OPERATIONALISING REDUCED DEGRADATION WITHIN REDD

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1. Why is it important to include degradation in REDD?

The Bali Action Plan includes a call for policy approaches and positive incentives on issues relating to Reducing Emissions from Deforestation and Degradation (REDD). The reasons for explicit inclusion of degradation alongside deforestation are twofold. Firstly, degradation may itself be a major source of emissions, although how this compares with emissions from deforestation on the world scale is not very clear as data on degradation rates is still very poor. Secondly, there is a danger that if it is not included, countries may be tempted to stop clear-felling forests (deforestation) and extract timber instead from within forests, lowering their carbon content without bringing about a loss of forest area, which would pervert the policy. However, operationalising REDD so that degradation can be included is not simple, for a variety of reasons. To understand these, it is first necessary to be clear about what we mean by 'degradation'.

2. What do we mean by degradation?

Degradation is a term widely used by foresters to mean a loss of various forest values (often meaning anything that brings about changes to 'intact' forest), but from a climate change perspective it is clear that it refers specifically to loss of carbon stock in existing forests while the forest remains forest[1]. This loss may be temporary, since forests may regenerate naturally if not further disturbed, and re-build their carbon stocks along with other forest qualities. If continued pressure is placed on the forests however, the forest system may be degraded to such an extent that it looses the capacity to recover on its own, and the forest may remain in a highly degraded state, with low, if stable, above-ground carbon stocks, for

[1] Neither the IPCC report of 2003 (Penman et al, 2003) nor a more recent review of literature on degradation (Mudiyarso et al, 2008) was able to find a clear definition which can be directly used in connection with carbon accounting, despite exhaustive searches in forest literature.

long periods. If yet more pressure is applied, the forest may disappear completely, i.e. deforestation occurs, in which case virtually all the living carbon stock may be lost. The fate of soil carbon in any of these cases is unsure, since it is not necessarily released to the atmosphere, but may be washed off site and stored elsewhere.

Photo cortesy Nadine Laporte

Degradation is popularly conceptualised in terms of the third of these processes, i.e. it is understood as essentially a precursor to deforestation, and that once degradation has started, the forest will slide down the slippery path to extinction. The story of small scale farmers following the timber extraction roads in the Amazon forests to clear for agriculture is frequently invoked in this sense. But although there is no doubt that in the Brazilian Amazon some deforestation is closely linked to initial degradation due to selective logging, in many other regions of the world forest degradation does not lead to deforestation, just to less dense forest. A fact that is also very rarely understood and acknowledged is that forest degradation is often driven by wholly different drivers and is typically carried out by wholly different actors from deforestation (Box 1).

Box 1. Distinguishing forest degradation from deforestation

A large part of deforestation is 'governed', that is, approved by authorities for the purposes of infrastructure development, urban expansion, commercial or small scale agricultural development, clear felling for timber trade, etc. In addition in many countries there are varying amounts of 'ungoverned' deforestation, that is to say forest clearance carried out for the same kinds of reasons but without official approval. Despite popular beliefs that forests are being decimated as a result of illegal and uncontrolled activities, governed deforestation often forms the larger part. Either way, deforestation results in discrete patches of forest being removed, at particular points in time and space, and usually the actors behind it are not resident in the area, but representing companies or government agencies. Degradation on the other hand is in most cases ungoverned. It tends to be carried out by people resident in the area, over extended time periods and spread thinly over large areas. The exception to this may be logging in humid tropical forests, which may be legal or illegal but tends to be organised by outsiders and localised in time and space, and is often of such intensity that it leads to reduced carbon levels for many decades.

Most of the literature on inclusion of degradation REDD has focused on selective logging, and mostly in the context of how much can and cannot be seen in satellite images (Souza et al., 2003; DeFries et al., 2007). In reality selective logging is only one of the many processes leading to degradation and it may by no means be the most important in terms of carbon emissions. A recent study estimated that the unmeasured and unregistered slow degradation of dry forests in eastern Africa as a result of small scale but unsustainable off-take of wood for firewood, charcoal and shifting cultivation could result in more emissions than all the deforestation that is registered for that area (Skutsch *et al*., 2008).

The conceptualisation of degradation as the 'small brother' of deforestation has resulted in a situation in which these two processes have been grouped together in the UNFCCC REDD negotiation text, while forest conservation, sustainable management of forests and enhancement of forest carbon stocks, which are important additional processes whose inclusion in the agreement is currently being discussed, have been seen as belonging to a different class. It is very questionable whether this is the most logical and workable approach. Forest degradation may in fact have much more in common both as regards processes involved and as regards methodology for assessment, with forest management than with deforestation.

3. Three models for incorporating forest degradation into REDD

From a conceptual and methodology point of view, forest degradation could be seen and measured as any one of the following:

- A form of deforestation, to be included in the same baseline and accounting framework as deforestation
- A separate process, with a separate baseline, monitoring and crediting system.
- A form of forest management, to be assessed and rewarded as forest management.

These are explained below. The advantages and disadvantages of these approaches are summarized in Table 1.

	Advantages	Disadvantages
Model 1 – Degradation as a form of deforestation		
Reductions in rates of loss due to forest degradation measured essentially in same way as deforestation and summed with those of deforestation, using RS as the primary source of data on rates of activity change and historical baselines. Combined index.	* Only one set of accounts needed * Use same baseline, monitoring and crediting system as deforestation (mainly reliant on RS) * Simple, relatively cheap solution	* Could include only very limited amount of forest degradation, such as some types of logging disturbances which are visible in RS. * Other forms of forest degradation, which may represent very large proportion of national forest emissions, particularly in dry forests, are excluded
Model 2 – Degradation as a separate process, accounted and credited in its own right		
Reductions in rates of loss due to forest degradation would be rewarded independently using a special and different methodology from deforestation	* Would stimulate programmes specifically to combat drivers of degradation (which are often not the same as those of deforestation) * Would allow inclusion of a much larger proportion of total forest emissions	* Almost impossible to establish credible baselines at scales which capture local conditions sufficiently, thus very difficult to credit reductions in degradation on a per ton output basis. * Large range of uncertainty would greatly reduce credits that could be claimed.
Model 3 – Degradation as a form of forest management		
Accounted for as part of the absolute stock change over an agreed period of time (similar to reporting under KP by Annex 1 for 'forest management'; the main difference being that all forest would have to be included). Net increases in carbon sequestered due to improved management would be rewarded. Reduced rates of degradation would not be directly rewarded, only stock increases in areas that had earlier been degrading.	* Would be included in one set of accounts with all forest management activities in a gross-net accounting system. * No historical baselines are needed, as credits based on stock change from beginning of period to end. * What would be rewarded would not be avoided degradation but all net increases in stock over the entire forest estate.	* Countries would be rewarded only for net stock increases over the accounting period, not for reductions in degradation rates directly. However, given that almost all interventions that successfully reverse degradation also lead to enhanced sequestration, this may not matter. * Change would be calculated for discrete areas of forest to capture the effects of long cycles of management. * A difficulty may be establishing what scale should be used for this.

Table 1. Advantages and disadvantages of different models for treating forest degradation under REDD. Source: prepared by M.Skutsch for Murdiyarso et al (2008).

3.1 Model 1: Degradation as a form of deforestation

If degradation is considered essentially a form of deforestation (deforestation which is in progress, but not complete), particularly in regions where experience shows that degradation usually rapidly leads on to deforestation, then logically it makes sense to group degradation with deforestation and to measure it in similar ways. Deforestation is measured on the basis of change in forest area over a given period, mainly using remote sensing (satellite images). A historical baseline may be developed because medium resolution images for the last twenty years are readily available. This would be used to assess reduced rates of deforestation during the commitment period. Degradation would be deemed to be occurring where areas of canopy cover within these forests appear in satellite imagery to have been disturbed, and a similar historical baseline could be used. Estimates of the typical proportion of biomass lost in such areas would be used as multipliers to assess emissions.

This approach has the advantage of simplicity and (relatively) low cost. However, by no means all types of degradation show up as canopy disturbances which are visible in easily available optical satellite imagery. Studies which claim that degradation can be assessed using a combination of optical remote sensing techniques, including higher resolution images (Souza, 2003, 2005; Asner, 2005) have focused on only one type of degradation: selective logging in rainforest, which is not representative of degradation as it occurs more generally. Moreover these techniques identify areas that have been disturbed, but cannot assess the biomass levels or changes in these (DeFries et al, 2007)[2]. Areas where other types of degradation occur, which primarily involve loss of biomass below the canopy, or at a scale below the resolution of the images, will be ignored

[2] Remote sensing using radar or LiDar may offer some possibilities for assessing changing biomass levels in forests in the future but have not yet been fully developed for this. They have been used on a small scale and experimentally, but application at national level is not yet possible. The costs, and expertise needed, put these methods out of the market for the time being.

because they cannot be 'seen' at all (Table 2). These include degradation resulting from e.g. firewood extraction, charcoal production and from grazing in the forest, particularly in dry forest zones. Many opportunities for crediting reducing emissions from programmes controlling these kinds of activities – through programmes reaching out to the communities dependent on this type of activity - will then be lost.

Highly Detectable	Detection limited & increasing data/effort needed	Almost Undetectable
- Deforestation - Forest fragmentation - Recent slash-and burn agriculture - Major canopy fires - Major roads - Conversion to tree monocultures - Hydroelectric dams and other forms of flood disturbances - Large-scale mining	- Selective logging - Forest surface fires - A range of edge effects - Old-slash-and-burn agriculture - Small scale mining - Unpaved secondary roads (6-20-m wide) - Selective thinning of canopy trees	- Harvesting of most non-timber plants products - Old-mechanized selective logging - Narrow sub-canopy roads (<6-m wide) - Understory thinning and clear cutting e.g. for firewood and charcoal - Invasion of exotic species and introduction of exogenous forest crops e.g. cardomon - Suppression of new growth due to grazing

Table 2: Detectability of forest disturbances by remote sensing. Adapted from: GOFC-GOLD: Report of the 2nd GOFC-GOLD Workshop on Reducing Emissions from Deforestation. St. Cruz, Bolivia, 17-19 April 2007.

3.2 Model 2: Degradation as separate process to be accounted and credited against its own reference scenario

To be more inclusive and to capture more types of degradation in a variety of forest types, ground level data on changes in forest stock is essential,

which can only be obtained through regular and repeated forest inventories. Such studies pick up both the areas that are affected by degradation, and the quantities of biomass lost in different locations. From this, a clearer picture may be formed about the processes that are causing the loss of biomass, and the temporal aspects (how rapidly degradation is progressing, and whether it has stabilized, or is in a state of recovery). However, most developing countries do not have the capacity to carry out comprehensive forest inventories and therefore have no systematic records over time of such changes.

Most developing countries indeed have no quantitative information at all on past trends as regards degradation, meaning that construction of a historical reference scenario is all but impossible. The lack of data on past degradation in most countries therefore makes accounting for reduced rates of degradation under REDD almost impossible at present. Therefore its use would be limited to the handful of countries which do have better stock data over time. For other countries, the approach could only work if ground based forest inventories were to be undertaken at the start of one commitment period and again at the end of the period, such that a degradation gradient could be assessed. Reductions could then be rewarded in a subsequent commitment period by comparison with the baseline developed in the first. It is questionable whether Parties would feel it worthwhile to make such measurements in preparation for a possible instrument that might be available at a much later stage, given the effort in data collection that would be involved. Moreover this approach would obviously provide perverse incentives to degrade in the preliminary period, and the costs of the inventory work could not be compensated by carbon revenues alone. This approach therefore does not appear to be optimal in any sense.

3.3 Model 3: Degradation as a form of forest management

For most people, degradation and forest management appear at first sight to be opposites. 'Degradation' has strongly negative connotations, implying

defilement and loss, while 'forest management' sounds rather responsible and positive, particularly if it is 'sustainable'. Yet all management of natural forests (with the exception of strict conservation) results in lowered forest carbon stocks, and could therefore be seen as a form of degradation not only from a carbon perspective, but also from the point of view of forest quality. Vice versa, degradation is the result of human uses of the forest, which are clearly forms of forest management, albeit unsustainable, and sometimes 'un-governed' and unofficial.

Another reason for conceptualizing degradation as a type of forest management and treating it as such is because any efforts to reduce degradation are likely to involve planned forest management and purposive activities by the land users to improve the situation. Not only should these halt the loss of biomass from the forest; in most cases such measures will reverse the processes and result in increases in stock, at least until the biological maximum is reached (Figure 1). The degraded forest will stop degrading and start to flourish, with new growth and new sequestration of carbon.

If degradation is seen as a form of (unsustainable) forest management, a quite different approach could be taken to measuring and rewarding improvements. Under the Kyoto Protocol, Annex 1 countries may include forest management (under article 3.4) as an additional activity leading to reduction of emissions. This is done without the use of reference scenarios, but simply on the basis of absolute changes in stock in the forest over the commitment period. Measurements are taken at the beginning and the end of the period and the difference is computed: it may be positive or negative. In this approach to accounting, no historical data prior to the commitment period is required.

This model could be applied to the case of forests in non-Annex 1 countries. Any net increases in stock within a country's forests could be

rewarded/credited. Measurements at the beginning and end of a period can be made by the forest users/managers for each parcel (whether government, private or community), with independent checking and monitoring (on a sampling basis) to ensure integrity. The legal requirement on forest users to produce statistics on forest stock would be compensated by distributing a share of the national REDD revenue to them, along principles of PES. Increases in stock would be the result of positive policies, programmes and incentive schemes which encourage better management, including reduced impact logging, sustainable extraction of firewood and small timber by local communities, or for example establishment of firewood plantation close to homesteads. These policies may be supported by measures outside the forestry sector itself, for example provision of alternative energy sources.

Under this model what is being rewarded is not the reductions in degradation per se, but the increases in stock which are the co-benefits of anti-degradation measures. Studies show that dry forests brought under simple forms of management stop degrading and start to accumulated carbon at rates of 1.5 to 5.5 tons carbon dioxide per hectare per year; in areas of higher rainfall, the rates may be up to 15 tons per hectare per year. This is in situations in which local people still use the forest for their subsistence requirements (firewood, fodder), but agree to an off-take level and manner that is sustainable.

Figure 1 illustrates the principle: what is rewarded is the pale green segment of the graph, rather than the dark green. The dark green quantity cannot be measured, since as discussed above there is no historical data available to draw the lower line. Payment for the pale green gains carbon is therefore a conservative estimate of the total carbon impact. Since the period over which increases are measured may be quite long (up to 8 years, e.g. 2012-2020), some way of spreading payments may need to be devised in order to keep up the incentive.

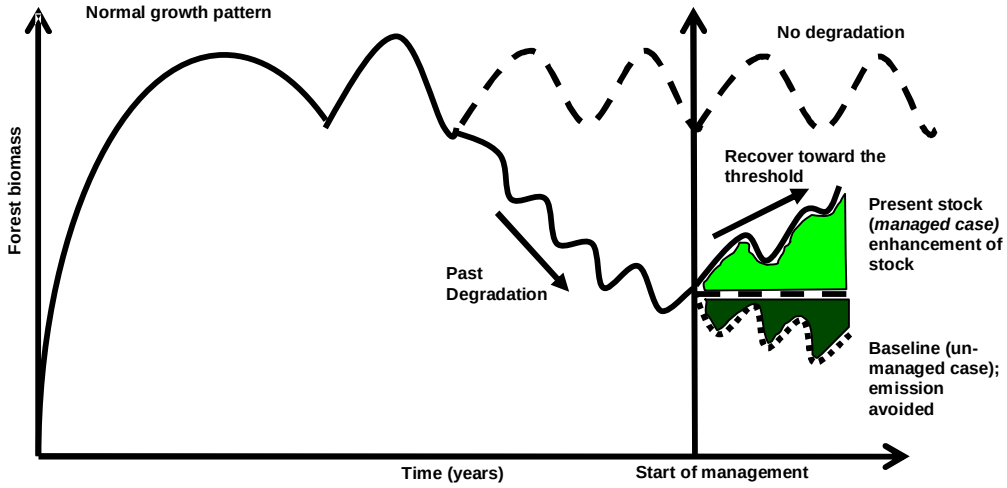

Figure 1 Avoided forest degradation and sequestration resulting from management Source: Zahabu, E. (2008) Sinks and Sources. PhD Thesis, University of Twente.

4. Different degradation models for different country circumstances?

One possibility is that several options as regards degradation are permitted under REDD and that countries have a choice of which they will apply. This could also assist in reaching international agreement on REDD since one of the main difficulties in achieving consensus has been the fact that different countries are at different stages as regards forest transition (Angelsen, 2007). Some have large intact forests, which have hardly been exploited for one reason or another (low population density, civil wars or social unrest, lack of access, lack of market opportunities). Other countries are experiencing rapid deforestation. In general countries may be grouped into four categories as shown in Figure 2:

(1) Constantly low deforestation rates up to now, mostly because of isolation in terms of economic opportunity. It is to be expected that there will be increasing pressure on forests in the countries in the near future. Among these countries are those in the Congo Basin and Suriname;

(2) Very steep deforestation rates at present (more than 5% per annum), such as Ghana, Nicaragua

(3) Leveled off deforestation rate, either because the forest has already largely been cleared, or because of strong policies for forest protection, such as India,

(4) Increasing forest cover due to successful conservation policies (Costa Rica) or successful afforestation and reforestation after experiencing deforestation for a long period. Among these countries are China and Vietnam.

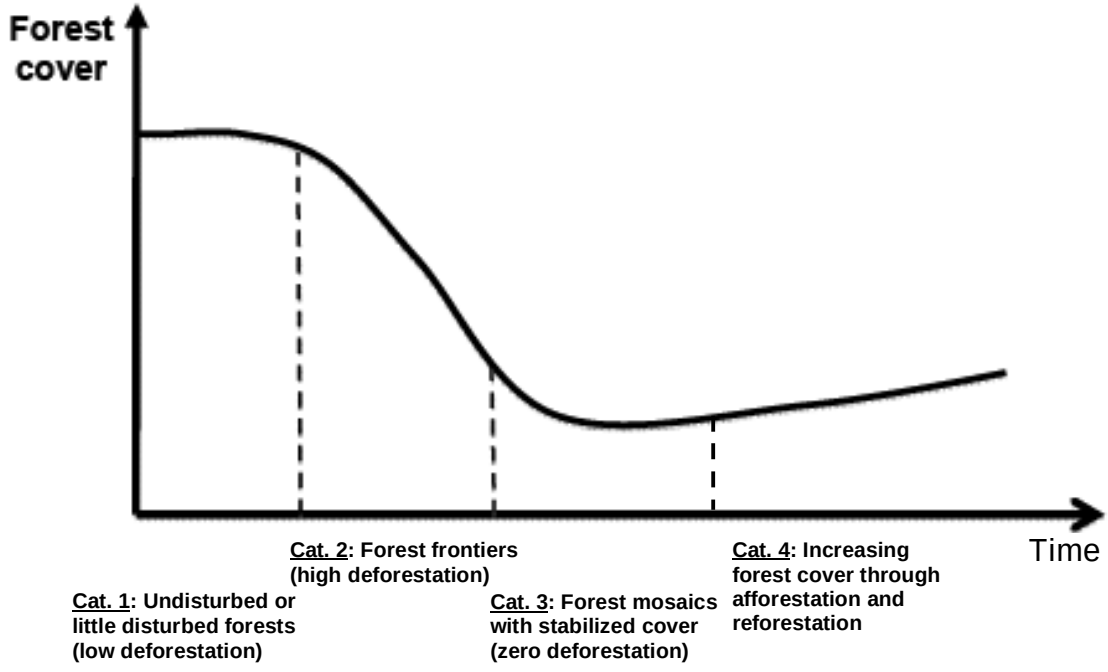

Figure 2. Categories of forest transition depending on the extent of forest cover and rate of deforestation over time. Source: Kanninen et al. (2007) Do Trees Grow on Money?

It is not entirely clear whether rates of forest degradation follow this same line. Lack of data prevents clear statements on this, but it is possible – and could certainly be hypothesised – that countries which have greatly reduced their deforestation rates may in fact be suffering (hidden) increases in degradation to compensate to some extent.

The fact that different countries are in such different circumstances would suggest that different approaches to dealing with forest degradation and rewarding reduced degradation could be useful. Countries might then select the approach which most clearly reflects their conditions. It is clear that countries falling into Category (2) above would benefit most by an instrument which is strongly focused on reducing losses of biomass, and hence for these countries, Model 1 for degradation would be most appropriate.

Countries on the upward curve (Category 4) as well as those who have not yet experienced much deforestation (Category 1) would benefit from a Model 3 in which degradation is incorporated as forest management. Countries which have stabilised their forest areas and which are now calling for rewards for conservation of these stocks (Category 3) might also profit from Model 3, since their biomass stocks may increasing within the forest and this should certainly be encouraged and incentivised.

Model 2 might be used by the few countries which do have more detailed data on stock, whatever their position on the forest transitions curve, or could be a model for future use in countries that are building up their data.

5. Conclusions

This policy note has presented some alternative ways of dealing with degradation within the overall framework of REDD. These alternatives are not mutually exclusive, but rather offer a range of possible options which might suit different countries, since local circumstances as regards rates of deforestation and degradation, and as regards data availability, vary considerably; no one size fits all, as regards REDD. In particular, the possibility of classifying degradation as forest management rather than as deforestation offers much promise as this would enable crediting of anti-degradation measures on the basis of additional carbon sequestered through forest enhancement.

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