REFERENCE SCENARIOS FOR DEGRADATION UNDER REDD

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Reference Scenarios for Degradation

Policy on Reduced Emissions from Deforestation and Degradation in Developing Countries[1] (REDD) is currently under discussion by Parties to the UNFCCC with a view to reaching a workable agreement during CoP15 at Copenhagen in December 2009, and starting crediting for REDD in the post-Kyoto period from 2012. Among the many difficulties in designing a workable agreement is the question of how to deal with degradation, and among the issues relating to degradation is the question of how to construct appropriate reference scenarios.

Reference scenarios for deforestation under REDD will be probably be based on historical assessments of past deforestation rates, extended to projections of future developments. These will be constructed using time series data over a period which still has to be negotiated, and which may be different for different countries; alternatively using baseline approaches which also take into account and model or simulate changes in drivers (population growth, increases in road network, demand for forest products, etc; see Box 1). The carbon implications will probably be calculated by multiplying areas deforested by typical or average carbon densities per hectare, for each type of forest and perhaps by set of drivers. Although there is still debate on whether simple historical data or a modelled approach is superior, the basic data on past forest cover is generally available from remote sensing images. However, the situation as regards reference scenarios for degradation is rather different.

[1] Officially, REDD stands for 'Reduced Emissions from Deforestation in Developing Countries', but it is commonly understood that the second D stands for Degradation: though not in the official title, degradation is explicitly mentioned in UNFCCC texts.

Box 1: What's the difference between a baseline and a reference scenario?

Methodology for CDM, including afforestation and reforestation projects, requires development of a baseline which indicates what emissions would occur in the absence of the project: credits are issued on the basis of the difference between this 'business as usual' scenario and the emissions or removals attributable to the project. The baseline represents the counterfactual case, and thus the target to be beaten.

Estimating the counterfactual case for REDD is much more difficult than for individual projects, since it requires knowledge of what the average national rate of deforestation would have been in the future, had no REDD activities been implemented; this hypothetical rate could be affected by many things, including global demand and prices for timber, food and other agricultural products such as biofuels, which may themselves be affected by the state of the world economy. Although a large number of models have been proposed in the literature to predict rates of deforestation based on observation of drivers in the past and predictions of these, or using a variety of simulation methods, Parties have tended to favour a simpler approach based on the idea of a reference scenario, that is, an observed rate of deforestation over a selected period in the past (and not necessarily the immediate past), as the base for comparison.

The disadvantage of this type of reference scenario is that it is not always clear that deforestation rates in the future would continue at the rates observed in the past (for example, once the more commercially attractive forest areas are cleared, the rate might be expected to decrease; on the other hand, a country which is just getting into global markets could reasonable expect that its deforestation rate would increase). However, it would be possible to adjust the reference scenario to reflect this where necessary, based on expert judgement and/or political negotiation. An advantage of reference scenarios is that their basis is easy to understand and transparent (can be checked relatively easily) while models, though offering the potential of more specificity and accuracy, tend to be opaque.

1. Why do we need separate reference scenarios for degradation?

There are two reasons why a reference scenario or baseline is required for degradation, in addition to, and different from, one for deforestation.

- Firstly, there is a real danger that if deforestation rates are curbed, there will be increased degradation in the remaining forest, generally known as leakage. To ensure environmental integrity it will be necessary to monitor this, and for this, information is needed on the 'business as usual' degradation rate. This will be particularly important in countries with humid forests which have had high deforestation rates in the recent past and which plan aggressive REDD programmes to tackle it. Degradation in such countries is often in the first instance related to (illegal) selective logging.

- Secondly, under REDD it is expected that carbon credits may be claimed for reductions in emissions that result from reduced degradation, as well as deforestation. This will be particularly important for countries which may not have had very high deforestation rates in the past, but which have chronic degradation problems, typically countries with large areas of tropical deciduous and dry forest. Here population densities are relatively higher than in humid forests, and are increasing; degradation is related to gradual over-exploitation of forest resources by local communities for products such as firewood and fodder, or is associated with low level shifting cultivation. It should be noted that this degradation is usually related to the increased ratio of population to available forest, and to increased demand e.g. for charcoal, from outside the area.

2. Difficulties in constructing reference scenarios for degradation

The difference between a reference scenario for degradation and for deforestation is that for the former, information is needed not just on changes in area of forest affected, but on the biomass changes within specific types of forest (the forest density). Although (at least for the more major forms of degradation), the locations may be identified, and the overall area of forest affected may be estimated from remote sensing, experts are clear that the changes in biomass densities cannot be quantified from RS images[2] (Souza, 2005; Asner 2005; Defries et al., 2007). Such data requires ground level measurements, in other words, systematic forest inventory at regular intervals. Very few developing countries have had the resources to carry out such inventories in the past.

The FAO Global Forest Assessment Report for 2005 notes that in their reporting, most developing countries either assume no changes in their average forest density, or apply a rule of thumb to calculate decreases over time. Neither method gives data which is sufficiently reliable as the base for future claims for reduced degradation. There are exceptions, for example Mexico, which has 23,000 permanent forest sampling plots which are monitored once every 5 years. In general however it can be said that the majority of countries that are planning to participate in REDD do not have the data necessary to construct historically based reference scenarios for degradation. Modelling is not an option either, since there is no data with which to calibrate a model.

3. Resolving the dilemma

One way to resolve this dilemma is to separate the two functions of the degradation reference scenario and treat them independently.

If a country's main preoccupation and basis for credits under REDD concern reducing deforestation, then its interest as regards degradation is primarily to control for leakage. The reference scenario for degradation could be expressed in terms of area visibly affected by degradation, and changes in this area over time as determined through remote sensing, rather than in terms of forest density. This is because the leakage effect (e.g. through illegal selective logging) is more likely to be manifested as increases in area degraded, rather than in deepening of biomass losses in any one degraded area.

On the other hand, if the country is planning primarily to claim credits on the basis of reduced degradation, then on-the-ground stock measurements will be essential both for constructing a reference scenario and for monitoring, at least in those areas which play a part in these claims. There are then two possibilities:

[2] Lidar technology, carried on small planes rather than satellites, is a possibility in this regard, but is still experimental, very expensive and obviously restricted to small areas.

(1) In cases where countries have sufficient past forest inventory data to construct a credible degradation scenario which is spatially explicit, degradation reductions may be included on the basis of such a baseline

(2) In cases where countries do not have such historical data, reductions in degradation itself cannot be claimed. However, since measures adopted to reduce degradation, such as improvement in forest management, not only reduce degradation but also generally result in enhancement of forest stock, credits could be accounted instead on the basis of ***net increases*** in forest stock (i.e. carbon removals), based on a forest inventory carried out at time t_0, that is to say, at the time the planned interventions start, and time t_1, at the end of the accounting period. This is similar to the way that forest management and degradation are accounted at present in Annex 1 countries.

An advantage of this approach is that it allows the integration into REDD of issues such as sustainable forest management, forest enhancement, and conservation. These have all been mentioned as important in the UNFCCC documentation relating to REDD, for example in CoP13/2 (the Bali decision) and in the SBSTA28 (Poznan) Chairman's summary on REDD, but have so far not been dealt with as regards accounting and methodology. Essentially, the second option takes degradation out of the deforestation envelope and places it instead in a forest management envelope. There are many practical reasons why this is an appropriate strategy (Box 2). The concept has earlier been proposed e.g. by Olander et al. (2006) and Blazer and Robledo (2007), and a methodology along these lines for use at project level is under development for application under the Voluntary Carbon Standard (pers.comm: Trines, 2009). Moreover, it fits well with recent proposals for a definition of degradation based on the concept of ´carbon carrying capacity´ (Cadman, 2008, see Box 3).

Box 2: Uncoupling degradation from deforestation

Degradation is popularly considered to be a precursor to full deforestation, and conceptualised as part of the same process; therefore it has been grouped closely with deforestation in UNFCCC documentation on REDD. But while it is true that in some cases degradation is followed by full deforestation, this is the *exception* rather than the rule. For example, it has been observed in the Brazilian Amazon that selective logging (degradation) may be followed by agricultural clearance as migrant farmers move in along the logging roads. But this only occurs in 30% of the area subject to selective logging (Krug, 2008). And in many other places, and in other types of forest, degradation is not caused by selective logging at all, but by extraction of various other forest products (firewood, charcoal, fodder) or by patchy clearance and re-growth associated with shifting agriculture, by indigenous communities. In such areas degradation very rarely leads to deforestation – just to less dense forests.

The drivers behind deforestation and degradation are not, in most cases, the same, and neither are the actors. Most deforestation is caused by expansion of urban areas, infrastructure development and large scale commercial conversion of forest for agriculture or ranching, some of which is 'governed' (sanctioned by government authorities) and some of which is 'ungoverned'. Most degradation on the other hand is the result of unsustainable extraction of forest products and values by local populations as part of their livelihood strategies. The exception to this is commercial selective logging in humid forests, but this affects a very small area in comparison to other forms of degradation. Dry and deciduous forests in the tropics are particularly affected by degradation due to unsustainable local uses, because their population densities are so much higher than the humid forests (Campbell et al. 2008), and these are growing.

Since the actors and processes are very different, it follows that in general, different strategies and programmes may be needed under REDD to deal with deforestation as compared with degradation. Moreover, while curbing of deforestation results in reduced emissions, curbing of degradation results not only in reduced emissions but in most cases also in increases in forest biomass. This is because programmes to deal with degradation tend in practice to focus on improved management methods. In other words, to deal effectively with many types of degradation, it is important to see them not as the beginning of a deforestation processes but as a form of poor forest management, which needs to be improved.

Box 3: Defining degradation for the purposes of REDD

While UNFCCC definition of deforestation is clear – it occurs when the canopy cover of a forested area falls below a minimum threshold already selected by each country, in the range between 10-30%, with some attendant height and area thresholds - there is no accepted definition of degradation under the UNFCCC. This is despite an IPCC expert group report which explored the issue of a definition for degradation (Penman et al., 2003) and an FAO study which reviewed existing definitions (Schone et al., 2007). However, it is clear that from the point of view of climate change mitigation, degradation refers to losses of biomass, and therefore of carbon stock, from forests which remain forests.

It has recently been suggested that degradation should therefore be defined as ***"a reduction in the carbon stock in a natural forest, compared with its natural carbon carrying capacity, due to human activities"*** (Cadman, 2008). The concept of *carbon carrying capacity* is new and very useful in this context, because it implicitly recognises that forest can be in transition from one state to another, with increasing as well as decreasing carbon stocks below this natural carrying capacity, although what exactly ´natural´ means, is still open to question. From the point of view of mitigation of climate change, all increases in carbon stocks should be welcomed while all decreases should be discouraged. If a forest has been degraded in the past, its carbon stocks will be below its carbon carrying capacity, but if it remains stable, it is not (or no longer) a source of emissions. If it is regenerating due to natural processes, which may be encouraged by human management interventions, its carbon stocks will be increasing and it will be a net sink. A definition based on the concept of carbon carrying capacity allows different processes of forest transition to be accommodated. For example it would consider the conversion of natural forest to tree crop plantation (e.g. oil palm) to be degradation, if the carbon stock is lower than the forest it replaces. Under current UNFCCC definitions, the oil palm plantation would not represent deforestation if its canopy cover were above the selected threshold, since no distinction is made between types of tree cover (Cadman, 2008).

4. Risk maps and spatially explicit sub-area baselines for degradation

A participating country would need to prepare a map of all its forests, indicating which areas are expected to be at threat from deforestation in the coming accounting period and which are at threat from degradation (there may be some overlap between these spatially, see Figure 1). These areas would be identified on the basis of expert knowledge (which may well be local expertise) and verified by an independent agency. Programmes initiated under REDD to curb deforestation and degradation would focus explicitly on these areas.

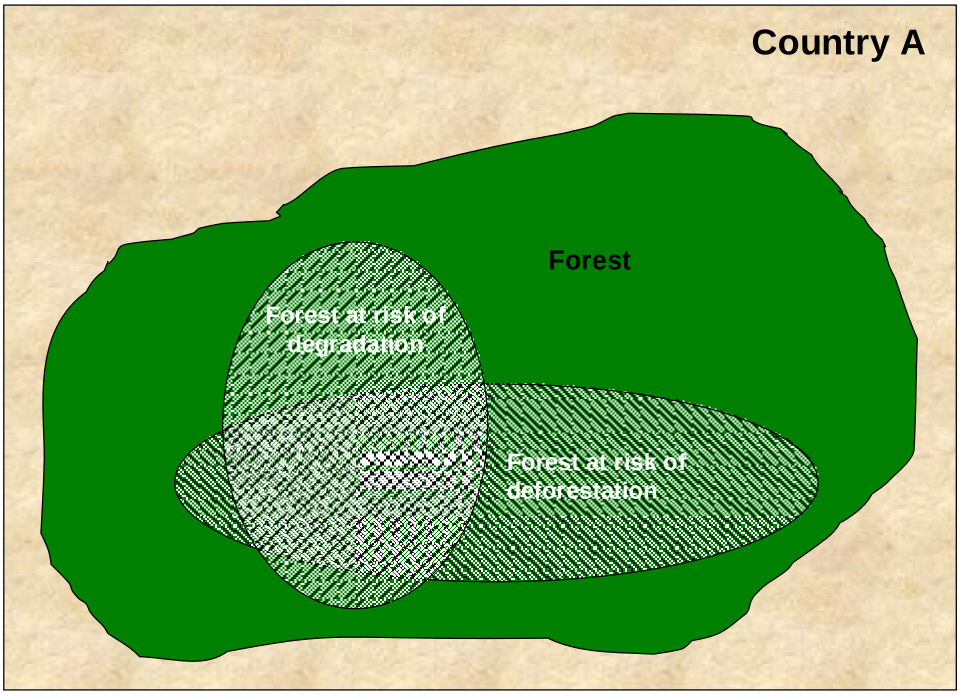

Figure 1: Risk map of deforestation and degradation

In the areas identified as at risk from degradation, a requirement for claiming credits for reducing it would be ground level inventories in areas which are brought under the REDD programme, at the initiation of the period. These could be carried out by the forest agency itself or by the local land owners or land users, for example by communities who are involved in management programmes such as Joint Forest Management, Community Forest Management etc., or in programmes involving Payment for Environmental Services, and would form spatially explicit sub-area baselines. Methods for involving communities in making forest inventories, thus reducing the costs of these exercises, have been developed by the Kyoto: Think Global, Act Local programme (K:TGAL); a manual is available at http://unfccc.int/methods_science/redd/items/4719.php and at www.communitycarbonforestry.org. Measurement of stock in adjacent areas which could be subject to leakage may also be required.

A second inventory would be made at the end of the period in each area brought under management (or, for more reliability, and to even out irregularities due to weather anomalies etc., this could be done on an annual basis). Carbon credits would then be accounted on the basis of net increases in carbon stock in each area. The estimate of carbon saved would be quite conservative as in reality there would also be considerable reduction in emissions from avoided degradation in these managed areas. This model would allow countries to claim credits for improvements in stock in degraded forest and, importantly from a governance point of view, would provide a basis for the distribution of payments to participating landowners/users.

References

Asner, G.P., Knapp, D.E., Broadbent, E.N., Oliveir, P.J.C., Keller, M., and Silva, J.N. (2005) Selective logging in the Brazilian Amazon. Science 310: 480-482

Blazer, J. and Robledo, C. (2007) Initial analysis on the mitigation potential of the forest sector. Paper prepared for the UNFCCC Secretariat by Intercooperation, Bern, Switzerland.

Cadman, S. (2008) defining degradation for an effective mechanism to reduce emissions from deforestation and forest degradation (REDD). Paper presented at the SBSTA Workshop on Forest Degradation, Bonn, October 20-21.

Campbell, B.M., Angelsen, A., Cunningham, A., Katerere, Y., Sitoe, A., and Wunder, S. (2008) Miombo woodland: opportunities and barriers to sustainable forest management. CIFOR, Bogor

DeFries, R., Achard, F., Brown, S., Herold, M., Murdiyarso, D., Schlamadinger, B., and de Souza, C. (2007) Earth observations for estimating greenhouse gas emissions from deforestation in developing countries. Environ Sci and Pol 10: 385-394

Krug, T. (2008) Detection of selective logging for estimating and monitoring forest degradation: methodologies and experiences in Brazil. Paper presented at the UNFCCC Workshop on Methodological Issues relating to REDD, Tokyo, 25-27 June.

Olander, L.P., Murray B.C., Steinger, M and Gibbs, H. (2006) Establishing credible baselines for quantifying avoided carbon emissions from reduce deforestation and forest degradation. Draft Working Paper NI WP 06-01, Nicholas Institute, Duke University

Penman, J., Gytarsky, M., Krug, T., Kruger, D., Pipatti, R., Buendia, L.,Miwa, KL., Ngara, T., Tanabe, K. and F. Wagner (2003). Definitions and Methodological Options to Inventory Emissions from Direct Human-induced Degradation of Forests and Devegetation of Other Vegetation Types. IPCC-IGES, Kanagawa, Japan

Schone, D., Killman, W., von Luepke, H and LycheWilkie, M. (2006) Definitional issues related to reducing emissions from deforestation in developing countries. Forests and Climate Change Working Paper 5, FAO, Rome.

Souza , C.M., Roberts, D.A and Cochrane, M.A. (2005) Combining spectral and spatial information to map canopy damage from selective logging and forest fires. Remote sensing of the environment, 98, 329-343.

Trines, E. (2009) Personal communication 12.01.2009

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Contact: Margaret Skutsch: m.skutsch@utwente.nl

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Text by Margaret Skutsch with inputs from Mike McCall and Eveline Trines.