accounting would have to assess, verify, and subtract leakage. Leakage prone project types would be avoided by strict eligibility criteria and would be (i) verified and subtracted in the calculation of emissions reductions attributable to the REDD (deforestation and degradation) activities; and (ii) added to the national target emissions level, once negotiated and registered. (Information on what the leakage prone project types might be is not included.) REDD credits under the national approach would be permanent and fungible, and XX% would be held in a mandatory reserve account. REDD credits issued to project activities would be either (i) temporary credits, or (ii) permanent credits with a mandatory reserve of credits to be transferred to the national reserve account.

Colombian proposal – This proposal calls for fungible RED credits which would be received directly by public or private entities or local communities that implemented project level activities. The emissions reference levels would be set for each of the areas of activity implementation, and the issue of leakage or emissions displacements would be addressed through methodological design.

COMIFAC - They suggest a reference scenario at either the national or project level. The reference scenario would be based on historical data as well as a development adjustment factor (including demographic trends, agriculture, food self-sufficiency, etc) and would be adjusted periodically (e.g. every 5 years).

Dual Markets Approach (CCAP) – Under this approach, new and separate emission reduction targets are proposed to be established for reducing emissions from deforestation and forest degradation, independent of the commitments established under the Kyoto Protocol. Developing countries commit to establishing and reporting national LULUCF inventories annually, including tree cover by biome type, land-use changes and emissions/sequestration. With regard to baselines, it recommends using methodologies that will enable consistency between countries and are scientifically sound, to be determined by experts in the field. To address domestic leakage, ideally baselines would be developed on a national basis, taking into account the forest cover changes and carbon flows across the entire country. In some cases, however, geography or measurement difficulties might support the use of a sub-national baseline (e.g., archipelago countries, large countries with forests concentrated in only one area, countries with inaccessible forests due to terrain or political instability). The proposal recognises, but does not address, the issue of permanence. Capacity building funding is provided up-front to provide incentives for data collection. The REDD targets can be met via funds, through mandates on companies, or both. No information is provided on how the funds would be generated.

Table 6. Key Characteristics of RED(D) Proposals

Fund Based Mechanisms									
	Nature of proposal	*Goal/ Objective*	*Baseline / Reference level*	*Financing*	*Crediting*	*Liability*	*Permanence*	*Leakage*	*Source*
Voluntary RED fund	Convention	Deforestation	Historical National	Voluntary funding	Ex-post	Banking & Borrowing	Debits deducted	N/A	Brazil
Stabilisation fund	N/A	Deforestation & Degradation	Historical + development factor; National and/or project	Tax on REDD credit, carbon tax, additional funding	N/A	Not considered	N/A	N/A	COMIFAC
Compensated Conservation	N/A	Afforestation/ Reforestation	Historical National	ODA, GEF, Adaptation Fund	N/A	N/A	N/A	CDM A/R projects to be deducted as leakage	India
Multilateral Fund (part of Nested Approach proposal –see below)	Kyoto Protocol	Capacity building (institutional & technical capacities)	N/A	Voluntary funding + AAU levy, carbon fee, international transport emissions levy, auction and/or price cap revenues	N/A	N/A	N/A	N/A	Paraguay, Mexico, Honduras, Panama, Peru, and Chile

Market Based Mechanisms								
	Nature of proposal	*Goal/ Objective*	*Baseline / Reference level*	*Financing*	*Liability*	*Crediting*	*Permanence*	*Leakage*	*Source*
N24 group	Kyoto Protocol	Deforestation & Degradation	National with projects	Annex II Parties plus others		Ex-post	Manage performance risk via reserve ratios, trust arrangements, risk pooling		Belize et al.
Nested Approach	Kyoto Protocol	Deforestation & Degradation	National & Project	Annex II Parties		Ex-post	Mandatory reserve account & temporary crediting	Eligibility criteria to avoid leakage prone project types; verified & subtracted	Paraguay, Mexico, Honduras, Panama, Peru, and Chile
Colombian proposal	Kyoto Protocol	Deforestation	Project	Annex II Parties		Ex-post? With host country approval		Addressed via methodological design	Colombia
COMIFAC	Kyoto Protocol	Deforestation & Degradation	Historical + development factor; National and/or project	Annex II Parties					COMIFAC
Dual Markets Approach	New separate market	Deforestation & Degradation	National with sub-national in certain cases	Annex II Parties (voluntary & market)	Absence of penalties > no lose targets.			Research to identify areas prone to leakage	CCAP

8. Evaluation of Financing Proposals

8.1 Are the goals and objectives of the financing mechanism clear?

As noted in section 2, the starting point for the goal of any mechanism is the Convention objective. Thus the goal of any mechanism for RED(D) could be to lower global costs of mitigation while also improving the effectiveness of overall efforts under the Convention to mitigate (and adapt) to climate change. Another related goal would be to help countries and forest owners to build capacity to better manage emissions from this source. In the end, the effectiveness of a financing mechanism for RED(D) would be assessed on its ability to deliver real and measurable emission reductions at global scale.

Proposals to date in the UNFCCC process can be broadly categorised into fund (i.e. non-market) and market based approaches. While all are focused on reducing emissions from deforestation, two different types of goal emerge: some proposals focus on capacity building to better monitor and manage emissions over time, while other proposals aim to finance incentives to reduce emissions from deforestation directly. Some of the proposals contain a combination of these two goals.

The **Voluntary RED** fund clearly specifies the objective of the fund and provides a framework, based on national monitoring and reporting, for how these funds would be disbursed in order to achieve its objectives.

The goals and objectives of other proposed funds however, such as the **Stabilisation Fund**, are less clearly defined. For example, the Stabilisation Fund proposes that the fund is created for countries with low deforestation rates but it does not, in its current form, clarify which countries may qualify for this fund; what the criteria for eligibility may be; and how additionality might be determined so as to avoid financing of forests with zero risk of deforestation. It is therefore not clear what the payments would be based on and how the objective of the proposal would contribute to the Convention objective of reducing GHG emissions.

The aim of the **Compensated Conservation** proposal is to provide compensation to countries for maintaining and increasing their carbon stocks as a result of conservation and increasing and improving forest cover. Determination of change in forest cover is proposed from some predetermined base year or cut off period (say, 1990)[47]. This proposal suggests that funds would be used for the purpose of reducing deforestation, as well as afforestation and reforestation, based on a national baseline. This raises questions however on how the baseline would be established. For example, would it incorporate national forest plans and take account of historical trends of deforestation? What about the impacts of economy-wide effects such as market prices on these decisions? There is also a potential for an Environmental Kuznets Curve in deforestation i.e. where countries would reduce rates of deforestation after a certain GDP per capita level. These issues would need to be considered in determining the baseline and would determine whether the mechanism would contribute to the objectives of the UNFCCC (discussed below).

One of the proposed funds aim is to support capacity building. More specifically, the **Multilateral Fund** aims to support capacity building and identifies the development of a forest inventory as one of its' goals. The goal of capacity building in itself however is very broad and can encompass a number of different factors. For example, capacity building may be defined as the minimum eligibility requirements that may be necessary to introduce a fund or market based mechanism. Alternatively, capacity building can be more broadly defined to include support for the development of a system of private contracts and property rights; enhancing sufficient government jurisdiction over the geographic area where a programme would be implemented (i.e., the ability to enforce compliance); and other institutional and technical infrastructure capacity, including hardware, software, internet access.

[47] An issue that has been raised with the use of a single base year is that there is large inter-annual variability in deforestation rates (and hence changes in forest cover). The use of a base period may therefore be more appropriate.

In the case of a fund, if the objectives are to build capacity to reduce emissions from deforestation (rather than to mitigate emissions per se), then it may be useful to make explicit the specific capacity building goals to be achieved. For example, the capacity building objectives might be to develop data to document the trend in emissions from deforestation over a five or ten-year period as well as to develop the necessary national systems to provide confidence in these data such that the performance of policies in this area can be effectively monitored. They may also have as a long-term objective the extension of GHG markets to this emission source. If so, fund objectives could be to achieve the minimum eligibility requirements that would be necessary for a developing country to participate in a RED(D) mechanism with the goal of emission reduction.

The capacity building goals proposed in the Multilateral Fund could therefore be further refined. This would help to identify what the financing needs are likely to be in order to achieve the pre-specified objectives, and thus to obtain a better understanding of the size of funds that need to be mobilized to help ensure their success.

The goals and objectives of the proposed market based mechanisms are more homogeneous, namely to reduce emissions from deforestation, based on voluntary participation by developing countries. Nearly all proposals also include the objective of reducing emissions from forest degradation. The methods outlined for how these goals would be achieved include national baseline and crediting mechanisms, project based mechanisms, and combinations of the two. The ability of the proposals to achieve their intended goals will depend on the monitoring requirements and capacities in different countries, and on the ability of different approaches to adequately account for issues including leakage and permanence (discussed below).

8.2 Are eligibility criteria and priorities identified?

Section 2.2 lays out a number of possible eligibility criteria. These will vary by type of mechanism, i.e. whether they are a fund or a market mechanism, and the specific goal of the mechanism. If the goal is capacity building, eligibility criteria and priorities will guide the disbursement of funds but there is not necessarily an expectation of demonstration of mitigation performance. However it might be valuable to demonstrate mitigation potential, for example, to target capacity building efforts in locations or countries that have the greatest potential for low cost emissions reductions and/or that have the highest capacity building needs in order to meet the pre-determined eligibility criteria. If the goal is emission reduction, i.e. in the form of a market mechanism, then eligibility criteria might be focused on the ability to ensure conditions for a secure market such as accurate monitoring and reporting to secure the property rights and to support compliance and enforcement provisions.

The **Voluntary Fund** proposal has a specific methodology to identify which countries are eligible for funds, based on the ability to lower emissions below the NERL. The methodology is ex-post and performance based, and therefore provides countries with on-going incentives to reduce emissions. The greater the emissions reductions, the greater are the funds received. Given that funding is ex-post and based on relative emissions reductions from other countries, there is no need to establish priorities for allocating funds. Monitoring capacity is implied as an eligibility requirement as the proposal notes that only countries with capacity to manage forests could participate. None of the other proposed funds establish eligibility criteria and prioritization approaches to help ensure that the funds are allocated in a cost-effective manner.

Examples of how criteria and prioritisation are applied in other environmental funds are described in Annex II (either for capacity building, or for projects and activities). Funds reviewed are the Global Environmental Facility (GEF), the Least Developing Country Fund (LDCF), the Special Climate Change Fund (SCCF), the Adaptation Fund (AF), and the proposed Readiness Mechanism under the World Bank Forest Carbon Partnership Facility (FCPF). These examples illustrate the range of approaches that have been taken to establish eligibility criteria for funding as well as prioritisation to promote more targeted resource allocation. Criteria are vague in certain funds, based generally on COP guidance for example, whereas other funds have much more detailed guidance. For example, criteria developed for selecting priority activities in the National Adaptation Plan of Action under the Least Developed Countries Fund includes guidance on the use of cost-benefit analysis, cost-effectiveness analysis, and multiple criteria analysis to rank and prioritise adaptation activities in Least Developed Countries

In general, establishing criteria and prioritisation methodologies for proposed fund based mechanisms would vary depending on the purpose of the fund and how the goals and objectives of the fund are defined. For funds that aim to support capacity building, it may be useful for an international body such as the UNFCCC to create a guidance document for developing countries on the requirements necessary to introduce a RED(D) market based mechanism (e.g. minimum eligibility requirements or more broadly technical, monitoring, institutional requirements as identified in Section 8.4.4). This would assist developing countries to identify and evaluate their existing capacities and to conduct a self-assessment of their needs and priorities.

In allocating the financial resources for capacity building, a governing body a fund for capacity building could consider this input, perhaps in combination with a country's potential to generate global environmental benefits (e.g., as in the GEF Resource Allocation Framework – see Annex II), so that funds could be allocated as cost-effectively as possible.

For fund based mechanisms that are intended to address RED(D) directly, eligibility criteria for funding would presumably include requirements that emissions reductions are real, measurable, and long-term. Funds could therefore be allocated based on environmental performance at either the national or project level, and should be ex-post – this will imply adequate monitoring and accounting methodologies so that environmental performance can be determined (i.e. through the use of agreed baseline methodologies). To ensure that emissions reductions are additional, measurable, and long-term, eligibility criteria should also include appropriate consideration of permanence and leakage issues. There may also be a need to standardise methods to address these. Funds should be targeted and allocated to countries or projects where there is a high risk of deforestation, high carbon content, and low economic cost.

With the exception of the **Nested Approach**, the proposed market based mechanisms do not specify explicitly the type of eligibility criteria that may be necessary to participate in a market based mechanism for RED. The Nested Approach proposes the use of Tier 1 eligibility criteria for national level accounting and Tier 2 or higher for project level accounting (see Table 6). **N24 proposal** outlines the need for the development of methodological guidance on monitoring but does not link this directly to eligibility.

8.3 Are funding sources sufficient and sustainable to address their objectives?

The sources proposed for securing financial resources vary across the proposals. Several of the fund based mechanisms specify options for raising funds from levies (e.g., on ERUs from joint implementation projects or Assigned Amounts, and/or a tax on international transport emissions), while other funds are based on voluntary contributions from Annex II countries.

It is difficult to assess whether the sources of funding proposed will be sufficient to address their objectives. This is because: i) objectives of the mechanism are not always clearly defined (especially in the case of capacity building); ii) existing estimates of financing needs vary widely, and in the case of capacity building are not well documented; and iii) pledges for funding are not always fulfilled.

The **N24 proposal** is perhaps the most comprehensive proposal in this regard, as it suggests a variety of sources of funding, with specific levies or targets, which are based on the objective of reducing emissions from deforestation by around 50%. The measures proposed are therefore intended to raise USD 10 billion.

Other proposals do not specify specific targets that would enable an assessment of whether they would be sufficient to achieve their objectives. However, it is possible to examine whether the sources of funding proposed would be sustainable, predictable/stable, and as well as whether they are an efficient means of procuring finances.

The benefit of introducing levies is that they represent a secure and potentially large *source* of funding[48]. There are different potential areas where such levies could be introduced. With regard to ERUs,

[48] For example, according to the UNFCCC, CERs in the Adaptation Fund holding account = 1,520,937; CERs expected until end of 2012 > 1,080,000,000 (of which 2% will go into AF holding account I assume).

approximately 80 million tonnes of CO2e are expected for 2008-2012 (UNFCCC, 2007). If for example, 2% of ERUs were directed to a RED(D) fund holding account, this would amount to a total of about 1.6 million ERUs. The average price of an ERU in 2006 was USD 8.70 (€6.70) (World Bank, 2007), thus an estimate of potential funds is approximately USD 14 million. Similarly, the **Stabilization Fund** includes a proposal to obtain financial resources via a tax on the sale of REDD credits. It is not possible to anticipate the price of RED(D) credits and the likely volume of credits that would be generated, as this would also depend on any aggregate emissions reduction commitments taken on by Annex I countries. Funds from such levies may suffer from insecure *level* of funds.

Taxes on carbon-intensive commodities and/or international transport emissions are an alternative source of funding proposed. Revenues from such taxes are likely to provide a large *and* stable source of revenue. However, though such environmental taxes are an economically efficient option as they provide cost-effective emissions reductions, earmarking tax revenues for specific purposes is not necessarily efficient (Brett and Keen, 2000). It is unlikely that activity in international transport will generate the optimal level of funds required to RED(D). Funds obtained and directed to RED(D) may therefore result in emissions reductions that are either sub-optimally high or low[49].

The **Compensated Conservation** proposal also includes the suggestion of using financial resources from the Adaptation Fund. Given that afforestation/reforestation may be considered as an adaptation measure, this may be warranted. However, given the large financial needs for adaptation, estimated at between USD 33-130 billion/year in 2030 (UNFCCC, 2007) and the current size of the fund, placing additional financial requirements on the Adaptation Fund may serve to further overburden the fund and undermine the ability to address its objectives.

Other sources of funding put forward in the **Multilateral Fund** proposal, such as using revenues from the auctioning of allowances in emissions trading, are likely to be less effective in securing the necessary funding and less politically feasible to implement at the present time. Only a minority of EU countries have taken the option of auctioning up to 5% of their allowances under the EU ETS during phase I (2005-2007) (namely Denmark, Hungary, Ireland, and Lithuania). In phase II (2008-2012), the EU ETS allows governments to auction up to 10% of the allowances issued[50]. In order for such a financing mechanism to be politically feasible, a harmonised approach to auctioning would be necessary; otherwise only limited number of countries would be bearing the costs of capacity building for RED(D) in developing countries. Moreover, such an approach may not be acceptable to many countries. Similarly, the proposal to obtain revenues from selling allowances at a price-cap level for those emissions trading programmes that have price caps is also unlikely to be feasible as only a very few number of countries are currently proposing the use of price caps (e.g. Australia and in several U.S. bills).

The majority of fund based proposals suggest the use of voluntary contributions to mobilise the financial resources for a RED(D) fund. The use of voluntary funding is proposed (either as the sole mechanism or in combination with levies and other methods) in the **Voluntary RED(D) Fund**, the **Multilateral Fund**, and in the **Compensated Conservation** proposals.

Several issues arise in the case of voluntary contributions. First, it is unclear what the incentives and sources of funding would be. Given the magnitude of the financial resources needed to address RED(D) (refer to section 2), it is unlikely that sufficient resources will be secured on a voluntary basis. Second, voluntary contributions often suffer from instability and unpredictability of incoming funds (e.g., the aggregate level of voluntary contributions is likely to fluctuate from one year to the next). Third, voluntary funding forgoes the potential to engage the private sector, hence the largest source of potential financing to the forest sector would not be tapped/harnessed. Instead, under the status quo, the private sector will only

[49] These fund based proposals are in fact suggesting the use of market-based instruments to raise revenue that would be earmarked for RED, none of the proposals suggest the use of a carbon tax on deforestation to help fund RED(D) activities, which would be efficient This could be due to implementation difficulties (illegal logging) or due to differences in who would bear the burden of the tax.

[50] At present, only a few of the National Allocation Plans have been accepted, including the UK which intends to auction 7% of total emissions allowances; Germany with >9%, the Netherlands with >4% auctioning, and Austria with 1.2%, among others.

have incentives to convert forest areas, whereas Annex I governments would be subsidising conservation. In order to provide the correct market signals, policy incentives should be consistent across both the public and private sector.

Unless these issues are addressed, it is unlikely that voluntary contributions will be effective in achieving the desired emission reduction goals.

Regarding the stability/predictability of funds, unpredictable/unstable sources of funding may present difficulties for example with regard to how the Voluntary RED(D) Fund proposal might be implemented in practice: there is likely to be uncertainty with respect to how much money would be available in the fund, and thus how much developing countries should spend on RED(D) (since funding is ex-post). It would represent a subsidy for action to RED(D), though it would not be clear how much developing country governments would be receiving at the end of the accounting period ($/t$CO_2$) due to: (i) variability in amount of resources contributed to the fund over time; (ii) the relative reductions compared to other developing countries participating in the programme. Developing country governments will therefore not know how much to invest in RED(D) efforts. This is unlikely to result in an efficient allocation of resources.

Further work is needed to obtain estimates of the capacity building costs associated with preparing a country for RED(D), in order to assess the types of financing mechanisms that are likely to secure sufficient funding for these. The financing mechanism should be efficient and should not introduce additional distortions into the market.

As mentioned in Section 2, market based mechanisms will automatically secure the appropriate size of financial resources necessary in an efficient manner. The size of the funds that will be created as a result of a market based mechanism will depend on the stringency of the baseline/cap that is determined, as well as the coverage of the mechanism (i.e. deforestation and forest degradation). These sources of funding will be sufficient to meet the aggregate GHG emission reduction commitment established in Annex I countries, and would be sustainable and predictable. The size of finances flowing to the forest sector would depend on the abatement costs across different sectors where the market would seek out the lowest cost emissions reductions to the point where the commitments are fulfilled.

8.4 Are monitoring, baseline, leakage, and permanence challenges addressed?

Table 6 highlights how proposals approach the challenges of monitoring, baseline development, leakage and permanence for performance. It focuses on proposals that have emission reduction (rather than capacity building) as the main goal.

8.4.1 Monitoring

If a financial mechanism for RED(D) is to be advanced, monitoring requirements require the urgent attention of the international community. Reliable monitoring is necessary to underpin management of emissions from deforestation, baseline development (or target setting) as well as detection of leakage and permanence. Inevitably national governments need to have the capacity to monitor and report performance of project or national-scale activity. At the international level, there will also be a need for capacity to compare, review and assess performance across nations and/or projects. Thus institutional capacity is necessary both internationally and at the national level to implement a mechanism for RED.

The **N-24** proposal explicitly recognises many of the challenges associated good monitoring but has few concrete design proposals (see Table 6). Instead it highlights the urgent need for monitoring decisions to guide pilot activities and underscore any decision on a future agreement in this area. The proposal suggests the need for immediate attention to a range of issues (with a report back to SBSTA-29), notably to cover national emission reference levels; agreed emission reduction reference scenarios; measurement, reporting and verification procedures; forest classification and stratifications, including improved measurement of forest degradation; issues relating to conservativeness and accuracy (as addressed in the 2003 IPCC Good Practice Guidance); incentive frameworks, including annual and inter-annual accounting methods;

independent review process and instruments to address performance risk. Other items to be addressed by COP-15 would include instruments to address forest conservation and stabilisation; national circumstances and development differences (i.e. the Development Adjustment Factor). They propose a decision at COP-13 on monitoring guidance that would address the first set of issues.

All of the mechanisms would feature ex–post rather than ex-ante monitoring by national governments and some of the proposals include specific approaches to penalise poor performance (e.g. VRF, Nested Approach).

The **Voluntary Reduction Fund** proposal includes a variety of other mechanisms aiming to provide incentives to improve data quality over time and to ensure consistency and comparability in accounting for emissions from deforestation. These include: public disclosure of all data; definition of a forest according to FAO and FCCC definitions; definition of deforestation according to FCCC national communication guidance[51]; identify which carbon pools are traditionally accounted for; estimate deforestation reference emission rates (RER) by biome on basis of annual emissions from deforestation by biome from the last 10 years (represented by 4 inter-spaced years of data); following the guidance in Annex I establish uncertainty bounds (the 95% confidence interval) of the RER. Interestingly, the VRF also proposes monitoring to occur by biome and to estimate mean above-ground carbon stock by biome using in-country published sources. This approach offers the possibility for significant improvements in the accuracy of emission estimates but, if used as an eligibility requirement, it is likely to effectively exclude most countries from accessing the Fund.

The **Nested Approach** identifies the type of monitoring requirements a developing country would need to meet in order to be able to participate in a RED(D) mechanism (see above). More specifically, it proposes the use of Tier 1 eligibility criteria for national level accounting and Tier 2 or higher for project level accounting.

In contrast the **Dual-Markets** proposal addresses monitoring only to a limited extent. It recognises the importance of comparable data and baselines for implementation of a mechanism for REDD and calls for the development of a standard template and estimation protocol.

8.4.2 Baselines

Developing baselines is an essential part of the design of any mechanism aiming to curb emissions from deforestation. A key challenge and pre-requisite for a mechanism to RED(D) is to define deforestation, to identify areas at risk of deforestation in the future, and to define the notion of "reducing emissions from deforestation" (and possibly also degradation) in an environmentally credible and comparable manner across developing country regions.[52] At a minimum, estimates of past trends of emission from deforestation are required as an input to baseline development. Minimum data requirements are time-series for forest areas and for estimates of carbon stocks associated with these areas, ideally over a decade or more. Averaging across longer time periods is helpful to avoid significant under- or over-estimation of change in any given year or in the future (see Section 4).

Three of the proposals have particularly innovative ideas in the areas of baseline development, monitoring and related issues: Voluntary Reduction Fund (Brazil); the Nested Approach (Paraguay et al.); and the N-24 proposal. A further proposal is also discussed here, namely the Intact-Non-Intact global monitoring approach (Mollicone et al. 2007).

[51] Presumably this is the Kyoto Protocol guidance for Annex I Parties.

[52] Designing a financial mechanism to include incentives to reduce both degradation and deforestation would increase the comprehensiveness of the instrument but it also would expand the range of data required to estimate emissions and historical trends. While more data intensive, it may be more reliable environmentally to monitor entire forest areas, rather than to focus only on portions of forest areas that are defined as at "risk" of deforestation.

All of the proposals focus on historical rates of change as the basis for the baseline. The **Voluntary Reduction Fund** aims to ensure reductions in emissions from deforestation (excluding degradation) compared to national scale historical rates of change, with the central feature being the establishment of a Reference Emission Rate (RER) as the national baseline and ex-post assessment of performance. The RER is to be derived from an average of a past 10-year trend in emissions from deforestation (with at least 4 individual years of data). In recognition of the broad uncertainty associated with emission estimates, it requires quantification of uncertainty for the 10-year emissions average. The RER would be set at the lower bound of a 95% confidence interval associated with this average trend, thus ensuring conservative accounting and lowering the risk of over-estimating the credits from the mechanism.

The **Intact and Non-Intact Forest (INIF) Approach** underscores the need for a comprehensive approach to provide early incentives to REDD. Baseline development and subsequent monitoring is organised around three different categories of deforestation or forest degradation activity: i) intact forest converted to non-intact (or significantly degraded) forests; ii) intact forest to non-forest land use; iii) non-intact forest to non-forest land use. The approach includes a clear definition of an intact forest[53] and proposes to identify land areas pertaining to the three categories of change through the use of readily available satellite data. The baselines would be developed in a centralised manner (top-down rather than bottom-up) to enable broad coverage of all tropical forest nations.

The INIF Approach also proposes to break countries into two different groups: a) those with high deforestation rates and b) those with low deforestation rates, and different rules for baseline estimation would apply to each. A global area baseline conversion (GBC) rate (in terms of ha/yr) is the basis for this decision. Those countries with national conversion baselines above the level of half the global conversion baseline are categorised as countries with high deforestation and those with national below this level as countries with low deforestation. The actual baseline for performance then would be assessed against a reduced conversion rate (RCR) which would be calculated in different ways for each of the two groups: use of a national conversion baseline for high deforestation countries, or the use of half the global conversion baseline for low deforestation countries. Carbon factors would be nation specific and fixed by participating countries based on either existing "default" data (e.g. IPCC factors) or on national, context specific data. All (area) conversion baselines would be developed using data covering the period 1990 to 2005 but with the limited requirement for only a fist and last year of data for the calculation.

By comparison to the Voluntary Reduction Fund baseline proposal, the INIF approach relies on data in the public domain for baseline development and is therefore less burdensome on countries in terms of advance in-country data requirements. National monitoring to assess performance however would be essential and this would necessarily require attention and resources in terms of time and funding prior to the implementation (see Monitoring below).

None of these proposals include a requirement for a future scenario or projections for the purpose of baseline development and this omission could lead to a situation of inflated crediting. Under the VRF, however, the RER would be recalculated every 3 years (as an average of previous 3 years) with an adjustment if the recalculated value falls below previous value. Regular updating of the baseline would limit the risk of large quantities of "anyway" tonnes being credited, but could introduce some uncertainty into a market for credits (Olander et al. 2006).

Variation in data quality and analytical capabilities across countries suggest that a centralised, inter-governmental effort to develop baselines for each country using the most advanced methods might be more expedient (and possibly more cost-effective) than a bottom-up approach. A fully-centralised approach might produce consistent baseline estimates of emissions from deforestation across a wider range of countries than bottom-up and decentralised national efforts (Olander et al. 2006). Such a top-down approach to baseline development, on the other hand, risks detaching countries from understanding their own emission trends and their driving forces and could handicap their efforts to manage such emissions.

[53] An "intact" forest is proposed as a forest zone that is: "*larger than 1000 ha and with a smallest width of 2 km; containing a contiguous mosaic of natural ecosystems; not fragmented by infrastructure; without signs of significant human transformation (minimum size of isolated deforested or degraded patches to be considered from satellite imagery: 5 ha); and excluding burnt lands and forest re-growths.*"

Table 7. Key monitoring features of proposals

Proposals	Baseline (or cap) methods?	Compliance or performance assessment? Deal with uncertainty?	Penalty for poor performance?	Eligibility: linked to monitoring?	Other mechanism to improve data quality?
Funds					
Voluntary Reduction Fund (Brazil)	+ Yes, historical – 10 year trend; no projections	+ Yes; Low end of 95% confidence interval	+ Yes	+ Implied - monitoring & capacity to manage forests through policy.	++ Yes Biome based monitoring, use of local data, published sources; public data disclosure.
Market mechanisms					
N24 (Belize et al.)	+ at least historical 5 yr trend	+ Yes "conservative" basis; possible use of reserve ratios, trusts, risk pooling…		+ Yes Third party review on use of guidelines	+ IPCC GPG 2003; new guidance by COP-13
Nested Approach (Paraguay et al.)	+ Encourage national cap, based on national RR; alternative: project baselines	- Uncertainty: possibly tCERs, credit reserve	- Partial – if credits granted, adjust if RR is exceeded	- No	+ Project level activity to encourage learning by doing, make accessible to even those with limited capacity
Intact / non-intact (Mollicone et al. 2007)	++ Baseline vary for high vs low deforestation nations; historical (15 yr) global & national conversion rates; fixed c-stock assumption (vary by nation)	+ national monitoring; recognition of temporary nature of changes; need for ongoing verification	-	+ implied but not explicitly stated	++ Combine global & national monitoring across three cases: intact to non-intact; intact to non-forest; non-intact to non-forest areas. Global conversion rates & centralised assessment for baseline development.
Dual Markets Approach (CCAP)	+ Standard template and estimation protocol	- Alternative options: discounting or retirement of a portion of credits	- No loose targets	-	+ Pre-2012: Collaborative research to identify priority areas for REDD; pilot projects Post-2012: national management plans

Requiring bottom-up monitoring as an input to baselines development has a number of benefits but will require more time, personnel (including levels and types of expertise) and entail higher costs than a combined approach. An alternative would be to develop baselines drawing on both top-down and bottom-up inputs, as proposed in the INIF Approach. Only two historical data sets are essential and these would be the focus of attention: changes in forest areas and changes in carbon stock per ecosystem or biome type.

Initial default data for first, coarse estimates are already available from the IPCC (Penman et al. 2003). A combination of remote sensing surveys, supplemented with national and expert sources could be used to supplement and improve these data sets over time. National governments and teams of experts could work together to build capacity to monitor from the ground up (Braatz 2007; Wilkie 2006).

The FAO and its ongoing forest assessment process might be a good candidate to partner with national governments to quickly advance the state of knowledge and data on forest areas and carbon stocks. Their programme already assists governments to set up monitoring systems at national level, including national forest inventories and field measurements. One of FAO aims is to set up global and regional monitoring systems and these might be critical for verification purposes should an international financing mechanism be desirable (Braatz 2007; Wilkie 2006).

Overall, baselines are important for both fund and market based mechanisms that aim to reduce emissions from deforestation as they enable an assessment of additionality and of performance. The level of accuracy required under a fund-based mechanism could be lower than under a market-based mechanism since there is less risk of weakening an ongoing market for emissions from other sources. A combination of top-down data analysis and bottom-up approaches to gathering context specific information for baseline development is likely to be both expedient and help to build capacity to understand and manage emissions from deforestation (and degradation) at national level.

8.4.3 Leakage

The potential for leakage is not restricted to market based approaches to RED(D). The difference is that under fund based proposals, the emission reductions would not be credited and hence the aggregate emissions reduction commitment established under the Kyoto Protocol would not be undermined. Nevertheless, national and international leakage in a fund based mechanism would still result in less effective policies and measures from both an environmental and economic perspective.

In the existing fund based proposals, only the **Compensated Conservation** proposal mentions leakage. It states that existing CDM Afforestation/Reforestation projects are to be deducted as leakage. This is in fact not a leakage problem but rather a double-counting issue.

Under the market based mechanism proposals, many advocate the use of a national baseline (Table 6), which serves to address the problem of in-country leakage. Incentives to avoid deforestation alone could lead to inra-national leakage in the form of significant forest degradation which in turn could increase emissions. The **INIF Approach**, in particular, highlights the importance of national baselines and comprehensive coverage for both degradation and deforestation activity.

In the two proposals that include the use of project-based mechanism, the **Colombian proposal** does not include a way to address leakage, and the **Nested Approach** suggests identifying strict “eligibility criteria” for project based mechanisms so as to avoid leakage prone activities. In addition, project leakage would be subject to monitoring and verification. Where detected, it would subtracted in the calculation of emissions reductions attributable to the REDD activity, and added to the national target emissions level once this is negotiated and registered. The eligibility criteria however are not specified. Independent verification would also imply the need to establish international rules and procedures to estimate leakage in order to ensure that subtraction of credits across projects and countries is accurate and consistent. Without a national baseline, however, it will be impossible to detect leakage from project level activity.

Given the magnitude of potential national leakage that is reported in the literature, the use of a national baseline is recommended over project-based mechanism. Project-based mechanisms (i.e. where forest owners/users are compensated directly) could be used *in tandem* with a national baseline in a country once a country has developed national systems to monitor emissions at the level of forest owner/users (see Section 8.5 for discussion). This is similar to the national obligations and commitments in Annex I countries, where countries are able to devolve responsibilities to the sub-sectoral or entity level as they develop national systems to monitor emissions at these levels.

The **Dual Markets approach** suggests that international leakage is best addressed through changing international market demand for industries such as beef, soybeans, and palm oil that often drive large-scale deforestation. Improving agricultural management practices (e.g., increasing production efficiency and sustainability) will also be important for reducing leakage. Separate and complementary policy mechanisms to the RED(D) carbon markets approach (e.g., certification) are needed to address these drivers. But it would be difficult for environmental officials or climate change negotiators to control policy outcomes in these other areas.

Additional studies on this issue are needed to better assess the potential and magnitude of international (or transnational) leakage. Given the results from the study by Gan and McCarl (2007) who find that transnational leakage generally diminishes as more countries cooperate, but cooperation among only a few countries does not always dramatically reduce leakage, one possible way to minimise the potential for transnational leakage is to include a minimum threshold of participation before RED(D) could come into effect (e.g. at least X% of total potential emissions from deforestation from at least Y developing countries). A similar requirement was set up for the Kyoto Protocol requiring that at least 55 nations needed to ratify the Protocol, accounting for at least 55% of GHG emissions, before the Protocol could come into force.

8.4.4 Permanence

The issue of permanence may arise in both fund based and market based proposals to RED(D) and would therefore need to be addressed in either. Few of the financing proposals however include a mechanism to account for permanence. Exceptions include the **Voluntary RED Fund** and the **Nested Approach**. These propose the following methods to account for permanence:

i. Temporary credits

ii. Insurance reserves

iii. Debits deducted

Further work would need to be conducted to evaluate how these proposals would be implemented in practice e.g., the size of the reserves, how to evaluate the amount of debits to be deducted. An expert review process and/or guidelines would need to be established to elaborate methods and to ensure that these are applied consistently across countries.

8.5 Payments to governments versus forest owners/users

The proposals do not go into specific detail about how payments could be made in practice. The **Nested Approach** proposes the use of Tier 1 eligibility criteria for national level accounting and Tier 2 or higher for project level accounting (which would presumably consist of payments directly to forest owners/users).

As outlined in section 5 above, a number of issues would need to be clarified in order to ensure that payments would be effective, including clearly identifying property rights, and the level of monitoring accuracy required to support the type of payments made.

8.6 Addressing uncertainty in price in a RED(D) market mechanism

Within the market based mechanisms proposed, the **Dual Markets Approach** is the only proposal that incorporates a mechanism to address the potential for RED(D) credits to flood the existing carbon market in a post-2012 regime. The proposal imposes a maximum limit on the percentage that Annex I can achieve through overseas REDD: *For example, if a country committed to an overall 30% reduction, they could also commit that 5% of that reduction would be generated through financing REDD activities in developing countries - the other 25% would come through domestic reductions or through purchasing reductions in the non-REDD post-2012 carbon market* (CCAP, 2007). Though such artificial constraints on market based

mechanisms are not economically efficient, they would help to maintain the environmental integrity of the international carbon market. From an environmental perspective, they impose a limit on the potential emission reductions that can be achieved through offsets, and hence a limit on the potential new supply of credits that could flood the market, drive the market price of carbon down, and eliminate incentives for investment in abatement. The **N24 proposal** proposes volume caps for pre-2012 Credits for Reduced Emissions from Deforestation (CREDs) to manage the supply accumulated before the post-2012 frameworks come into effect.

It could be useful to consider the introduction of such a % RED(D) constraint in order to address the potential for market flooding the market and hence this type of price uncertainty. Similar constraints have been placed for example, during the first Kyoto commitment period, where a maximum limit of one percent of an industrialised country's base year emissions may be offset annually by CDM afforestation/reforestation projects. A similar limit imposed on RED(D) credits could be revised accordingly in a subsequent commitment period, once better information on prices and costs is available.

The alternative option of introducing a price floor (i.e., a lower price bound below which the price of the permit will not fall) could in fact serve to attain a higher level of environmental quality that in the absence of a price floor. Such a system would need to be harmonised and implemented across all countries however and further work would be necessary to evaluate how this could be implemented in practice and at what administrative cost. Other options, such as the introduction of an offset safety valve (see section 6.2), are also available and could be further explored.

9. Discussion and Conclusions

This paper identifies design features for a fund or market-based mechanism for RED(D) to enhance performance along the two dimensions of environmental effectiveness and economic efficiency. The paper also analyses recent fund and market-based proposals and discusses how these design features might be implemented in practice, namely:

- Identifying clear goals and objectives of the mechanism with respect to environmental performance (e.g. facilitating verifiable reductions in emissions from deforestation; promoting forest conservation and avoiding deforestation) which support the objectives of the Climate Convention;

- Identifying eligibility criteria and priorities (i.e. for disbursement of funds or for participation in the mechanism) and linking these to the goals of the mechanism; for RED(D) mechanisms, eligibility criteria should be linked to good practice in monitoring and possibly also baseline development;

- Mobilising sufficient, long-term, and stable sources of funding for RED(D) mechanisms (including from the private sector);

- Ensuring accurate and consistent monitoring and performance evaluation (including measurable indicators and data upon which to assess environmental and economic effectiveness and, where relevant support enforcement and compliance functions).

A number of Parties have submitted proposals on how to reduce emissions from deforestation (and degradation). The proposals vary significantly in terms of their goals (capacity building vs. RED), their scope (deforestation and forest degradation), and the types of mechanism that would be used (national vs. project-based performance objectives). Often, the modalities proposed are not sufficiently detailed to allow an assessment of whether they would contribute to the goals of the Convention (e.g. to ensure real, measurable and long-term emissions reductions). Eligibility criteria for participation in a mechanism, as well as prioritisation for funds are rarely specified. In the case of fund-based mechanisms (either for capacity building or for RED(D) directly), there are often a myriad of proposed sources of funding, without a financial needs assessment and an evaluation of whether these needs could be met in practice.

Overall, key issues highlighted in this paper include the following:

- Given the high uncertainty in emissions estimates in the forest sector and the potentially large magnitudes of in-country leakage, a national-scale financing mechanism would be able to deliver a higher level of environmental performance than a project-based mechanism. This is true for either fund or market-based mechanisms. Whether this is best achieved via an emissions cap or an emissions baseline has not been examined here.

- Insufficient attention is currently paid to the monitoring needs and capacities that would be necessary to support the types of mechanisms proposed for RED(D). This is a fundamental pre-requisite for any type of mechanism and is necessary to ensure the delivery of environmental and economic performance.

- Early action to build capacity for monitoring is needed as it will take time to collect sufficient data and analyse them in order to have high confidence in monitoring and assessment capabilities at national scale.

- Substantially more work is needed to identify and elaborate on the minimum eligibility requirements that a developing country would need to meet in order to be able to participate in any RED(D) mechanism (whether fund or market-based); in the case of a market mechanism, eligibility would necessarily need to be linked to capacity to monitor change across the activities targeted by the mechanism.

- If the aim is to introduce a market-based mechanism for RED(D) where credits are "fungible" with those in the international carbon market, then it will be necessary to ensure that 1 ton of emission reductions from a forestry project is equal to 1 ton of emission reductions from an energy project. Alternatively, if a RED(D) market, independent of the current Kyoto market, were created, monitoring would need to ensure that emissions estimates are consistent across countries. A fund-based mechanism would also need to ensure consistent monitoring across countries.

- Methods for conservative approaches for emissions accounting could help to reconcile the issue of fungibility. These should be proportionate to the uncertainty underlying the monitoring methodologies used so as to provide continuous incentives for improvement.

An argument for a concerted international effort to improve data and monitoring so as to enable a fund or market-based RED(D) mechanism can be made on several grounds. First, the significance of emissions from deforestation is estimated to be high, possibly as great as 20% of global emissions today. In addition, there is evidence of high potential for mitigation activities in the forestry sector, and in particular avoided deforestation, to contribute to large low-cost emission reductions (IPCC, 2007c). Mitigating emissions from deforestation may be an essential part of the long-term climate change package of required response measures, especially in the near term (OECD forthcoming 2008). If stringent emissions reductions are to be achieved by mid-century, RED(D) may provide a critical near-term bridge and time to transition in the longer-term to cleaner energy systems. Another argument, not explored here, is that in the post-2012 framework, an international financing mechanism for RED(D) could provide a means for meaningful burden-sharing to achieve more aggressive global emission reduction targets than would otherwise be possible. Finally, RED(D) would also be able to deliver a wide range of co-benefits including adaptation to climate change, biodiversity preservation, and water conservation for local communities, among many others.

The paper suggests that currently available national inventory data from developing countries on emissions from land use change and forestry are insufficient to support decision making on how to best finance emission reductions so that environmental and economic objectives are achieved. Good quality, internationally comparable, accurate and consistent data, along with harmonised reporting, will be key.

Given high uncertainty surrounding available emissions estimates and more generally a lack of reliable data for deforestation and emissions in developing countries, the creation of markets for RED(D) by 2013 would be premature without considerable progress in the area of monitoring. Until reliable emissions data on RED(D) are more widely available and consistent at a scale that is relevant to international market-based approaches, fungible RED(D) credits in the international carbon market could seriously undermine the

objectives of the Convention. However there is one important caveat to this conclusion: interest in the creation of environmental markets is often an incentive in itself for governmental attention and resources to flow to improve information to better manage a problem. To ensure the "value" of environmental services flowing from avoided deforestation in a market context, it will be necessary to harmonize methods, fill data gaps and generally improve the quality of comparable information.

Exploratory preparation to develop conditions and information that enable markets for RED(D) would be a first step. This work could include some combination of top-down data assessment, from publicly available data sets and bottom-up data gathering and capacity building. National governments are central to the implementation of any future mechanism and they will need to be central players in preparatory work and operation of national systems for monitoring. They will need to oversee and endorse performance assessment results and maintain the systems and the expertise that allow such an assessment to occur in an independent manner. At worst, such exploratory work would lead to a conclusion that it will take longer than expected to develop reliable data and inventories, limiting investment in RED(D) to only pilot or demonstration projects, presumably at a relatively small scale, or possibly suggesting the need to address deforestation through an alternative mechanism than one that focuses on emission.[54] Alternatively exploratory work might yield promising results, at a minimum improving knowledge about the emissions from deforestation and the drivers of these, to allow better development of management practices. Building such knowledge about the nature of the problem and approaches to manage it from the ground up provides the means for national policies and capacity to manage deforestation. This is a pre-requisite for the implementation of a market mechanism.

In the end, it is likely that financing mechanisms for RED(D) will require some combination of both international and national systems for monitoring, reporting and review to establish a basis for performance assessment of the mechanism and to build confidence in its actual performance over time. It is therefore appropriate to move forward on both institutional fronts – working both to advance the international institutional framework for centralised monitoring and review of national emissions and baselines estimates in this area while also advancing efforts to build capacity for assessing and managing emissions from deforestation at national level. With respect to the institutional framework, some of the basic building blocks are already in place and these could be usefully extended should a mechanism for RED(D) be put in place. Ideally the design of the mechanism would provide continuous incentives for improved monitoring and accuracy of emissions data.

This paper has analysed issues and options for how a financing mechanism for RED(D) could be implemented in practice. In either a fund or market based mechanism, the framework for accounting would need to address leakage and permanence. For example, given current data availability, the paper suggests the use of a national baseline or cap approach (in order to minimise national leakage), along with an option that at least X number of countries voluntarily participate in the mechanism (in order to minimise international leakage). There are also methods available to ensure that a potential new supply of credits from RED(D) do not destabilise the existing international carbon market (e.g., via the introduction of RED(D) limits; the use of a price floor; or offset safety valves, depending on the type of mechanism adopted). It is important to bear in mind that the aim of a market mechanism is to achieve emission reductions at lowest possible cost, and that ultimately, allowance prices (and hence incentives for abatement) should be driven by the stringency of the emission reduction commitments.

One potential way to provide incentives for and encourage increasingly accurate and consistent monitoring could be to have a two track system based on the national monitoring capacities of a developing country. For example, under an IPCC Tier X approach, only a national baseline would be allowed and payments would be made to the government (i.e., national level trading only). This type of mechanism could have similarities to current domestic Payment for Environmental Services programs where the national government is responsible for managing and allocating funds. In effect, this would constitute a form of international payment for environmental service (IPES). Alternatively, the developing country government could use the funds to finance policies and measures based on their national circumstances. This would be a national sovereignty issue since monitoring would be undertaken at the national level, subject to monitoring

[54] For example, the Stern Review provided a number of suggestions such as mechanism that targets forest area conservation (rather than emissions per se).

requirements that are established at the international level. This would also imply that the developing country governments would be able to decide how to allocate resources in the best way so as to ensure equity considerations, local communities' needs, etc. If payments to the developing country are made ex-post, national governments would have direct incentives to implement appropriate policies and measures, address property rights issues and other regulatory and government imperfections, including corruption.

An expert international body could identify the minimum IPCC Tier level for monitoring that would be sufficient to support such an approach. The national baseline could be discounted based on the margin or error associated with specified Tier monitoring methods (i.e., a conservative approach). Assuming that the more sophisticated the Tier, the smaller the margin of error will be, the discounting factor will decline accordingly. This would provide developing country governments with incentives to improve the accuracy of the monitoring methods they use.

Perhaps, at sophisticated levels of monitoring such as wall-to-wall coverage with high resolution imagery, project level activities would also be feasible, since this provides greater accuracy at smaller scales. Once this threshold is reached, governments could be allowed to devolve the national baseline to the project level, and thus *international* payments for RED(D) could be made directly to individual forest owners/users.

Further work would be necessary to assess which options are more effective from an environmental and economic standpoint, as well as administratively feasible. One promising possibility would be to evaluate a differentiated mechanism that would combine a variety of incentives, rules and monitoring approaches for different types of countries. Such a mechanism might separate and treat differently those countries that are expected to undergo rapid deforestation versus those that represent relatively low risks or that have already taken early action to deforestation. Baselines and the design of incentives might be designed to address each in a different manner, all with the overall aim to limit future emissions and to protect existing forests.

Alternatively, if accurate and consistent monitoring and accounting of RED(D) is not feasible in the near future, alternatives to an integrated market mechanism need to be more seriously considered. Pilot projects and other policies and measures can offer important new lessons, however credits from such activities would not be able to be traded in the current international carbon market. A key challenge under a fund-based approach would be to mobilise sufficient financing to meet the desired objectives.

Forests provide a number of public good benefits at the international, regional, and local level, and concerted efforts will need to be made in order to internalise these external benefits. Bundling of environmental services, including international payments for the carbon and biodiversity benefits provided by forests, may offer an alternative starting point. Agreements could be reached whereby national governments in developing countries would make concerted efforts to create payments for environmental services at the domestic level (to internalize the local and regional external benefits of watershed benefits, soil erosion etc), and that these efforts would be matched by international payments to internalise the global environmental benefits (carbon and biodiversity). Though monitoring accuracy is important, this would be a separate mechanism and would therefore not undermine the emission reduction targets under the Kyoto Protocol (or any post-2012 regime). Such international compensation mechanisms, based on performance achieved at the national level, may also provide the impetus necessary to encourage developing countries to improve the property rights regimes, and other market and governmental imperfections outside of the forest sector. Similarly, this may encourage developed countries to address the international distortions that further contribute to deforestation and forest degradation in developing countries.

The key criteria identified and discussed in this paper apply to both fund-based and market-based proposals. The building blocks necessary are the same under each, and would be similar to the building blocks necessary to establish alternative options, such as cap-and-trade mechanisms or integrated Payments for Environmental Services programmes that internalise local, regional and international public good benefits provided by forests.

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ANNEX I. DRAFT TEXT FOR A DECISION ON REDUCING EMISSIONS FROM DEFORESTATION IN DEVELOPING COUNTRIES

Draft decision [-/CP.13]

Reducing emissions from deforestation in developing countries

The Conference of the Parties,
Recalling the relevant provisions of the Convention, in particular Article 2, Article 3, paragraphs 1, 3 and 4, Article 4, paragraphs 1(a), (b), (c) and (d), 3, 5 and 7,
[Concerned about the contribution of the emissions from deforestation to global anthropogenic greenhouse gas emissions,]
Acknowledging that forest degradation also leads to emissions, and needs to be addressed when reducing emissions from deforestation,
[Recognizing that efforts and actions to reduce deforestation, maintain, and conserve forest carbon stocks in developing countries, are already being taken,]
[Option 1:
Recognizing the need for specific policy approaches to address different national circumstances and multiple drivers of deforestation in order to increase effectiveness of efforts to reduce emissions from deforestation in developing countries,
Option 2:
Recognizing the complexity of the problem, and that different national circumstances and multiple drivers of deforestation need to be addressed in order to increase the overall effect of efforts to reduce emissions from deforestation in developing countries,]
[Recognizing the potential role of further actions to reduce emissions from deforestation in developing countries to help meet the ultimate objective of the Convention,]
[Affirming the urgent need to take further meaningful action to reduce emissions from deforestation in developing countries,]
[Noting that sustainable reduction of emissions from deforestation in developing countries requires stable and predictable availability of resources,]
Recognizing that reducing emissions from deforestation in developing countries can promote co-benefits and may complement the aims and objectives of other relevant international conventions and agreements,
1. *Invites* Parties to further strengthen and support ongoing efforts to reduce emissions from deforestation on a voluntary basis;
2. *Encourages* all Parties, in a position to do so, to support capacity-building and technical assistance, and facilitate transfer of technology, to improve, among other things, data collection, estimation of emissions from deforestation, monitoring and reporting, and to address the institutional needs of developing countries to estimate and reduce emissions from deforestation;
3. *[Further encourages* Parties to explore a range of actions, identify options, and undertake efforts, including pilot activities to address the drivers of deforestation relevant to their national circumstances with a view to reducing emissions from deforestation;]
4. *[Invites* Parties, in particular Parties included in Annex II to the Convention, to mobilize resources to support capacity-building and efforts to reduce emissions from deforestation;]
5. *Encourages* the use of the most recent reporting guidelines[1] as a basis for reporting greenhouse gas emissions from deforestation, noting also that Parties not included in Annex I to the Convention are encouraged to apply the Intergovernmental Panel on Climate Change good practice guidance;[2]

Option 1 for para 6
6. [*Requests* the Subsidiary Body for Scientific and Technological Advice to undertake further methodological work relating to a range of actions including efforts to assess the effectiveness of actions in

relation to policy approaches and positive incentives, to reduce emissions from deforestation in developing countries, taking [into account] [note of], [as appropriate,] the views expressed in relevant documents (Footnote 1). The work should include:
(a) Submissions from Parties by 21 March 2008 on proposed solutions to outstanding methodological issues (Footnote 2), including, inter alia, issues associated with [national] [and subnational] reference emissions levels from deforestation, as a well as information gathered and experiences learned in relation to paragraphs 1, 2 and 3 above;
(b) Requesting the secretariat to organize, subject to availability of supplementary funding, a workshop on potential solutions to outstanding methodological issues and experiences learned in relation to paragraphs 1, 2 and 3 above, before its [twenty-ninth] session (December 2008) and to prepare a report for consideration by the Subsidiary Body for Scientific and Technological Advice at that session;

Footnote 1: FCCC/SBSTA/2007/MISC.2 and Add.1; FCCC/SBSTA/2007/3, [paragraphs 25 to 86]
Footnote 2: Consideration of these methodologies could include whether the emission reductions are real, demonstrable, transparent, verifiable, results based, and independently peer reviewed.]

Option 2 for para 6
6. [Requests the Subsidiary Body for Scientific and Technological Advice to undertake further methodological work relating to a range of actions to reduce emissions from deforestation in developing countries. The work should include:
(a) Submissions from Parties by 21 March 2008 on proposed solutions to outstanding methodological issues including efforts to assess the effectiveness of actions, as a well as information gathered and experiences learned in relation to paragraphs 1, 2 and 3 above;
(b) Requesting the secretariat to organize, subject to availability of supplementary funding, a workshop on potential solutions to outstanding methodological issues and experiences learned in relation to paragraphs 1, 2 and 3 above, before its [twenty-ninth] session (December 2008) and to prepare a report for consideration by the Subsidiary Body for Scientific and Technological Advice at that session;]

7. [*Invites* relevant organizations and stakeholders, without prejudice to any future decision of the Conference of the Parties on reducing emissions from deforestation in developing countries, to participate in and/or support, the implementation of activities to reduce emissions from deforestation
referred to in this decision, and to share the outcomes of these efforts with the Subsidiary Body for Scientific and Technological Advice by providing corresponding information to the secretariat, by xx September 2008, for compilation in appropriate documentation prior to the twenty-ninth session of the Subsidiary Body for Scientific and Technological Advice;]
(Note: the timing is subject to final outcome of paras. 6 (b) and 8)

8. [*Decides* to address, at a future session, as soon as possible, the range of policy approaches and positive incentives as proposed by Parties[3] on issues relating to reducing emissions from deforestation in developing countries and to also include consideration of this matter in the context of any discussions on future international cooperation on climate change, taking into account any other relevant work under the Convention.]

ANNEX II: EXAMPLES OF ELIGIBILITY CRITERIA AND PRIORITISATION IN ENVIRONMENTAL FUNDS

GEF Strategic Approach to Enhancing Capacity Building:

The GEF approved a Strategic Approach to Enhancing Capacity Building in November 2003. The approach lays out a multilevel plan for capacity building for global commons and outlines the development of:

- Targets and indicators for measuring results and effects of capacity-building activities.
- Operational modalities and project criteria for implementing the strategic approach.
- Proposals for a technical support programme.
- GEF support for capacity building is to be developed based on four "pathways":
  - A self-assessment of capacity needs by countries.
  - Strengthening the capacity-building elements in GEF projects.
  - Development of targeted capacity-building projects.
  - Country-specific programmes for addressing critical capacity building needs in least developed countries and small island developing states.

For example, a National Capacity Needs Self Assessment (NCSA) program is operational and guidelines have been prepared to assist countries in preparing their NCSAs. Under an NCSA, funding is provided to assist countries for preparing self assessments of their capacity needs and priorities to manage global environmental issues. Once countries identify gaps in capacity building, they are encouraged to develop a plan of action for overcoming the gaps. NCSAs are intended to be entirely country driven, undertaken in accordance with country priorities and situations.

Three dimensions are critically important in deciding how to allocate resources for capacity building for global environmental benefits: How available funds should be distributed among countries, focal areas and programme priorities within a global focal area.

GEF Performance-Based Resource Allocation Framework:

The Performance-Based Resource Allocation Framework (RAF) is a new system adopted by the GEF Council in September 2005 to allocate GEF resources to recipient countries based on global environmental priorities and country-level performance. It is an attempt to move in the direction of more targeted resource allocation. The RAF is initially limited to biodiversity and climate change projects. The GBI for climate change seeks to measure the potential global benefits that can be realized from climate change mitigation activities in a country. The approach reflects the objectives of the GEF climate change operational programs to address long-term priorities to mitigate climate change. With respect to climate change, the GEF Benefits Index (GBI_{CC})provides a relative ranking of countries for meeting the climate change objectives of the GEF (which are to contribute to the overall objective of the UNFCCC) under the RAF. The index is constructed from two indicators: (i) baseline GHG emissions for the year 2000 in tons of carbon equivalent; and (ii) Carbon Intensity Adjustment Factor computed as the ratio of the carbon intensity in 1990 to the carbon intensity in 2000:

$$GBI_{CC} = \text{Baseline GHG Emissions} * (\text{Carbon Intensity}_{1990} / \text{Carbon Intensity}_{2000})$$

Baseline GHG emission levels provides a broad measure of the scale of the mitigation potential of a country, while avoiding perverse incentives that results from using current level emissions. To ensure widest coverage among countries, the year 2000 is used as the base year. Including baseline GHG emission levels in the GBI results in a larger GEF Benefit Index for larger emitters. There are two reasons for using GHG emission levels. First, in general, countries with larger emissions have lower abatement costs, which increase less rapidly with abatement than those in countries with smaller emissions. Second, projects are

likely to have greater demonstration and learning effects in high emitting countries than in countries with smaller levels of emissions. 7. The carbon intensity of a country measures the tons of carbon equivalent emitted by a country per unit of economic activity (GDP). It changes over time because of (i) increased carbon efficiency brought about by changes in fuels or technology or economic growth; and (ii) structural shifts in the economy away from carbon intensive activities. There are two reasons for using change in carbon intensity. First, reducing emissions will be less costly in countries that have already demonstrated willingness and/or ability to reduce carbon intensity. Second, it rewards countries that have reduced their carbon intensity levels.

Criteria developed for selecting priority activities in the National Adaptation Plan of Action (NAPAs) under the Least Developed Countries Fund (LDCF):

A set of locally-driven criteria is used to select priority adaptation activities. These criteria should include, *inter alia*:

- Level or degree of adverse effects of climate change;
- Poverty reduction to enhance adaptive capacity;
- Synergy with other multilateral environmental agreements;
- Cost-effectiveness.

These criteria for prioritization will be applied to, *inter alia*:

- Loss of life and livelihood;
- Human health;
- Food security and agriculture;
- Water availability, quality and accessibility;
- Essential infrastructure;
- Cultural heritage;
- Biological diversity;
- Land-use management and forestry;
- Other environmental amenities;
- Coastal zones, and associated loss of land.

The criteria is then ranked and prioritised. Guidance is provided in the LDC Expert Group Annotated Guidelines for the Preparation of NAPAs where Appendix D on Selection and Prioritization of Options[55] provides guidance on the use of cost-benefit analysis (CBA), cost-effectiveness analysis (CEA), and multiple criteria analysis (MCA) to prioritize adaptation activities in LDCs. Use of these methods and results of the analyses are reported in the NAPAs. The GEF then applies guidance provided by the COP on how to prioritize funding allocation in the 20 LDCs. Guidance is based on the principle of balanced access:

Balanced Access for LDCF

Decisions 6/CP.9 and 3/CP.11 call for balanced access by least developed country Parties to funding for the implementation of national adaptation programs of action. Balanced access to LDCF resources should provide that there will be no advantage or disadvantage in submitting projects for NAPA implementation based purely on timing. This will avoid a "first-come, first-served" determination of funding. The approach to balanced access should be flexible, and take into account different factors, such as vulnerability to climate change and type of interventions to address it; national and local circumstances including population and country size; and national and local capacity to cope with current variability and future change.

To ensure that resources are available to meet urgent needs, an approximate range of resources to implement first NAPA projects may be estimated once the size of the fund for the first round of implementation of NAPAs has been ascertained. LDCs will have the option to decide how to use the first round of LDCF resources, either through one relatively large project that addresses the first priority identified by the NAPA or through a number of smaller projects that address the multiple priorities listed in the NAPA. The GEF Secretariat and Implementing Agencies will then monitor the requests for projects through their LDCF pipeline management.

The approach to balanced access to LDCF resources will be re-examined and evaluated with a view to modification throughout the fund's lifetime, to take into account experience gained, the balance of the LDCF and the continuing needs for further support from the LDCF.

http://www.napa-pana.org/extranapa/UserFiles/File/C.28.18LDCTrustFund_000.pdf

[55] http://unfccc.int/files/cooperation_and_support/ldc/application/pdf/annguide.pdf

Special Climate Change Fund (SCCF):

The SCCF under the Convention was established in 2001 to finance projects relating to adaptation; technology transfer and capacity building; energy, transport, industry, agriculture, forestry and waste management; and economic diversification. This fund should complement other funding mechanisms for the implementation of the Convention. The GEF, as the entity that operates the financial mechanism, has been entrusted to operate the SCCF. Adaptation activities to address adverse impacts of climate change have top priority. Technology is also a priority – key technologies are identified with large GHG mitigation potential and of interest to a large number of developing countries. Activities are financed based on COP guidance.

Adaptation Fund:

The Adaptation Fund is for developing countries that are particularly vulnerable to the adverse effects of climate change. At its 26th meeting, the SBI considered views from Parties on eligibility criteria, priority areas and monetization of the share of proceeds for the Adaptation Fund, and agreed on a negotiating text for a draft decision to be completed with, inter alia, elements on institutional arrangements. The draft text states that the Adaptation Fund shall finance concrete adaptation projects and programmes that are country driven and are based on needs, views and priorities of eligible Parties. Further information is not available at this stage.

Forest Carbon Partnership Facility Readiness Mechanism:

The preliminary selection criteria for countries identified by the FCPF Readiness Mechanism (i.e. for capacity building) are:

- Relevance of Countries (forest cover; current/expected emissions from deforestation)
- Balance (3 main biomes; geographical balance)
- Ownership of National Government
- Variety of Approaches (Forest types; degradation should be tested; different implementation strategies)

ANNEX III: IPCC GOOD PRACTICE GUIDANCE FOR LAND USE, LAND USE CHANGE AND FORESTRY (2003)

FRAMEWORK OF TIER STRUCTURE IN THE GOOD PRACTICE GUIDANCE

The **Tier 1** approach employs the basic method provided in the IPCC Guidelines (Workbook) and the default emission factors provided in the IPCC Guidelines (Workbook and Reference Manual) with updates in this chapter of the report. For some land uses and pools that were only mentioned in the IPCC Guidelines (i.e., the default was an assumed zero emissions or removals), updates are included in this report if new scientific information is available. Tier 1 methodologies usually use activity data that are spatially coarse, such as nationally or globally available estimates of deforestation rates, agricultural production statistics, and global land cover maps.

Tier 2 can use the same methodological approach as Tier 1 but applies emission factors and activity data which are defined by the country for the most important land uses/activities. Tier 2 can also apply stock change methodologies based on country-specific data. Country-defined emission factors/activity data are more appropriate for the climatic regions and land use systems in that country. Higher resolution activity data are typically used in Tier 2 to correspond with country-defined coefficients for specific regions and specialised land-use categories.

At **Tier 3**, higher order methods are used including models and inventory measurement systems tailored to address national circumstances, repeated over time, and driven by high-resolution activity data and disaggregated at sub-national to fine grid scales. These higher order methods provide estimates of greater certainty than lower tiers and have a closer link between biomass and soil dynamics. Such systems may be GIS-based combinations of age, class/production data systems with connections to soil modules, integrating several types of monitoring. Pieces of land where a land-use change occurs can be tracked over time. In most cases these systems have a climate dependency, and thus provide source estimates with inter-annual variability. Models should undergo quality checks, audits, and validations.

Source: IPCC - Penman et al. 2003 (Box 3.1.1