REDD models and baselines

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SUMMARY

The article reviews some of the critical issues for including Reduced Emissions from Deforestation and forest Degradation (REDD) into a new global climate agreement. Four different REDD models (regimes) are discussed based on two dimensions: scale (national vs. project) and funding (market vs. funds). One of the most troublesome issues concerns setting national baselines (= emission quotas). Research provides few definite answers on how to do this, yet it has huge implications for the possible payments to developing countries. The paper argues that the expectations about the magnitude of such transfers are unrealistically high, and may reduce the prospect for reaching an agreement and increase the chances for 'hot air' from the South.

Keywords: climate change, deforestation, REDD, climate agreement, baselines

Modèles REDD et lignes de base

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Cet article résume certaines des questions critiques à l'inclusion des émissions réduites de la déforestation et de la dégradation forestière (REDD), dans un nouvel accord climatique global. Quatre modèles (régimes) REDD différents sont examinés en se basant sur deux dimensions: l'échelle (nationale/ du projet) et les finances (marché/ fonds). L'une des questions les plus difficiles concerne les lignes de base nationales (c.a.d les quotas d'émission). La recherche offre peu de réponses certaines sur cette question, bien qu'elle ait des implications énormes pour les payments possibles aux pays en voie de développement. L'article démontre que les prédictions quant à la magnitude des ces transferts sont démesurément élevées, ce qui risque de réduire les espoirs de parvenir à un accord, et d'accroître la probabilité d' "air chaud" en provenance du Sud.

Modelos y pautas de REDD

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El artículo examina algunos de los temas claves para la inclusión de la Reducción de Emisiones por Deforestación y Degradación (REDD) en un nuevo acuerdo mundial sobre el clima. Se analizan cuatro modelos diferentes de REDD, considerando las dos dimensiones de escala (nacional o basado en el proyecto) y financiación (por el mercado u otros recursos). El establecimiento de pautas nacionales, es decir cuotas de emisiones, es uno de los temas más problemáticos, y las investigaciones proporcionan pocas respuestas definitivas sobre cómo lograrlo, aunque tiene implicaciones fundamentales para los posibles ingresos de los países en vías de desarrollo. El artículo sugiere que las expectativas poco realistas sobre la magnitud de estas transferencias pueden reducir la posibilidad de lograr un acuerdo y aumentar la posibilidad de 'hot air' (compra de derechos a emisiones) de parte de los países del sur.

The coming of REDD

The issue of *Reduced Emissions from Deforestation and forest Degradation (REDD)* has undergone a major transformation over just 2-3 years. From being a too-difficult-to-handle issue in climate negotiations, it is now at the centre stage of the international climate debate and seen as a major opportunity and a low-cost option for limiting global warming.

The heightened REDD focus is partly due to the simple fact that we cannot afford to ignore the third largest greenhouse gases (GHG) emitting sector, responsible for about 1/5 of the global GHG emissions. Early resistance from environment and development NGOs has evaporated, as they have realized that "failing to address the issue of tropical deforestation is dangerously irresponsible" (Laurance 2007).

The influential Stern Review (Stern 2006) states that reducing deforestation is among the cheapest options at hand, although in the ensuing debate, the words 'cheap' and 'simple' have been mixed up. The main justification for the report's conclusion is the frequently very low value of agricultural production on cleared forest land, thus the compensation needed to stop deforesting activities is well

below most other mitigation measures. But, the challenges of implementing a system of international payment for environmental services (PES) are huge.[1]

Another influential recent report by the World Bank (Chomitz *et al.* 2007) argued, however, that while challenging, it is feasible to "mobilize global interests for forest conservation". One reasons for the cautious optimism is that recent proposals have a national level approach, which reduces earlier concerns with project level approaches such as leakage and possibly also high transaction costs.

The political changes in both the South and the North are also noteworthy. Brazil, the traditional sceptic of any inclusion of REDD in an international climate agreement, has softened its position due to domestic political changes. The fact that the main proposals in the debate have come from the South (including Brazil itself, Central African countries, and the Rainforest Coalition led by Papua New Guinea and Costa Rica) has also reduced their suspicion. More generally, REDD is now seen by many deforesting countries as a golden opportunity for increased financial transfers from North to South.

In the North, among several of the Annex I countries of the Kyoto protocol or groups within these countries, REDD is viewed as a golden opportunity to undertake cheap emission reductions abroad instead of costly ones at home in order to meet national GHG targets. Norway launched in late 2007 its 'rainforest billions' (NOK 15 billion or about USD 2.8 billion over five years). These were the result of a strong pressure on the government from an interesting coalition of environmental organizations on the one hand, and the political establishment and business interests on the other. While the former group strongly stresses that the REDD efforts should not be at the expense of domestic reductions, the latter clearly hopes that it will relax the demand for such reductions.[2]

Finally, the international climate negotiations have their own dynamics. The Marrakesh Accord (COP7 in 2001) agreed on the main principles for aforestation and reforestation (AR) projects in the Clean Development Mechanism (CDM). Avoided deforestation (AD) was not included, but with the AR principles settled, the time was ripe to move on to tackle the AD issues. In 2005 (COP11, Montreal), one therefore initiated a two year examination process on REDD. The last climate summit in Bali in December 2007 (COP 13) concluded that REDD should indeed play a role in a future climate regime. However, most of the hard issues remain to be solved and agreed on. Thus the road is long to an inclusion of significant REDD mechanisms into a new climate treaty.

The paper focuses on a few of the broad issues, such as key incentive and distributional issues and main dimensions for the architecture of a REDD agreement. Section 2 discusses why REDD is so hard, including the distribution game being played. Section 3 outlines two key dimensions of a future REDD regime: scale (national *vs*. project) and funding (market *vs.* funds), and discusses pros and cons of the four main models generated by these. Section 4 digs deeper into the question: how to set a baseline for national deforestation?

REDD is complex, and due to space limitations several key issues are not discussed, including a number of methodological ones related to the measurement of the actual GHG reduction. For the same reason the paper also focuses on the first D of REDD, paying only scant attention to forest *degradation*. This does *not*, however, suggest that reduced degradation cannot be an equally mitigation measure as reduced deforestation.

Why is REDD so hard?

The strong will and interest from almost all major parties to include REDD in one form or another into a future climate regime is a very good starting point. But, the broad consensus is also deceptive and conceals major hindrances that must be overcome. These are partly related to classical collective action problems that must be overcome, and partly to directly conflicting interests among the countries.

REDD is (not only) a collective action problem

The current REDD debate can be viewed in the light of two different games being played: a *collective action game*, and an *aid game*. Reducing emissions from deforestation has many features of a classical collective action problem of the prisoners' dilemma (PD) type: all countries would benefit if they jointly Reduce Deforestation (RD strategy) rather than Continued Deforestation (CD strategy).[3] But each country would individually always prefer CD, thus the non-cooperative solution and only Nash equilibrium is that all countries choose CD. A REDD agreement tries to change this by modifying the rules of the game such that it becomes in every country's own interest to go for RD. The problem is twofold (Barrett 2003). First, the agreement must be such that every country benefits from participating (sign and ratify the treaty). Second, after agreeing to participate the countries must have an incentive to comply. The typical international environmental agreement is *not* followed up by the signatories (Barrett 2003).

The other major aspect of REDD is the simple fact that deforestation is almost exclusively a problem in developing

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[1] In addition to the complexity of PES, the upward trend in agricultural commodity prices may also modify some of the Stern conclusions..

[2] One has to add that forest carbon credits are still viewed with high suspicion within EU, e.g., forestry CDM were excluded from their emission trading scheme (EU-ETS). One reason is that many EU firms have undertaken costly emission reduction, and would be sceptical to suddenly introducing REDD as a 'free' – or at least comparatively cheaper – 'lunch'.

[3] The terms reduced/continued deforestation are used, although some countries are beyond their forest transition turning point. Thus the more precise term, to include net reforesting countries, would be to let CD denote a business-as-usual (BAU) strategy, and RD be reduced deforestation or increased reforestation compared with BAU.

(poor) countries in the South, and it is expected that rich countries in the North pay the costs of reductions. Although global warming may hit the poor relatively more than the rich, the other conceptual model useful to understand the REDD discourse is simply one where rich countries buy REDD in poor countries. One can label this the *aid game*. The aid can be in the form of initiatives such as the Norwegian one already mentioned (bilaterally buying REDD), the World Bank's Global Carbon Fund (multilateral), or by including REDD in a climate agreement and specifying the rules such that there is a net transfer from rich to poor countries.

A major difference between the two games is the net benefits occurring to the various parties: in the collective action game the benefits to the South (and the North) will be in the form of the collective good being produced (= reduced climate change), while the implementation will be costly to all parties. In the aid game the South is expected to benefit also from the implementation of the measures, i.e., get a double benefit.

The distribution issue

Whether one frames REDD as a collective action game or as an aid game, the distributional issue is at the forefront. How much should a poor country receive for a given amount of carbon credits from REDD? In both a climate agreement and in a bilateral or multilateral (non-market) purchase of REDD the central questions are how to determine the baseline and set the carbon price (if not left to the market).

There are expectations in developing countries that REDD should imply not only major transfers of money but also significant net benefits (i.e., international transfers minus national costs of REDD). One may argue that large transfers are needed to get poor countries on board and have them make national commitments in a new climate treaty. Also, rich countries are committed to economic development and poverty reduction which might justify such large transfers.

Nevertheless, these expectations can easily translate into unrealistic demands that will put the climate negotiations in jeopardy. McKibbin and Wilcoxen (2002) therefore argue that that a new climate agreement should minimize transfers across national borders. Following this line of argument and the underlying idea of PES, a climate treaty should be about limiting climate change and not about redistributing of world income. That might be a welcome side-effect at the margin, but not a primary aim.

The argument that a new climate treaty should be solely on minimizing climate change is, however, not an argument against cross-border transfers. A treaty that includes poor countries will only be feasible (i.e., acceptable to those countries) if the deal includes net transfers of money from the rich to the poor. Thus such transfers are not based on a development and poverty argument, but rather on being a necessity to get an agreement. The question remains, however, how large such transfers should be. The expectations from the South are high. Besides the strategic element of such expectations and demand, they are to some extent also based on an old perception of developing countries being innocent victims of greenhouse gas (GHG) emissions in the North. Increasingly, however, they are part of the problem and therefore share the responsibility. Four of the six largest GHG emitters are middle-income developing countries (China, India, Indonesia, Brazil), and most of the future increase will take place in the current developing countries.

The distribution issue may also divert attention from other aspects, as noted by Barrett (2003) in his excellent treatment of international environmental treaties: "Though much energy is expended in negotiating allocations – that is, in dividing up the pie – this aspect of negotiations should not be of prime importance. It is more important that a treaty be able to promote participation, enforce compliance, and stop leakage. Unless a treaty can do these things, there will be no pie for the parties to divide."

Changing the political economy of deforestation

A national REDD approach (discussed in section 3) has two steps. First, the countries (governments) are rewarded through some international mechanism for reduced emissions (international incentives). Second, the payments received must be translated into incentives for the decision makers and land users to conserve or improve forests (domestic incentives).

There is a vast literature on the causes of deforestation; comprehensive meta-studies or reviews include Angelsen and Kaimowitz (1999), Geist and Lambin (2002), Rudel (2005), Chomitz *et al.* 2007), and Kanninen *et al.* (2007). The basic economic approach (inspired by the historical work of von Thünen) suggests that farmers and companies convert forests to agricultural use because it is the most profitable alternative to them: the agricultural rent is higher than the forest rent to the decision makers. Reducing deforestation is therefore about making standing forests more valuable (increasing forest rent) and/or non-forest uses less valuable (reduced agricultural rent). Direct payment for keeping the forest (Payment for Environmental Services - PES) has therefore emerged as a powerful measure to change the cost-benefit calculus of land users, although the preconditions needed for this to be effective should not be underestimated (e.g., Wunder 2005).[4]

This approach needs to be complemented with a political economy approach: a large portion of the deforestation is a desired policy and stimulated (or at least tolerated) by the governments. Timber and oil palm concessions are allocated to powerful individuals in exchange for political or monetary remuneration (Tacconi 2007). Export agriculture is stimulated to generate foreign exchange, at the expense of forests. Individuals and companies violating forest

[4] See also the special issue of Ecological Economics 65 (4) May 2008 on "Payments for Environmental Services in Developing and Developed Countries".

regulations can escape courts by 'using envelopes'.

An effective system for forest conservation requires changing the incentives for subsistence peasants, community forest groups, large commercial cattle ranchers, timber and oil palm companies, land use planning agencies, and politicians from the local to national level. The international payment must trickle down to those making or influencing the decisions about forest conversion. This job is as challenging as creating the incentives at the international level.

Tropical deforestation is increasingly driven by large commercial actors (Rudel 2007). The nice implication is less direct conflict between forest conservation and poverty alleviation. The uncomfortable implication is, in the words of (Pearce 2007), that: "the 'good guys' will get nothing. The money will not go to those trying to conserve forests or harvest them sustainably, but rather to bribe the 'bad guys' who are destroying them. The most prolific deforesters are already lining up". This raises key questions about who has the right to the land in the first place. Ultimately the distribution of money depends on the REDD design, but some pay to the 'rich guys' who are converting forest legally seems unavoidable.[5]

Weak data have strong implications

While it is appreciated that data on forest area and forest area change (deforestation) is weak, one has to work closely with them to appreciate how poor the data quality often is. Among the noteworthy exceptions is Brazil with its monthly announcement of satellite-based deforestation data. For particularly African countries the state of affairs is bleak, although some progress has been made. Further improvement can be expected as the incentives to develop good information systems increase with REDD and various *readiness* activities are undertaken.

In the past, poor data has been a cautionary note in most research papers on deforestation. But the consequences are a lot more profound: they have direct implications of which mechanisms are feasible for a country, and therefore their potential in a new climate treaty. The key dilemma is this: the national approach advocated in section 3 is *currently* out of reach for most developing countries due to poor national information systems on forests and land use.

Four different REDD models

A number of different models for including REDD into a global climate regime has been put forward over the past 3-4 years. This section will not provide a comprehensive review of all of them, but rather highlight three key dimensions that are important: type of commitment (emissions *vs.* causes), scale (national or regional *vs.* project level), and funding mechanism (market *vs.* funds). In addition, many of the proposals put forward differ primarily in the way baselines are determined, and that issue is discussed separately in section 4.[6]

A major distinction can be made between emission-oriented and cause-oriented approaches, cf. Schlamadinger *et al.* (2007b). These are also referred to as output *vs.* input approaches. Although inputs are needed to produce outputs, the difference is in the specification of the commitment: changing the causes (e.g., policy reforms that should reduce deforestation and emissions), or reducing emissions with no specification of how to achieve that.

The Kyoto protocol is an example of an emission-oriented approach. Its obvious merit lies in targeting as directly as possible the problem, namely "too high GHG emissions". Given the commonly poor forest cover data (and therefore also lacking data on resulting CO_2 emissions), however, that might not be an option in the short run. An alternative is therefore to address the causes in a Policy and Measures (PAM) approach, which avoids complicated and costly monitoring and verification (Benndorf *et al.* 2007).

Nevertheless, applying this approach has important flaws. The *actual* reductions achieved will be highly uncertain, thus PAM cannot be sold in a carbon market where actual and certified emission reductions is the commodity being traded. Second, for PAM to be effective, the incentive reforms must be implemented along a long chain of decision makers. Since the overall incentives are not based on performance, and full and effective implantation is costly, the reform is likely to be incomplete. Finally, one puzzling result emerging from the deforestation literature is that the underlying extra-sectoral (non-forestry) causes are the most important to address. But these are highly context specific, leaving decision makers with quite generalized policy recommendations (Angelsen and Kaimowitz 1999).

The PAM approach seems to lend itself more to bilateral and multilateral donors as a new type of development aid, rather than being part of a new climate agreement. The aid can, however, be moved in the direction of a 'performance based climate contract': the support is conditioned on implementing specific policy reforms and projects that should reduce overall deforestation.

The rest of this section focuses on the emission-based approach. The two other dimensions, scale and funding, yields four different models, as illustrated in Table 1, and discussed more closely below.[7]

"Cap and trade" (CAT)

The "cap and trade" (CAT) model is the textbook application of the tradable emission quota system, and is also referred to

[5] Additionally, due to economics of scale, large farmers may be favoured for efficiency reasons.

[6] A comprehensive review and discussion of various proposals are given in Government of New Zealand (2008).

[7] A global carbon market does not yet exist, and the distinction between market- and fund-based approaches is less clear-cut than the table suggests. For example, a conservation project by an NGO might generate certified carbon credits sold on a specific carbon market.

TABLE 1 *Different models for inclusion of REDD in a new climate agreement*

Scale \ Funding	Global carbon market	Global fund
National (regional)	"Cap and trade" (CAT) (Rainforest Coalition)	Compensated reduction (Brazil)
Project	CDM+	Conservation projects (ICDP, PES, etc.)

as Baseline and credit (BAC), or Reference level and credit (RAC), cf. Government of New Zealand (2008). The basic architecture is straightforward: First you cap: each country gets a baseline of emissions from deforestation (emission quotas). Then you trade: if the emissions are lower (higher) than the baseline, the country can sell (buy) carbon quotas. The trade part ensures that *efficiency* criterion is met: a common quota price (= global carbon price) will ensure that the marginal costs of emissions are the same across countries. As argued in the Stern report, a CAT model should be the ultimate goal for a climate agreement. Its attraction lies in the comprehensiveness and the strong and uniform incentives it gives to all participating countries.

Various versions of a CAT model has been proposed by surprisingly many countries (for a review of different country positions, see Alvarado and Wertz-Kanounnikoff 2007). The most prominent proposal is by the *Rainforest Coalition*, with Papua New Guinea and Costa Rica as frontrunners.

One of the touchy issues relates to fungibility between REDD credits and other (fossil fuel) carbon credits, i.e., sectoral fungibility. Should a parallel market for REDD credits be established, or should they be fully tradeable in a future global carbon market? Various in-between solutions with limited fungibility are also conceivable. Where one draws the line for sectoral fungibility also has implications for the financing of REDD activities: the more fungible, *ceteris paribus,* the more money can potentially be raised from the carbon market for REDD activities.

Compensated reduction

The proposal of 'compensated reductions' was launched by a group of Brazilian NGOs (Santilli *et al.* 2005), and has in a modified version eventually become the official position of the government of Brazil. It differs from the Rainforest Coalition proposal in a number of ways. First, the funding will come from a multilateral fund rather than the carbon market. Second, Brazil argued that REDD should be outside a new climate protocol, and – by implication – Annex I countries would not be able to offset own emission targets with REDD purchases. A final central element in the Brazilian proposal is to set baselines equal to the average deforestation rate of the past 10 years. Any reductions from this baseline will be rewarded from the global REDD fund, based on an agreed carbon price.

One central issue in both the CAT and 'compensated reduction' model is that of *symmetry* between achieved deforestation rates above and below the baselines, sometimes referred to as *liability*. In the textbook CAT model, any party must buy permits if emissions exceed the allocated quota. But, it is hard to imagine a poor country like Zambia or DR Congo using scarce foreign exchange to buy carbon credits. Thus, although not always explicitly made, most proposals have in mind a clear asymmetry, i.e., a failure to reduce deforestation to the given baseline will result in non-participation rather than having to buy quotas. Alternatively, as in the Brazilian proposal, a failure to meet the baseline in one period would be carried over to the next commitment period, reducing potential future benefits. The carry-over share can vary from full liability (100%) to zero.

Another contentious issue for both the national approaches is whether they should include countries with net *reforestation*. India and China, both net reforesting countries, are strong proponents for an inclusion, and have been sceptical to the Brazilian proposal on that basis. After all, zero is just a number on the number line, and all countries should be encouraged to move their figure for forest area change to the right on that line. Why stop at zero? From a climate perspective, a carbon dioxide molecule removed from the atmosphere (increased sequestering of carbon in trees) is just as good as a molecule not released (reduced deforestation). Moreover, many countries that experience a net reforestation have regions with deforestation, and there should be incentives for reducing that.

CDM+

Given the uncertainties about the short-term realism of national approaches, a tempting alternative would be to extend the existing Clean Development Mechanism (CDM) to include not only Aforestation and Reforestation (AR) projects, but also Avoided Deforestation (AD) projects at the less-than-national scale. One argument would be that one already has agreed-upon rules and regulations for CDM through the Marrakesh Accord (COP7 2001). An extension of the CDM to include AD would thus be less negotiation-intensive compared to other proposals, and can therefore come into force at an earlier stage.

There are, nevertheless, some good reasons why AD was not included in CDM. The problem of *leakage* is more pronounced compared with AR projects, and mechanisms must be in place to ensure that deforestation is not just moved outside the project area. Equally important is the problem of *additionality*; the project must come in addition to the business-as-usual (BAU) alternative. This is essentially the problem of setting a realistic baseline.

The critique of CDM generally and AR in particular is twofold. First, the contribution of CDM projects generally to

local equity and sustainable development is low, particularly when left to market forces (Olsen 2007). Second, the very limited success of establishing CDM AR project in the CDM – only one registered so far – has taught some valuable lessons.[8] The most important one is that complicated rules easily become counterproductive: trying to achieve too much and include numerous concerns make one achieve very little. AD projects are – in themselves – more complicated than AR projects, e.g., to define a credible baseline. It is therefore a real risk that a CDM+ approach might achieve very little in terms of real reductions in deforestation, by simply not approving projects for reasons of high ambition and complexity.

Conservation projects

The forth model is a continuation and intensification of various forest conservation projects at the less-than-national scale, such as 'command and control' conservation projects, integrated conservation and development projects (ICDPs), and the more recent projects with Payment for Environmental Services (PES). The latter type provides valuable experiences relevant for REDD, although most of them are limited to Latin America (see Kaimowitz, this issue, for a review of Mesoamerican experiences).[9] One of the lessons learned is that the time and transaction costs involved can be substantial, and may represent a major hurdle when dealing with thousands of small potential forest converters (e.g., Wunder 2007). Working with communities and local-level organizations is a cost-saving approach, but effective local organizations are often not present.

One possible model that has been aired in discussions is to establish a global forest conservation fund along the lines of the Global Environmental Facility (GEF), managed jointly by the UNDP, UNEP and the World Bank. But, many are sceptical to the record of GEF in dealing with conservation, and are afraid of creating (yet) another large international organization. Whatever organizational form it takes, funding would be raised by voluntary deposits in a similar way as for 'compensated reductions'. The same international body might deal with different mechanisms, i.e., with a project-based approach or PAM for countries not yet ready to participate in a system requiring credible national accounting of REDD.

Comparing the four models

The pros and cons of the different approaches are summarized in this section. Since we are dealing with possible *future* models, yet to be tried out at a large scale and/or in this context, any discussion will to some extent the author's subjective judgement.

A national approach has the following advantages *vis-à-vis* a project approach:

- Chances to have a major impact on deforestation rates are higher, since a national approach will have to address the broad forces that lead to deforestation. A project approach may create a few conservation islands, but with limited impact on overall deforestation, i.e., winning some battles, but losing the war.
- It allows for a comprehensive accounting of all emissions from the forestry sector, and therefore avoids the issue of domestic *leakage*.
- Policies and measures required to reduce deforestation are chosen and implemented by national governments, based on country contexts. No one-size-fits-all policy prescriptions are needed. Governments have financial incentives to implement the measures that really matter, rather than doing lip services. If designed well, the approach will give pecuniary incentives at all levels for reduced deforestation.
- Related to the above points, cost efficiency should be ensured both at the domestic level and also the international one (at least in the CAT model).

The arguments in favour of a project approach include:

- A national approach requires a comprehensive accounting of deforestation and resulting carbon emissions. Most developing countries are not yet ready to participate in such a regime.
- Setting baselines involves large transfers of money, and is difficult. A real risk is that baselines will be set too liberal, and therefore create "hot air" in a CAT model.
- A project-based approach like CDM+ can build on existing rules and arrangements, and therefore be implemented more quickly.

Related to the other dimension in Table 1, the funding mechanism, the main arguments in favour of a market-based approach are:

- The global carbon markets can potentially mobilize much larger amounts of money to fund REDD activities compared with voluntary funds. In particular, if the money spent on REDD by the Annex I countries is not credited in their own national carbon accounts, any voluntary fund is very unlikely to raise the amounts needed to cut deforestation rates by, say, 50 % over the next decade.
- Linking REDD to a global carbon market is needed to achieve international cost efficiency. The fundamental

[8] See http://cdm.unfccc.int/Statistics/Registration/RegisteredProjByScopePieChart.html for the distribution of CDM projects by sector. Among the more than 1 000 projects registered more than half are in the energy industries. There are, however, a number of AR projects in the voluntary market.

[9] An increasing number of PES pilot projects and initiatives are now evolving in Asia and Africa. Even though it is too early to draw the 'lessons learned', they provide important insights into REDD design.

role of the efficiency criterion is not fully appreciated in the debate. It is not just one among a dozen of desirable features of a climate regime, nor some fancy economistic term. It is a prerequisite to minimize global warming from the limited efforts that the global community is willing to spend.

The arguments for a fund based approach can similarly be summarized as:

- Including REDD into the global carbon market at this stage runs the risk of 'hot air': large quantities of cheap carbon credits will depress the global carbon price, reducing the incentives for emission reductions in elsewhere. This scenario can, however, be avoided in two ways: (i) limiting the supply of REDD credits by setting tight baselines, or by limited fungability and 'gearing' of REDD units[10]; (ii) increasing the demand by more ambitious targets for Annex I countries.
- Integrating REDD into a global carbon market might be more complicated than a fund-based approach, and would therefore take longer time to become operational. A market based system is likely to have stricter requirements in terms of a well defined and certified product that can be traded. On the other hand, a market system will focus on that product – certified carbon credits, while a fund system is likely to include a number of other aims or co-benefits which makes it more complex.

There are quite fundamental arguments for moving Northwest in Table 1, i.e., towards a CAT model. This model has the potentially to raise the largest amounts of funds for REDD, and will also cost efficient implementation. A CAT model should therefore be the long term aim of the current climate negotiations. At the same time, the practical hindrances towards CAT have to be recognized, and thus the need for measures that can be implemented more quickly, i.e., towards the Southeast of the table. A distinction between realistic short and long term aims is therefore essential.

The basics of baselines

Baselines and distributional implications

Possibly the most critical element of a REDD regime is how to set the baseline, whether in a national or project level approach. This section focuses on the former. A national REDD baseline gives a country an emission quota for CO_2 (and possible other GHG) from deforestation and forest degradation. It is a benchmark to judge performance and reward the country if emissions are lower, and not give any reward or possibly punish if they are higher.

The question of baseline is sometimes hidden in climate speak such as 'net-net' or 'gross-net' accounting, or may be presented as a purely technical issue. Nothing can be further from the truth. Determining baselines has profound implications for both efficiency (the incentives to participate) and distribution of benefits and costs. Some might, due to the problems involved, "throw up their hands in despair at the idea of working out baselines" (Pearce 2007). But there is no escape; the unavoidable question is when to start counting CO_2 molecules. For example, behind the system of 'gross-net' accounting used for forest management activities in the first commitment period of the Kyoto protocol is the implicit assumption that the baseline is zero emissions, cf. Schlamadinger *et al.* (2007a).

To illustrate the magnitude of money flows involved, consider the scenarios run by Strassburg *et al.* (2008) with a carbon price of USD 5.63/tCO_2, and reduced deforestation cost curves along the lines presented in the Stern-report. Depending on how the baseline is set (global or national historical deforestation, or some combination of these), annual transfers to Indonesia will vary between zero (no participation) to more than USD 3 billion.

Such exercises obviously have strong elements of uncertainty. Yet, simple 'back-of-the-envelope' calculations show that various possible REDD mechanisms easily can give net transfers to developing countries in the order of tens of billions dollars per year. With such amounts on the table, the climate game will be a tough one. At the same time, these amounts illustrate the large potential in integrating REDD as a mitigation mechanism, cf. Karousakis and Corfee-Morlot (2007).

Three elements of a baseline

Given that baselines are essentially emission quotas, it is useful to think of them as being made up of three elements: (i) the business as usual (BAU) scenario, (ii) a shared responsibility for reduced overall emission reductions (downward adjustment to reflect the ambition of reduced global emissions), and (iii) special political and economic considerations.

The problems of determining the BAU scenario is discussed in the next section. The second element of shared responsibility is commonly neglected in the REDD policy debate and even academic papers. The implicit assumption is then that developing countries should be fully paid from the first CO_2 molecule not emitted. Returning to section 2, this suggests that the game being played is not 'collective action' but rather the 'aid game' where rich countries buy REDD in poor countries. This contrasts the way baselines are set in the Kyoto protocol for Annex I countries: on average a country got a GHG emission quota (baseline) equivalent to 95 % of its 1990 emission level, which is well below the BAU scenario.

There are two major reasons for not equating BAU with the baseline. First, reducing climate change is a *shared*

[10] 'Gearing' implies that an estimated REDD amount is multiplied by a factor between zero and one to take into account uncertainty related to actual measurement and permanence, cf. Government of New Zealand (2008).

responsibility among all countries, and a factor reflecting this should be included. Second, not including a shared responsibility factor would imply a lot of 'hot air': a substantial reduction in deforestation can be almost for free or very low costs (maybe to be termed 'warm air'?). In the Strassburg *et al.* (2008) study 30-40 % of the reductions can be undertaken at a cost of less than USD 1/tCO_2. Although this is at the extreme among the different analysis done, several studies point out that the first reductions are very cheap.[11]

As Chomitz *et al.* (2007) convincingly argues, the fact that something is free is not an argument against REDD but rather in favour of it: we are saving money that can be used for reductions in other sectors. But setting the baseline equal to the BAU would water out the mechanism, as significant amount would be spent on reductions that are almost costless. This is also likely to undermine the political support for the system. What matters are the incentives on the margin, and these might be diminished with high baselines.

In addition to a BAU prediction and a shared responsibility factor, the baseline can also include other elements. The proposal by the *Coalition of Rainforest Nations* includes a 'development adjustment factor' (DAF) to "allow for certain amounts of deforestation to occur for the purpose of a country's socio-economic development" (Alvarado and Wertz-Kanounnikoff 2007).

While too generous baselines might create 'warm air' and lead to politically unrealistic levels of international transfers, the main problem with setting baselines too strict is that some countries might choose to opt out of an agreement. For example, Indonesia have in recent years had a very high rate of deforestation of 2.0 % per year for 2000-05 (FAO 2005). Setting the baseline equal to or below the average of developing countries (about 0.5 %) might lead to non-participation: it has to reduce deforestation from 2.0 to 0.5 % at their own expenses before they can start getting paid, and that might not be worth the effort. Besides the distributional issues, setting the baseline can thus be seen as a balancing act between: (i) creating incentives for participation and (ii) avoiding 'hot air'.

Proposals for determining the baseline

The baseline will include many elements, some of which are ultimately political questions left to the negotiation process. Researchers' main input should be in determining the BAU scenario: what will be the predictable rate of deforestation without REDD? Researchers should provide a framework or formula or to be applied to narrow down the scope of negotiations. Which variables should enter that formula?
Several proposals have been put forward, the two most debated being the Brazilian of compensated reduction (Santilli *et al.* 2005) and the Joint Research Centre (JRC) of the European Commission approach (Achard *et al.* 2005), cf. the comparison in Skutsch *et al.* (2007). The main variables included are:

National historical deforestation: Almost all proposals put forward include historical national deforestation as a key variable in setting the baseline, cf. Alvarado and Wertz-Kanounnikoff (2007). The Brazilian proposal of 'compensated reduction' advocates that this should be the only variable: the average of the last 10 years, and updated every 3 years.

How good is past deforestation to predict the future one? There are two answers to that question. First, we don't know a lot about it, mainly due to poor time series data for most countries. Second, what we know suggests that, although it might be the best predictor, past deforestation is not a very accurate predictor of future deforestation, cf. Haugland (2008). Unlike emissions from fossil fuels, which are closely linked to one variable (GDP levels), deforestation is 'multi-causal' and can be highly variable over time within countries.

There are several reasons for this. The forest area (change) might follow a forest transition: a move over time from high forest area and low deforestation rates, to a period of accelerating deforestation, until the forest area stabilize and eventually recover, see Mather (1992), Rudel *et al.* (2005) and Angelsen (2007). Thus some countries at early stages in this transition, like Papua New Guinea and DR Congo, can be expected to have high forest area and low but accelerating deforestation rates. Others in the middle of this transition, like Indonesia, will have high rates, but these are expected to slow down as forest is getting scarcer. Finally, countries late in this transition like China and India (and rich countries) have increasing forest area.

Deforestation rates may also follow more erratic trends. Higher prices and demand for commodities that are 'deforestation agents' can have profound impacts. Much of the deforestation history is about 'commodity booms' (e.g., Angelsen and Kaimowitz (2001) and Rudel 2005). Policy and market changes often generate strong snowball effects which multiplies the initial impact.

Global historical deforestation: Given the erratic behaviour of national deforestation, one option would be to use the average deforestation rates for developing countries, or at least to give it some weight, as done in the various scenarios outline in Strassburg *et al.* (2008).

The JRC proposal suggests that countries with a rate of deforestation below *half the global average* use that as a baseline, while countries with a higher deforestation rates use a national historic baseline. This would benefit countries with low deforestation rates in the recent past, either due to good policies (which is the intention of the proposal), their location on the forest transition curve, or for other reasons, e.g., war.

Development Adjustment Factor (DAF): The proposal from the Rainforest Coalition, supported by a number of other (groups of) developing countries, gives higher baselines to the poorest countries. In addition to a fairness argument mentioned above, another justification might be that poor

[11] For two reviews and discussion of such studies, see Karousakis and Corfee-Morlot (2007) and Government of New Zealand (2008).

countries are at an early stage in the forest transition. The BAU deforestation is therefore likely to be higher than in their recent past, and this should be reflected in the baseline. Using GDP/capita as an indicator of the stage in the forest transition is at best a very rough indicator, and the empirical evidence on this is mixed.[12]

Rewarding early action: There is almost universal agreement that countries that have taken early action to reduce deforestation (and forest degradation) should *not* be penalized by getting lower baselines. While intuitively appealing, all low-deforesting countries may, of course claim to have taken important steps to reduce deforestation in the past, and should be credited for that. But, as all countries cannot be above average, there is a need for a more systematic approach to assess the impact of past policies. Theoretically, this can be done by using a predictive regression model, and let the difference between observed and predicted deforestation be attributed to differences in policies across countries.

The literature on cross-country deforestation regression models to analyse the causes of deforestation has included a number of other variables, and some of these are potential candidates for inclusion in a formula for setting baselines (see overview by Kaimowitz and Angelsen 1998). This includes population densities and growth, forest area, economic growth, commodity prices, governance variables, regional (continental) dummies, and a tropical dummy. Past work has, however, tried to detect causal links, while the task here is to predict (in particular, past deforestation can be included in the model). More research is clearly needed, and the REDD literature has to a large extent failed to draw on past work on causes of deforestation. Nevertheless, in the end, the formula must be fairly simple and have an intuitive appeal.

Considering the uncertainty of setting baselines, one practical approach suggested by Schlamadinger *et al.* (2005), is to use a *corridor approach* with an increasing percentage of the reductions being credited. For example, a reduction from 0.8 to 0.7 % (or the equivalent in hectares) gives carbon credits only worth 20 % of the estimated carbon reductions, while reductions from 0.7 % to 0.6 % give credits equivalent to 40 % of the estimated reductions, and so on.

Given the high stakes for deforesting countries, the difficulty of predicting deforestation in a BAU scenario, and the additional elements that should be factored into the final baseline, the risk for 'hot air' is very real. This has been a major concern of environmental NGOs, e.g., Leach (2008). Restricting baselines to realistic levels is therefore a major challenge in the ongoing negotiations. Proposals about countries being allowed to suggest their own baselines are like asking firms how much they would like to pollute before starting to pay a pollution tax.

The potential negative *impact* of 'hot air' can also be avoided by tightening the commitments of Annex I and possible other countries for overall GHG emission reductions. Putting REDD permits into the market is thereby accompanied by an increase in the demand, thus avoiding a significant drop in the carbon price. This is indeed a major argument for including REDD in a new climate agreement: by introducing a low-cost mitigation option, the global targets can become more ambitious.

Seeing both the forests and the trees

The perceptions created by the Stern and others reports about REDD being a quick fix, due to the low agricultural rents and therefore small compensation needed to revert the forest clearing decision, overlooks the main hurdles involved. The basic challenge is to set up a system where global willingness to pay for REDD is transferred to national governments and then to the incentives of land use decision makers. An incentive system must be created, baselines set, a reliable system for measuring change must be in place, and it all needs to be verified in a credible way. Buying carbon dioxide molecules in the forest is more difficult than buying bananas.

The long term aim should be a national approach, where funding is drawn from carbon markets (CAT). Once a mechanism is established, countries can join as soon as they satisfy a set of criteria related to reliable systems for monitoring REDD. A massive effort is needed to establish and strengthen the systems for such data collection and analysis. The latter part should be stressed: we need to analyse and better understand the domestic processes of deforestation and degradation to design and implement policies to reduce it.

Given that many countries are unlikely to be able to participate in a CAT model for several years to come, a small menu of mechanisms should be offered, including project based approaches and possibly also support to policy changes (PAM). This would be in line with the 'nested approach' put forward by Pedroni *et al.* (2007), where project activities can start immediately while national level programmes are progressively implemented as countries qualify.

The road to fully incorporating REDD in a new climate agreement is long, but must be walked in a relatively short period of time. Negotiations and the international debate easily become too focussed on the details. While the Bali meeting was an important step forward, most of the critical issues are yet to be addressed.

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[12] Haugland (2008), in her predictive model which includes historical deforestation, finds a positive correlation between deforestation rates and GDP/capita, i.e., the poorest developing countries are deforesting less.

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