Submission to the UNFCCC/SBSTA
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Reducing Emissions from Deforestation in Developing Countries: potential policy approaches and positive incentives

Joint Submission by
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Joanneum Research, Instituto de Pesquisa Ambiental de Amazonia (IPAM), Union of Concerned Scientists (UCS), and The Woods Hole Research Center (WHRC) welcome this opportunity to submit ideas to the II Workshop on Reducing Emissions from Deforestation to be held in Cairns, Australia (7-9 March 2007).[1] This submission adds detail, some new policy approaches and data on tropical deforestation to the previous documents[2] submitted by our respective organizations to I Workshop held in Rome, Italy, from 30th August to 1st September, 2006.

Tropical forest vegetation stores more than two hundred billion tons of carbon (PgC) globally (IPCC 2001) and deforestation is releasing these stocks into the atmosphere. Although greenhouse gas (GHG) emissions from the burning of fossil fuels are the principal cause of global warming, tropical deforestation causes 10 to 25 % of annual global emissions of carbon dioxide (CO2).

There is growing consensus in the international community that to avoid "dangerous interference" in the global climate system (the primary objective of the United Nation Framework Convention on Climate Change, UNFCCC, Article 2) greatly reducing greenhouse gas emissions from tropical deforestation is an essential complement to deep reductions in emissions from the industrial sectors. The Stern

[1] Joanneum Research's Institute of Energy Research investigates relevant mechanisms and develops strategies for the reduction of emissions affecting the climate and the environment. UCS is a leading science-based organization working for a healthy environment and a safer world. WHRC is an independent scientific organization devoted to policy-relevant research and education in defense of a habitable earth. IPAM is the Amazon Basin's largest independent research and education institution.
[2] http://unfccc.int/documentation/documents/document_lists/items/2960.php

Review (2006), for example, noted that "curbing deforestation is a highly cost-effective way of reducing greenhouse gas emissions and has the potential to offer significant reductions fairly quickly" and the recent GLOBE (G8+5) legislators summit highlights "incentives for measures to reduce deforestation" as a key element to reach greenhouse gas stabilization[3].

This submission outlines important issues to be considered when designing an international accounting and incentive system for Reducing Emissions from Deforestation and Degradation (REDD) in developing countries, and a range of potential solutions. An agreed international policy framework must deal effectively with the following key issues:

1. Monitoring Deforestation and Degradation

Frequently, doubts have been raised about the practicality, reliability and even the existence of a monitoring system broad enough to assess the advance of deforestation in all tropical regions on the planet. Advances in the field of remote sensing and technological transfer agreements among countries, however, can remove the numerous barriers to more precise measurement of tropical deforestation for the purposes of agreements such as the UN Framework Convention on Climate Change and the Kyoto Protocol. In addition, the IPCC 2006 Guidelines provide detailed guidance on reporting emissions from deforestation (IPCC 2006).

A historic data set of high-resolution optical remote sensing imagery has been complemented with radar imagery from European, Canadian and Japanese satellite missions since the early 1990s. Radar is particularly suited to tropical forest observation due to its ability to penetrate cloud cover that is common over dense humid forests[4]. The Advanced Land Observing Satellite (ALOS) which carries a novel radar sensor (PALSAR) was launched in 2006 by the Japanese Space Agency JAXA[5]. A dedicated observation plan was designed as part of this mission to provide pan-tropical, high-resolution imagery on an annual basis, thus having great potential to monitor tropical deforestation.

Emissions from forest degradation, where significant forest carbon is lost without complete land transformation from forest to non-forest, may not be as large per unit area as complete land transformation, but degradation occurs over large areas and can have a significant contribution to carbon loss (Asner *et al.* 2005, Alencar *et al.* 2006, Nepstad *et al.* 1999). Furthermore, forest degradation is often a precursor to deforestation, as it increases access to forested areas, and may increase susceptibility to fires (GOFC-GOLD report).

The GOFC-GOLD report, as well as the technical background paper prepared for the August 2006 SBSTA workshop in Rome (Brown, *et al*. 2006) acknowledge that detecting and measuring forest degradation is more technically challenging than measuring deforestation. But both reports state that there are methods to detect and measure forest degradation, including visual interpretation, advanced image

[3] GLOBE Washington Statement: http://www.globeinternational.org/docs/content/washington_statement.pdf

[4] Sgrenzaroli, M, et al. (2004). A novel approach to the classification of regional scale Radar mosaics for tropical vegetation mapping. Geoscience and Remote Sensing, IEEE Transactions on, 42(11), 2654-2669.

[5] Advanced Land Observing Satellite, JAXA, http://www.eorc.jaxa.jp/ALOS

processing algorithms, and airborne photography, all of which can be enhanced by linking with ground-based measurements. While these methods are more costly and time-intensive, with adequate support countries facing significant emissions from degradation could begin to measure and reduce these emissions, and thus reduce the susceptibility of their forests to future deforestation. In addition, spaceborne LIDAR systems (e.g. the GLAS sensor aboard the IceSAT mission) show significant potential when used with radar and optical imagery to support the estimation of carbon accumulation in the biomass of regrowing forests[6,7].

2. Policy Approaches

Activities leading to forest loss in developing countries vary in cause and intensity. While some countries are currently facing high levels of transformation of forest to non-forest land, others are dealing with issues of forest degradation, where forest carbon stocks are decreased without complete land transformation. Additionally, the drivers of deforestation vary considerably among countries and regions as does the institutional and technical capacity to effectively address these drivers. A policy mechanism under the UNFCCC or Kyoto Protocol that reflects this range of deforestation drivers, intensity and capacity is essential to support effective reductions in emissions over a wide range of national circumstances.

This range of circumstances may best be addressed through a mechanism whereby participation is voluntary, and the level and means of participation are flexible. A voluntary, flexible, step-wise approach that is well-designed offers real potential for consensus and broad participation among Parties. Such an approach should include a suite of options that would allow for increasing levels of participation, climate benefits, scale of reduced deforestation and associated sustainable development benefits, and stringency of regulation. Developing countries could select the option that best represents their national circumstances and their capacity to participate. Ideally, participation in one of the options would inherently build capacity for the next level of participation, and improve the ability of the Party to assess, monitor and achieve reductions of greenhouse gas emissions. For example, countries with limited capacity to conduct an inventory of forest land and identify areas of land being deforested could participate through a mechanism which builds capacity for the development of a forest inventory, including the necessary institutions and monitoring programs to maintain such an inventory. Countries with some capacity to assess deforestation/degradation but not yet at the national level could begin further capacity-building activities such as regional emissions reduction programmes aimed at addressing deforestation and/or forest degradation hotspots or specific drivers of deforestation and degradation such as illegal logging or fire.

Countries with sufficient national capacity and interest should have the option of establishing a voluntary national quantifiable emissions limitation program, including

[6] Kellndorfer et al. (2004). Vegetation height estimation from Shuttle Radar Topography Mission and National Elevation Datasets. Remote Sensing of Environment, 93,339-358.

[7] Lefsky, M. et al. (2006). A global forest canopy height and vertical structure product from the Geoscience Laster Altimeter System. AGU Fall meeting, 2006.

historical emissions, trends, projections or reference levels, and the earning of credits for emission reductions below an established amount. Key design features of such a market-based approach are discussed below.

3. Source of Financing

Several non-exclusive alternatives exist for financing the reduction of emissions from deforestation in developing countries, including:

- ODA
- Carbon market
- Proceeds from auctioning of allowances in emissions trading systems , such as aviation
- Emissions taxes on energy intensive goods and services

Within the concept of a flexible policy approach that includes a range of implementation options, the potential exists for a combination of several funding options to provide the most effective support for the many activities needed to address reduce emissions from deforestation and forest degradation in developing countries. However, it is clear that an ODA approach alone is insufficient for the scale of action needed to address emissions from deforestation. The potential scale of financing available from the carbon market - including proceeds from auctioning of emissions trading allowances and/or taxes on energy intensive goods and services -- makes it the most promising funding source for actual emissions reductions (Chomitz *et al*. 2006). Non-market based options are important in the context of a step-wise approach, for the support needed in capacity-building options of participation.

In a market-based approach, where financing is based on the emission reduction commitments of countries with national-level emission caps, developing countries that elect to reduce their national deforestation rates against a reference level could receive compensation through trading in international carbon markets. Reductions below an agreed upon reference level could be issued credits which could be sold to Annex 1 countries or other designated entities. Reductions would be credited post facto, after verification using robust remote sensing technology[8,9] coupled with targeted ground-truthing as needed to ensure accuracy. Ensuring that countries that have reduced their emissions and received compensation do not subsequently increase them could be addressed in several ways. Countries that received compensation and subsequently exceeded their reference level deforestation rate could be disallowed access to the market until net deforestation is reduced below the period of reference. Such disallowed access is one way of limiting crediting of impermanent reductions while guaranteeing the voluntary character of the mechanism. A second option is for a country to voluntarily take on a binding agreement to reduce emissions at or below an agreed reference level.

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[8] Various technologies adequate to this end are already in use and are improving rapidly. See GOFC-GOLD 2006. Ruth DeFries, Frédéric Achard, Sandra Brown, Martin Herold,Daniel Murdiyarso, Bernhard Schlamadinger, Carlos de Souza Jr. Reducing Greenhouse Gas Emissions from Deforestation in Developing Countries: Considerations for Monitoring and Measuring. GOFC-GOLD Report No. 26; http://nofc.cfs.nrcan.gc.ca/gofc-gold/Report%20Series/GOLD_26.pdf.

[9] ALOS Kyoto & Carbon Initiative Science Plan, http://www.eorc.jaxa.jp/ALOS/kyoto/KC-Science-Plan_v2.pdf

This structure of policy mechanism would not only provide means for developing countries to take immediate action to mitigate climate change, but should also leverage more stringent developed country targets after 2012. Deeper commitments by developed countries to reduce emissions are essential in order to create the demand for credits from reduced emissions from deforestation, and to ensure that these emissions reductions were not simply traded off against less reduction from fossil fuels. Thus the success of a market-based approach depends upon continued and increased participation of developed countries beyond the Kyoto Protocol first commitment period, and a mechanism to ensure that the stringency of the developed country emissions reductions targets reflects both the new opportunity for contributing to these targets and the deep reductions necessary to avoid dangerous climate change.

Initiation of emissions reductions in all options could be financially supported by non-market mechanisms to address up-front capacity and financing needs. These non-market approaches could expand with capacity and demonstrable progress to include the generation of market-based credits for emissions reductions.

4. Early Action

Market mechanisms could be designed to provide credits for emission reductions post-2012, but in order to encourage countries to address this important source of emissions without delay, early action by participating developing countries should be supported. During the period before 2013 countries should be encouraged and supported to participate in pilot programs. These programs could build capacity and at the same time test and analyze different approaches to key definitions, monitoring strategies, reference scenarios, and other important factors. Emissions reductions that occur as a result of these pilot programs could be supported with a voluntary fund or other non-market source, with an additional option that verified reductions could generate credits pre-2012, just as the CDM allowed early crediting and incentivized early action, with its prompt start in 2000.

5. Additionality, Leakage, and Permanence

Additionality. The issues of additionality, leakage and non-permanence are frequently invoked as barriers to adoption of any mechanisms providing compensation for emissions reduction. Additionality and leakage are potential concerns for all sectors. For REDD, reference levels should be established using information on historical deforestation rates and/or trends, thereby increasing the likelihood that activities can be demonstrated to be additional to business-as-usual activities.[10]. The procedure for selecting reference levels (or reduction goals) must take into account the different regional dynamics of deforestation in the tropics. Countries with substantial tropical forests, but with relatively low deforestation to date (for example Peru and Bolivia) might adopt higher baselines than their recent deforestation rates (on the "growth limit" model of Australia) as an incentive to participate and to avoid future increases. For regions that have been heavily degraded, such as Kalimantan, Sumatra and Sulawesi, for example, where 70-80% of the

[10] Santilli et al. 2005

lowland *Dipterocarpaceae* forest cover has been removed, and conversion into oil-producing palm species is has been underway for a some time, a reference level could be expressed in terms of carbon stock changes.

A historical reference level could be revised downwards in regular intervals in order to incentivize continual reduction of deforestation rates.

Leakage. Current Kyoto rules create a potentially significant market leakage problem, in that activities that increase carbon stocks in Annex I countries are credited, but forest destruction in developing countries is not debited. By bringing more large-scale emitters into the international emissions control regime, a market-based scheme would help to address this issue. Leakage of deforestation per se from one country to another (for example, Brazilian soy planters who move to Bolivia) might occur, although participation of several countries in a geographical region (Amazonian countries for example) would address this problem. Ultimately, international leakage – in all sectors – will only be resolved when all major emitters participate in an international emissions control regime.

Permanence. Permanence is unique to the land use and forestry sector, and therefore is a unique challenge to policies focusing on REDD. Forests protected by reducing deforestation rates (i.e. protected carbon stocks) can be lost in the future due to natural disturbance or through direct human action. Thus, carbon credits from deforestation reduction must address the issue of potentially impermanent reductions. There are several options for addressing permanence, such as:

- Requiring participating countries that increase deforestation emissions above their agreed levels (provided this is not a "growth limit" target) to assume the surplus emitted as an obligatory reduction goal subsequently
- Requiring participating countries to stay below their reference levels in order to maintain market access
- An insurance system where a portion of the credits from reductions achieved in the first five-year commitment period can be available for emission credits starting in 2013. Another part could be banked for use at some later date.

6. Interannual Variability

One significant challenge for addressing emissions from deforestation is the interannual variability in levels of deforestation. This variability distinguishes deforestation emissions from other fossil fuel emission sources (which only have slight variability from climate and economic cycles), and raises challenges for establishing sound reference levels and future accounting rules. In particular, there is a risk that a single numerical target may lead to either a) emissions rising significantly above the reference level, or b) being much below the reference level without much additional efforts. The example of target-setting in Annex I countries provides examples of both of these extremes, with certain countries not having calculated population increase into their negotiated target and thus presently falling far short of

it, and others having negotiated a target which has a significant amount of "hot air" included and currently are well below the target with business-as-usual activities.

We propose the use of a 5-15 year historical period, where data are available, to better represent deforestation levels and trends. While the use of a longer historical period may reduce sensitivities to interannual variability, even this may not capture long-term fluctuations in deforestation due to influences such as commodity prices, interest rates, climate impacts, or economic shifts such as the increasing role of biofuels in the economies of some countries.

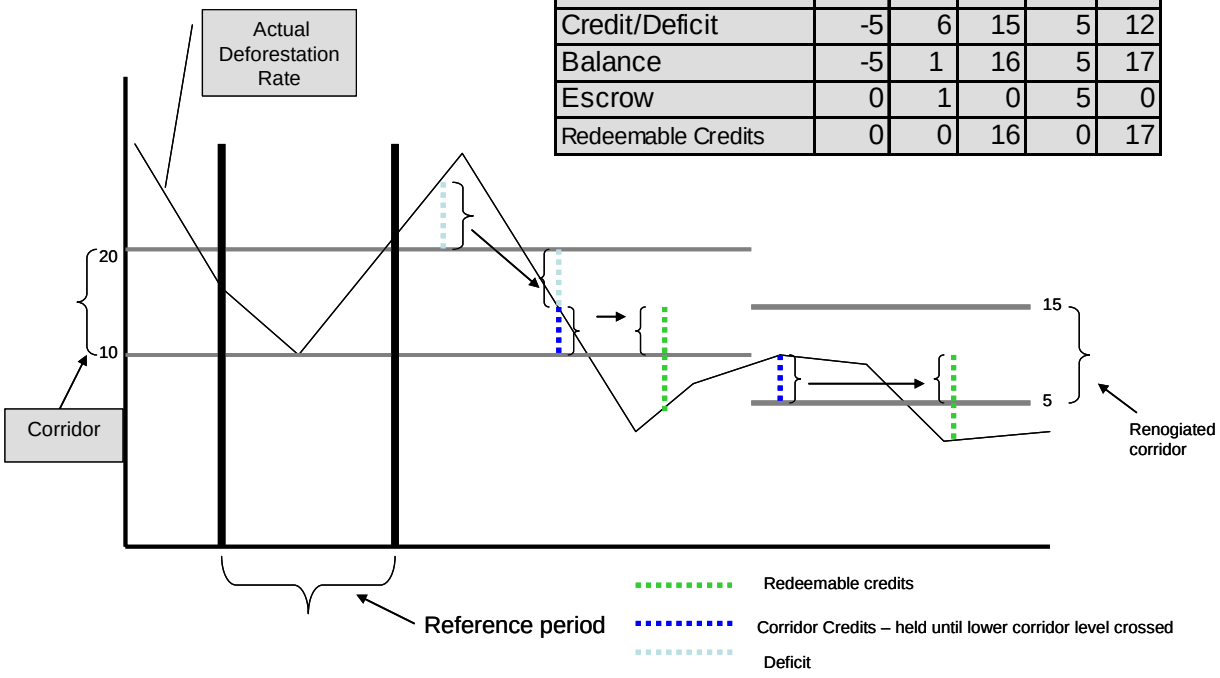
The establishment of a reference level should be informed by data on historical emissions, emission trends over time, and should also take into account external parameters like those mentioned above. One option might be for historic reference levels to be used initially, with a transition to regional models as they become more readily available and standardized. To address issues of interannual variability and shifts in external parameters, another option could be a "corridor approach", which would work as follows.

Corridor Approach

A country would establish, through negotiation or another mechanism, an upper and lower reference level for emissions based on emissions over an agreed historical period of 5-15 years. If a country brings its emissions below the lower reference level, credits are generated. There are two ways to address emissions above and within the corridor. In variant 1 if a country's emissions rise above the upper reference level, then a debit against future credit is initiated, as in the Brazilian proposal. For emissions within the corridor, credits could accrue but not be eligible for redemption or sale until emissions fall below the lower boundary. This approach would increase the likelihood that these credits are produced by real efforts and are not the result of interannual variability or business-as-usual activity. The corridor acts as a buffer against these factors, while still insuring that countries get credit for even initial efforts that begin to reduce deforestation below the upper bound.

Figure 1. Corridor Approach Variant 1

	T1	T2	T3	T4	T5
Reference level corridor	10-20	10-20	10-20	5-15	5-15
Deforest. rate	25	14	5	10	3
Credit/Deficit	-5	6	15	5	12
Balance	-5	1	16	5	17
Escrow	0	1	0	5	0
Redeemable Credits	0	0	16	0	17

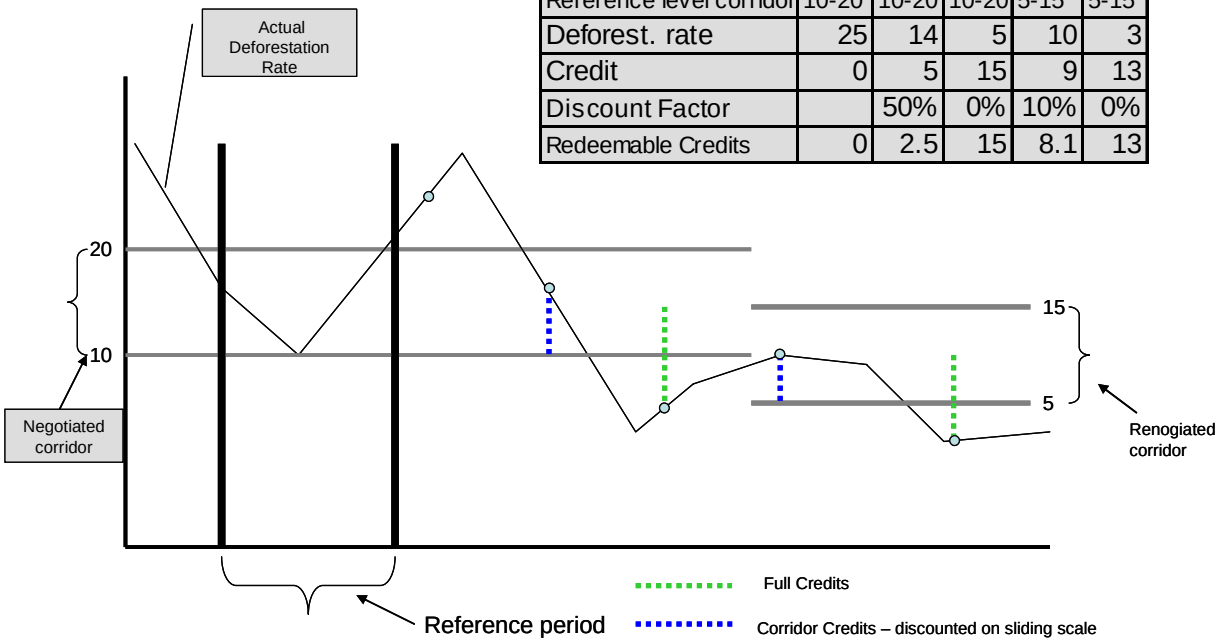


In variant 2 no debits accrue for emissions above the upper reference level. Emissions below the upper reference level would be discounted, with the discount rate decreasing as emissions levels are closer to the lower reference level. The credits per ton of emissions below the upper reference level varies between zero (when the emissions rate is at the upper reference level of the corridor) and one (when the emissions rate is at the lower reference level of the corridor) (see appendix).

Figure 2. Corridor Approach Variant 2

Example with discount credits

Reference level corridor	10-20	10-20	10-20	5-15	5-15
Deforest. rate	25	14	5	10	3
Credit	0	5	15	9	13
Discount Factor		50%	0%	10%	0%
Redeemable Credits	0	2.5	15	8.1	13



The advantage of banking full credits within the corridor (variant 1) is that this avoids the potentially difficult negotiation of specific levels of discount, as well as the possible perception that tons reduced within the corridor are second-rate relative to other tons reduced. It also fully credits even the initial activities that countries take to reduce emissions, while still reducing the likelihood that credits generated are the result of business-as-usual activity or interannual variability since they must be linked to a demonstrated trend of reduced emissions.

The advantage of discounting credits within the corridor (variant 2) is that it would provide an earlier and potentially steadier financial incentive, as opposed to the time lag imposed by banking the credits until the lower reference level is reached. It also more accurately reflects the decreasing likelihood that business-as-usual activities or interannual variability are contributing to progressive reductions in emissions through the corridor and further reduces the chance that "hot air" credits enter the system.

Options such as the corridor approach, compensated reductions approach, and others that have been proposed by countries and organizations should be given consideration. Modeling exercises and pilot programs offer an opportunity to test their effectivenss and applicability over a range of country circumstances. The organizations represented by this submission are engaging in projects to test the ideas presented here, as well as other options for policy mechanisms. Results of these

projects will be made available at future SBSTA meetings through side events and project reports.

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Appendix:

Guiding principles for including avoidance of emission from Deforestation, forest Degradation and Devegetation (DDD) in the international response to climate change

Submission by the ENCOFOR project team
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This submission is intended to frame some broad principles which could help guide an international instrument to reduce emissions from deforestation and forest degradation.

Principle 1. A comprehensive instrument
All relevant land conversions that lead to net emissions should be admitted under this approach, including the three DDDs: **D**eforestation (from forest to non-forest), forest **D**egradation (from forest types with high carbon stocks to forest types with lower carbon stocks) and **D**evegetation (from non-forest status with higher carbon stocks to non-forest status with lower carbon stocks), as far as technology allows their detection[11]. Relevant greenhouse gases (GHGs) include CO_2 (from the 5 pools as agreed previously), CH_4 and N_2O. Pools and emission sources can be omitted in a conservative way.

Principle 2. First establish the instrument, then country targets
It is recommended to first set the "DDD instrument" (and other rules of a future climate agreement), and only after that to set national, sectoral, or any other targets there may be for different countries.

Principle 3. A flexible, voluntary scheme
Non-Annex I countries should be free to participate in this scheme. We propose flexibility for the participating countries to choose from a menu of options:

i) At national or regional level, full carbon accounting of LULUCF without having to address leakage. The condition is to have an operational national LULUCF inventory system. In this case definitional issues (e.g., forest / non-forest) may no longer be relevant.

ii) At national level, allow permanent credits for certain land conversion avoidance. Countries would have the option to only select deforestation, or deforestation + forest degradation, or deforestation + forest degradation + devegetation of other lands. A condition is to have an operational national LULUCF inventory system for the said

[11] Definitions of these activities can be drawn from the IPCC Report on "Definitions and Methodological Options to Inventory Emissions from Direct Human-induced Degradation of Forests and Devegetation of Other Vegetation Types".

activity or activities. This can be seen as being similar to JI track 1, as it too requires the fulfilment of national inventory and reporting requirements.

iii) At project level, allow DDD avoidance activities (similar to JI track 2). Methodologies would have to address leakage. This mechanism could result in temporary credits.

The implementation of these activities should be inspired by already existing modalities and procedures like accounting by Annex I countries. We recommend flexibility in setting national definitions, thresholds, base periods, spatial resolutions and other modalities, followed by UNFCCC approval. Definitions should be chosen within certain bounds. A possibility is the use of Kyoto definitions, but to allow larger area thresholds in the forest definition, to accommodate relevant technical and socio-economic concerns (e.g., those related to remote sensing, land tenure, etc.).

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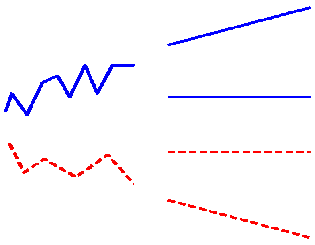
Principle 4. No-regret targets using a target corridor

No-regret targets could be adopted. That is, there are incentives to reduce emissions below the target, but no penalty for exceeding the target. Targets could be set in the form of a corridor (see drawing below). This corridor could be derived using historical emissions, emission trends, and trends in underlying causes. If actual emissions are above the corridor, no credits can be sold but neither is there any liability (no-regret targets). If the actual emissions are within the corridor, the amount of credits per ton of emissions by which the country "undershoots" the ceiling, varies between zero (when the DDD rate is at the ceiling of the corridor) and one (when the DDD rate is at the bottom of the corridor). This corridor approach reduces hot air and reduces the risk of missing a single-level target.

Even when using the corridor approach, it is possible that emissions could exceed the corridor ceiling in some years. In order to mitigate this, a fraction of credits in other years could be kept in a buffer, to make up for any "shortfalls" when emissions are above the ceiling.



Historical Corridor of

emissions future emissions

Principle 5. Use existing market mechanisms to compensate for DDD avoidance
The compensation for land conversion avoidance can best be realized through existing market mechanisms. Such mechanisms can be improved in such a way to allow the international trade of emission allowances from reducing DDD.

Principle 6. Encourage early action and capacity building
Encouraging early action could be achieved in a similar way as in the CDM, which had a prompt start from the year 2000. Early crediting could include a first accounting period from 2008-2012, with credits generated in that period to be used in the international market from 2013. During the first commitment period, a learning phase (similar as the Activities Implemented Jointly pilot phase) could be executed in order to get experience and knowledge. This could include pilot projects and collaboration with other UN institutions working in this area (e.g., FAO and ITTO). A second target period could coincide with any non-LULUCF or general target period for the time post 2012. Capacity building initiatives to support early action should be a priority and should begin immediately.

Principle 7. Transparent and verifiable methodologies for monitoring and estimation
Methods for monitoring and estimation could build upon IPCC GPG LULUCF 2003, chapter 4.2.6, expanded and modified as appropriate. Time series consistency between methods for base period assessments and future estimation is desirable. A cost effective and accurate monitoring based on remote sensing technology and ground truthing can meet good practice requirements.

Principle 8. Bottom-up approach with top-down review
The details of each country's definitions, timing of base period, determination of target corridor, and other issues could be proposed bottom up, and evaluated by a supervisory panel consisting of representatives of other parties, and experts.

Principle 9. Reporting requirements
Countries participation in this mechanism should be required to report on historical emission rates, recent trends, future projections, underlying causes of DDD, and measures taken to reduce DDD. During the target periods the reports must include annual estimation of DDD activities and resulting emissions, at the appropriate level as outlined in principle 3. These reports should be provided regularly (e.g., every 5 years).