



SUBMISSION TO THE AWG-KP ON LULUCF DEFINITIONS, MODALITIES, RULES AND GUIDELINES IN THE SECOND COMMITMENT PERIOD.

1 INTRODUCTION

The Wilderness Society makes this submission in response to the invitation from the AWG-KP for Parties to submit their views on, inter alia, the “The definitions, modalities, rules and guidelines for the treatment of land use, land-use change and forestry (LULUCF) in the second commitment period,” by February 15, 2009. . Our organization is continuing to evolve our understanding of the interaction between LULUCF definitions, modalities, rules and guidelines and climate and biodiversity outcomes. The focus of our work has been to ensure that countries account for their emissions from this sector rather than simply use the sector as an opportunity to offset emissions from fossil fuel use in the energy and transport sectors.

All the four options in respect of LULUCF currently before parties need to address possible rule and definitional changes. Option 4 is seeking to move to a full carbon accounting model (AFOLU) for the sector. This approach if adopted represents a large and comprehensive set of rule changes. The definitional problems bedeviling the current accounting and reporting systems (and hence any revisions i.e. options 1 -3) would still negatively impact on climate and biodiversity outcomes even under a move to a full carbon accounting model.

The Wilderness Society is deeply concerned that the perverse outcomes associated with current LULUCF rules and definitions will inevitably contaminate REDD unless addressed. If the inherent problems, particularly in the current definition of forests, are not resolved the effectiveness of any REDD mechanism to help deliver deep cuts in global CO₂ emissions would be very significantly constrained.

The Wilderness Society along with other National and International ENGOs have identified a clear set of policy priorities for maximizing emissions reductions and the mitigation potential from the LULUCF sector and any future REDD mechanism. These priorities reflect mitigation potential embodied in the ‘forest transition curve’.

The Wilderness Society has articulated these priorities below. This hierarchy goes from the highest priority to the lowest and represents an approach that will also maximize biodiversity conservation.

- (i) The protection of carbon stocks in primary forest and other primary ecosystems (including peat lands) from logging, conversion to plantation or agriculture and other forms of degradation including deforestation.

- (ii) The recovery or restoration of natural forest and other natural ecosystems (including peat lands).
- (iii) The development of ecologically sustainable forest management systems in logged areas that are currently the subject of industrial logging practices.
- (iv) Afforestation and reforestation in areas of degraded land incapable of natural recovery.

In addition, when assessing rules and definitions for use in LULUCF under any option, and in any REDD mechanisms, a clear policy outcome has to be that the conversion of natural forests and other natural ecosystems to plantations is not an acceptable mitigation strategy. This is because the intrinsically emissive nature of the practice and the devastating impact on biodiversity undermines the environmental integrity of the convention.

2 THE ROLE OF RULES AND DEFINITIONS

The context for many of the current problems with definitions and rules and the perversity in terms of outcomes flows from the development of an exclusive list of land-use activities. The environmental integrity¹ of the Convention is further compromised for this sector because, for example activities identified under Article 3.3 of the KP are mandatory, ie have to be accounted for, but activities under Article 3.4 are voluntary.

In the longer term the problems and difficulties that parties are currently grappling with and the failure of the land-use sector to deliver real emissions reductions and realize its full mitigation potential will be resolved by moving towards a comprehensive land based accounting approach.

The Wilderness Society does not believe this is possible in the timeframes available in the current negotiation for the next commitment period. Parties need to identify a work program and a suitable set of references to the IPCC to ensure that this approach is available in the subsequent commitment period, i.e. post 2017.

In the interim there are a number of ways that significant perversities and unforeseen consequences in the definitions and rules could be resolved.

3 THE OFF-SETTING MECHANISMS

The purpose of articles 3.3, 3.4 and 3.7 is to allow parties in Annex 1 to offset their greenhouse gas emissions against removals from the LULUCF sector.

¹ FCCC/CP/2001/13/Add.2 p3 'Further emphasizing that environmental integrity is to be achieved through sound modalities, rules and guidelines for the mechanisms, sound and strong principles and rules governing land use, land-use change and forestry activities, and a strong compliance regime,'

For the first commitment period this has been used to provide some parties with an easy mechanism to set targets that can be met without dealing with emissions from the fossil fuel intensive sectors.

However in order to provide this mechanism, a set of contradictory and irrational rules tied to some perverse definitions have been written. Finally opaquely derived caps have been put in place to manage the scale of the offsets! The effect has been to also enable evasion of dealing with emissions from land use sectors.

The Wilderness Society urges parties to strongly advocate for deep cuts in all emissions. The capacity of the earth's remaining terrestrial natural and managed ecosystems to remove CO₂ is critically important. However, there already exists a deep deficit in this capacity created by historical and ongoing land degradation (including deforestation). Therefore removals from the atmosphere and avoided emissions from the sector should be used to set more ambitious targets above those required from other sectors.

Recommendations

(i) That parties work together to develop new and / or improved rules and definitions that can be used to genuinely minimize emissions from land use activities and maximize removals as per KP Article 2 (a) (ii).

(ii) Further and before targets are set, the potential scale of both emissions and removals generated needs to be transparently understood.

- Targets for overall emissions reduction must be set before applying a potential offset from removals
- Targets should be adjusted conservatively upwards based on the scale of potential offsets

(iii) The gross emission and / or removal from all activities within the sector should be reported, and then a net emission or removal derived for each activity for accounting purposes.

(iv) A comprehensively derived net emission / removal Ghg volume from the LULUCF sector should be incorporated into national accounts like any other sector.

(v) Provided that the deliberative process (rules and definitions followed by an understanding of the scale of potential offsets before targets are set) is followed, caps are an unnecessary hindrance to meeting the aspiration identified under KP Article 2 (a) (ii).

4 ELIGIBLE ACTIVITIES UNDER LULUCF.

For the next commitment period additional activities need to be identified and where necessary appropriate definitions developed and the existing serious problems with current definitions resolved (see below). Accounting and reporting for these activities must be mandatory. As a principle, (working towards a comprehensive land based

approach) all eligible activities should be mandatory. We do not have the expertise in cropland or grazing land management to make a recommendation in these two activities.

The emissions and removals from the activities should be measured using a stock change approach and then accounted for using comprehensive net – net accounting (see above).

Recommendations

(i) We submit that accounting and reporting for the following activities must be mandatory. We have identified:

- Deforestation (emissions);
- (NEW) Forest Degradation (emissions);
- Afforestation (removals);
- Reforestation (removals);
- (NEW) Organic soil (peatland) degradation (emissions);
- (NEW) Organic soil (peatland) restoration (removals);
- (NEW) Wetland degradation (emissions);
- (NEW) Wetland restoration (emissions and removals); and
- Forest Management (removals). All emissions currently reported for this activity would be subsumed into the new activity of forest degradation².

(ii) In the absence of a comprehensive land based accounting mechanism, harvested wood products should not become an eligible activity.

5 NATURAL DISTURBANCES (FACTORING OUT).

It is explicitly stated both in the Convention and the KP that the purpose of these instruments is to limit and reduce anthropogenic greenhouse gas emissions.

The impacts of natural disturbance, notably fire, drought and disease on accounts have been raised as a barrier to comprehensive and mandatory accounting. Parties have proposed a number of highly perverse solutions to address these issues.

Globally and over the long term these impacts together with the positive impacts (up to a point) of increased CO₂ levels on plant growth will tend to be balanced out by removals. However in the context of five year commitment periods there will be large fluctuations.

In part these problems have arisen because parties have adopted a very perverse definition of forests and a completely ambiguous definition of forest management which incorporates the notion of forest land. Some parties have used this to include large areas of un-managed land remote from management activities and still subject to large scale ecological processes. By moving to erect forest degradation as an activity under LULUCF and transferring forest management emissions to this activity some of

² Note it is proposed that plantations should be treated separately to natural forest and could be accounted for as a voluntary or mandatory activity under cropland management.

these problems will be resolved. Changes to the definition of forest (see below) may also help to confine the scale of the perceived problem.

It will be critical to recognize that anthropogenic activities associated with logging and related forestry operations including fire management can be the source of significant emissions. Further management responses, including salvage logging subsequent to large scale disturbances, exacerbate emissions. These have to be accounted for.

A possible solution would be to only factor out statistically extreme events. However without some capping mechanism (undesirable) or credit withholding mechanism this could still end up creating distortions in terms of emission reductions commitments.

Recommendation

(i) Factoring out of natural disturbance should only be undertaken if outstanding issues can be adequately dealt with, noting that a credit withholding mechanism might offer a way forward.

6 DEFINITIONS

There are a number of the current definitions which need to be revised and a number of new ones required. This is line with a move to more comprehensive land based accounting.

a) “Forests” and “Deforestation” (FCCC/KP/CMP/2005/8/Add.3 p5)

“Forest” is a minimum area of land of 0.05-1.0 hectares with tree crown cover (or equivalent stocking level) of more than 10-30 per cent with trees with the potential to reach a minimum height of 2-5 metres at maturity *in situ*. A forest may consist either of closed forest formations where trees of various storeys and undergrowth cover a high proportion of the ground or open forest. Young natural stands and all plantations which have yet to reach a crown density of 10-30 per cent or tree height of 2-5 metres are included under forest, as are areas normally forming part of the forest area which are temporarily unstocked as a result of human intervention such as harvesting or natural causes but which are expected to revert to forest;

“Deforestation” is the direct human-induced conversion of forested land to nonforested land;

The most perverse and problematic definition is that for “forest”. This in turn renders the definition of deforestation useless.

The Wilderness Society has produced a short paper, appended, addressing this issue and canvassing alternative approaches³. This identified that SBSTA has a clear mandate to explore alternative definitions. A very similar set of issues and potential approaches was identified by the parties to the CBD⁴.

³ Cadman S. 2008(a) http://unfccc.int/files/methods_science/redd/application/pdf/seancadman2_11nov08.pdf

⁴ AHTEG, 2008. The draft findings of The Ad Hoc Technical Working Group (AHTEG) on biodiversity and climate change convened in response to paragraph 12(b) of decision IX/16B of the Conference of the Parties to the Convention on Biological Diversity

In brief the main issues that have to be addressed regarding the definition of forests are:

- It does not separate plantations from natural forests
- It explicitly excludes areas ‘temporarily de-stocked’ from accounting without defining ‘temporary’
- It sets the bar for deforestation so low that in many biomes ecosystem collapse will have occurred long before the threshold is reached
- It cannot be used to address degradation issues.

The consequence of not dealing with this definition goes well beyond the capacity of LULUCF to deliver symmetrical and comprehensive accounting. If used to operationalize a REDD mechanism then some extraordinarily perverse outcomes are possible. The most obvious of these is the use of financial mechanisms intended to reduce emissions from deforestation to fund the conversion of natural forests to plantations.

Australia provides an instructive example of the perversity inherent in the inclusion of plantations in a definition of forests. In this case an aggressive forest conversion strategy was pursued in the state of Tasmania in the period from 1990 – 2008. There were very large, poorly reported and unaccounted for emissions associated with this activity. At the same time Australia benefited from a ‘reduction’ in emissions from deforestation. This may well have suited the Australian Government of the day but it didn’t help much in reducing emissions or protecting sinks!

Recommendation

(i) That parties erect a new and /or a modified definition of forest which separates plantation from natural forests and recognizes the continuum of land uses. Plantations would be recognized as a crop and could be dealt with under the activity ‘cropland management’.

b) Forest Management (FCCC/KP/CMP/2005/8/Add.3 p5)

(f) “Forest management” is a system of practices for stewardship and use of forest land aimed at fulfilling relevant ecological (including biological diversity), economic and social functions of the forest in a sustainable manner;

This is so broad and ambiguous that it is largely useless. It is based around forest land. This in turn causes problems because it has led some parties to include large areas remote from management activity.

We are giving further thought to an appropriate recommendation.

c) (NEW) Forest Degradation

(proposed) Forest degradation is the reduction of the carbon stock in a natural forest, compared with its natural carbon carrying capacity⁵, due to the impact of all human land-use activities

⁵ Carbon carrying capacity (CCC) is defined as the mass of carbon able to be stored in a forest ecosystem under prevailing environmental conditions and natural disturbance regimes, but excluding anthropogenic disturbance; See Gupta, R.K. & Rao, D.L.N. (1994) Potential of wastelands for sequestering carbon by reforestation. *Current Science*, **66**, 378–380.

Reducing emissions from deforestation AND forest degradation (REDD) requires the development of a definition of forest degradation. Experts at meeting organized under SBSTA in Bonn in 2008 identified that forest degradation involved a carbon stock change. This is critical as breaking forest degradation into a series of activities (or using existing activities) will entrench the current problems under LULUCF into a REDD mechanism, most notably asymmetrical accounting.

The Wilderness Society supports a carbon stock change approach, on which there is broad consensus amongst ENGOs. A definition (above) has been identified and elaborated in the attached paper⁶. This approach was first articulated in a recent ANU publication⁷.

Recommendation

That parties erect a new stock change based definition of forest degradation for use in reporting and accounting for emissions from forest in Annex 1 countries (LULUCF) and non Annex 1 countries (REDD).

(d) Other new definitions required

A number of parties have proposed broadening the number of land use activities to include peatlands (already partially captured under forests but not explicitly) and wetlands. The Wilderness Society strongly supports this, as degradation of both these ecosystems is highly emissive and is in a line with moving towards a comprehensive land based accounting approach. This would require definitions for:

- Wetlands
- Wetland degradation
- Wetland restoration
- Organic soils (Peat-land)
- Organic soils (Peat-land) degradation
- Organic soils (Peat-land) restoration.

The Wilderness Society notes that there is an internationally recognized definition for wetlands from which could flow definitions of wetland degradation and restoration.

Recommendation

(i) Parties should adopt the definition of “Wetlands” from the Ramsar Convention on Wetlands (Iran, 1971). We also propose the Parties adopt the following definitions of Wetland degradation and restoration:

(ii) “*Wetland degradation*”: any on-site or off-site activity that negatively impacts the wetland functioning as a carbon store or the ability to sequester carbon and green

⁶ Cadman S 2008(b) http://unfccc.int/files/methods_science/redd/application/pdf/seancadman2_11nov08.pdf

⁷ Mackey et al. (2008). Green Carbon: The role of natural forests in carbon storage. Part 1. A green carbon account of Australia’s south-eastern Eucalypt forests, and policy implications. Australian National University Press, Canberra; p36; http://epress.anu.edu.au/green_carbon_citation.html

house gases, such as conversion or reclamation to agriculture, agro-forestry or forestry that involve enhanced drainage or artificial inundation, removal of natural vegetation, mining, or other destruction of wetland areas.

(iii) “*Wetland restoration*”: any on-site or off-site activity that positively impacts the wetland functioning as a carbon store or the ability to sequester or capture carbon and greenhouse gases or any other functions and values of wetland areas.

(iv) Parties should elaborate definitions for Organic soils (peatland), Organic soils (peatland) degradation and Organic soils (peatland) restoration.



Defining Forests under the Kyoto Protocol: a way forward

Sean Cadman October 2008⁸

Background

Under the Marrakesh Accords the intrinsic problems with a structurally based definition were identified and parties were asked through SBSTA to come up with a Biome based definition, namely:

Decision 11/CP.7 Land use, land-use change and forestry

- “2 (b) investigate the possible application of biome-specific forest definitions for the second and subsequent commitment periods with a view to the Conference of the Parties at its tenth session recommending a decision for adoption on the use of such biome-specific forest definitions for future commitment periods to the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol at its first session;”

Though this decision has yet to be implemented it provides the formal basis for revision of the KP definition of forest.

One could therefore propose a solution that while not addressing the admirable and desirable aim to establish biome based definitions will at least prevent perverse outcomes associated with plantation development in the second commitment period under LULUCF rules. This revised definition would have the added advantage of forestalling similarly perverse outcomes becoming entrenched under future REDD mechanisms.

The current definition used for reporting and accounting purposes under the Kyoto Protocol (hereafter, KP) is structurally based comprising:

- A minimum area of land of 0.05 hectares with tree crown cover (or equivalent stocking level) of more than 10 per cent with trees with the potential to reach a minimum height of 2 metres at maturity *in situ*.
- It includes (i) young stands of natural regeneration; (ii) all plantations which have yet to reach a crown density of 10-30 per cent or tree height of 2-5 metres; (iii) areas normally forming part of the forest area which are temporarily unstocked as a result of human intervention such as harvesting or natural causes but which are expected to revert to forest.

⁸ Sean Cadman is the principal consultant with Cadman & Norwood Environmental Consultancy and works as a forest consultant to The Wilderness Society in Australia.

The KP definition makes no distinction between, among other things, planted crops of monoculture perennial woody plants and complex biodiverse natural forests.

The KP definition has already led to significantly perverse accounting and reporting outcomes. For example, where primary natural forests are cleared and converted to short rotation fuel and cellulose fibre crops, this land cover change is not classed as deforestation. Of course emissions increase whether or not they are accounted for; leading to increased atmospheric forcing that will take hundreds of years to reverse.

Further to existing concerns, proposals being put forward for ‘land-swapping’ by parties for the post 2012 commitment period would see even more perverse outcomes entrenched under the current definition. This is particularly ironic given that the main proponent of this proposal, New Zealand only allows logging in plantations.

Proposed Definitions and operational suggestions.

Under this proposal the existing structural definition would be retained and two sub categories erected (Natural Forests and Plantations). The term “natural forests” in this paper is synonymous with “native forest” as used in some countries.

It is proposed that Plantations, would be accounted for separately from Natural Forests and reported under AFOLU as an agricultural activity. This would avoid the current perverse outcomes because conversion from Natural Forest to Plantation would be treated like any other forest to agriculture conversion - as deforestation and / or forest degradation.

1 Natural Forest

1. A *natural forest* is a terrestrial ecosystem generated and maintained primarily through natural ecological and evolutionary processes.

Natural forests are an essential part of the global carbon cycle, and have played, and continue to play, a major role in modulating the strength of the greenhouse affect.

2 Plantations

2. A *plantation* is a crop of trees planted and regularly harvested by humans..

ISSUE 1 SEMI NATURAL FORESTS

Some ‘forests’ have been under intensive forest management for up to 7 rotations. This class of forest is often called ‘semi-natural’ where these forests are primarily used for wood production and are maintained by hand planting, fertilizer application and the use of herbicides. Parties could nominate them as plantations for accounting and reporting purposes.

ISSUE 2 NATURAL REGROWTH ON PREVIOUSLY CLEARED LAND

In some regions forests can regenerate on previously cleared land from adjacent un-cleared areas, ground stored and / or wind-blown seed. If these are allowed to grow without significant management interventions they should be regarded as natural forests regardless of tenure.

ISSUE 3 SILVICULTURAL REGENERATION

These are forests which have been subjected to one or two intense logging cycles but allowed to regenerate with minimal intervention using natural seed fall and /or aerial seeding. This would be classed as natural forest as in the absence of further cutting they are capable of meeting the definition of natural forests.

ISSUE 4 FOREST RESTORATION PLANTINGS

In many regions trees are being planted in complex multi- species plantings or have been established as complex agro-forests with high structural and species diversity, in some cases the core species are native to the region. These systems may combine planted vegetation, providing both useful products and environmental services, with naturally occurring succession, stewarded by landowners over the long term. The sequestration of carbon is an additional service in those systems that include mature trees. In these circumstances, if the plantings are designated as permanent they could be nominated as natural forests for reporting and accounting purposes.

ADDITIONAL GUIDANCE

Recent Work by FAO⁹ (see below) although somewhat Eurocentric aligns quite closely to the categories identified above and could also form the basis for assignation to the simple 2 class categorization for the purposes of the UNFCCC proposed in this paper.

⁹ FAO 2007 GLOBAL FOREST RESOURCES ASSESSMENT 2010 SPECIFICATION OF NATIONAL REPORTING TABLES FOR FRA 2010 Forest Resources Assessment Programme Working paper 135 Rome 2007

After FAO 2007 (From T4.2) Characteristics categories and definitions²

Category Definition

Primary forest, Naturally regenerated forest of native species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed.

Explanatory note

1. Some key characteristics of primary forests are:

- they show natural forest dynamics, such as natural tree species composition, occurrence of dead wood, natural age structure and natural regeneration processes;
- the area is large enough to maintain its natural characteristics;
- there has been no known significant human intervention or the last significant human intervention was long enough ago to have allowed the natural species composition and processes to have become re-established.

Other naturally regenerated Forest Naturally regenerated forest where there are clearly visible indications of human activities.

Explanatory notes

1. Includes selectively logged-over areas, areas regenerating following agricultural land use, areas recovering from human-induced fires, etc.
2. Includes forests where it is not possible to distinguish whether planted or naturally regenerated.
3. Includes forests with a mix of naturally regenerated trees and planted/seeded trees, and where the naturally regenerated trees are expected to constitute more than 50% of the growing stock at stand maturity.

Other naturally regenerated forest of introduced species (*sub-category*) Other naturally regenerated forest where the trees are predominantly of introduced species.

Explanatory note

1. In this context, predominantly means that the trees of introduced species are expected to constitute more than 50% of the growing stock at maturity.

Planted forest. Forest predominantly composed of trees established through planting and/or deliberate seeding.

Explanatory notes

1. In this context, predominantly means that the planted/seeded trees are expected to constitute more than 50% of the growing stock at maturity.
2. Includes coppice from trees that were originally planted or seeded.
3. Excludes self-sown trees of introduced species.

Planted forest of introduced species (*sub-category*) Planted forest, where the planted/seeded trees are predominantly of introduced species.

Explanatory note

1. In this context, predominantly means that the planted/seeded trees of introduced species are expected to constitute more than 50% of the growing stock at maturity.

Defining Forest Degradation for an Effective Mechanism to Reduce Emissions from Deforestation and Forest Degradation (REDD)

Sean Cadman October 2008¹⁰

Background

At the request of the Bali COP, SBSTA convened a Workshop on Methodological Issues relating to Reducing Emissions from Deforestation and Forest Degradation in Developing Countries in Tokyo in June 2008. At the workshop, the Climate Action Network (CAN) presented a set of principles to aid Parties in their deliberations on an effective REDD mechanism. CAN's Principles include a definition of forest degradation in terms of the impact human land use activities have in degrading carbon stocks.

At Tokyo, Parties agreed that an expert workshop on forest degradation was needed. The workshop on forest degradation will take place in Bonn on 20-21 October. CAN has been invited by the Secretariat to nominate one expert participant.

In this document a rationale is set out for a scientifically based carbon stocks and flows approach to defining forest degradation. Terms are defined and related to other proposed definitions. Finally, methodological approaches and mechanisms aimed at reducing emissions from forest degradation and deforestation consistent with the proposed definitions are set out.

Defining forest degradation

CAN base their proposed definition of Forest Degradation following Mackey et al.¹¹ :

“Despite the progress we are now seeing in the development of international policy responses to the problem of deforestation, there remains a lack of clarity about the kinds of human activities that contribute to forest degradation. From a climate change perspective, **forest degradation needs to be defined to include the impact of all human land-use activity that reduces the current carbon stock in a natural forest compared with its natural carbon carrying capacity.** The impact of commercial logging on natural forests must therefore also be considered when accounting for forest degradation. As discussed earlier, commercially logged forests have substantially lower carbon stocks and reduced biodiversity than intact natural forests, and studies have shown carbon stocks to be 40 to 60 per cent lower depending on the intensity of logging (Brown et al. 1997; Dean et al. 2003; Roxburgh et al. 2006). In Brazilian Amazon, the area of natural forest that is logged commercially resulting in degraded carbon stocks is equivalent to that subject to deforestation and represents approximately 0.1 Gt of green carbon emissions to the atmosphere (Asner et al. 2005)” (emphasis added).

¹⁰ Sean Cadman is the principal consultant with Cadman & Norwood Environmental Consultancy, works as a forest consultant to The Wilderness Society in Australia and is the expert nominated by CAN for the Bonn workshop.

¹¹ Mackey et al. (2008). Green Carbon: The role of natural forests in carbon storage. Part 1. A green carbon account of Australia's south-eastern Eucalypt forests, and policy implications. Australian National University Press, Canberra; p36; http://epress.anu.edu.au/green_carbon_citation.html

The language contained in the text above provides the rationale for the following definition of forest degradation:

“Forest degradation is the reduction of the carbon stock in a natural forest, compared with its natural carbon carrying capacity¹², due to the impact of all human land-use activities.^{13,14}”

Importance of a Comprehensive Definition

This work and its proposed definition identify a very significant consideration, that of carbon carrying capacity. Intensive land use activities in natural forests degrade carbon stocks and maintain them well below carbon carrying capacity. Thus, carbon carrying capacity of a natural forest provides a baseline for assessments against which changes in carbon stocks (emissions from “degradation”) can be measured. Using this baseline means that degradation can be readily determined and quantified. If the degradation activities persist, and the degradation of carbon stocks continues, the loss of carbon can be accounted for. The degradation may be reversible. However, if degradation is permanent and irreversible, as in the case of deforestation, then the permanent loss can be determined. The significance of this is summarized below:

“Given the extensive impact of human land-use activities, particularly land clearing and all forms of commercial logging, carbon carrying capacity has to be estimated carefully in many landscapes from the best available data. If the carbon carrying capacity is not considered explicitly, the current carbon stock will be taken as representing the baseline against which future changes are gauged. Assuming there is a history of intensive land use, the result will be an underestimate of the green carbon account. The landscape’s potential for carbon storage will have been undervalued.” Mackey et al 2008 (*loc. cit.* p. 33-34)¹

Failure to fully account for emissions due to forest degradation so defined, leads to a false sense of neutrality of climate impacts due to forest management practices. The sustainability of these practices is already widely questioned. Reduced impact logging produces better environmental outcomes, and real financial benefits can be shown to accrue to the practice. Even in these circumstances, financial benefits cannot necessarily be successfully translated into a sufficient incentive to secure a long term change in practices without subsidies¹⁵. Failure to account for the full economic benefits of climate mitigation arising from reducing emissions from forest degradation also creates a perverse bias favoring the financial value of extractive forest practices and the conversion of natural forests to plantations.

¹² Carbon carrying capacity (CCC) is defined as the mass of carbon able to be stored in a forest ecosystem under prevailing environmental conditions and natural disturbance regimes, but excluding anthropogenic disturbance; See Gupta, R.K. & Rao, D.L.N. (1994) Potential of wastelands for sequestering carbon by reforestation. *Current Science*, **66**, 378–380.

¹³ The definition of forest degradation provided by CAN’s REDD Principle 8.2 has been further elaborated here in order to provide effective guidance for activities that are genuinely capable of achieving emissions reductions.

¹⁴ Forest degradation is thus defined without reference to arbitrary definitions of forest or deforestation based on forest cover.

¹⁵ Holmes, T. P., et al. (2002). [Financial and ecological indicators of reduced impact logging performance in the eastern Amazon](#). *Forest Ecology and Management* **163**:93-110.

¹⁶ Curran, L. M., et al. (2004). Lowland Forest Loss in Protected Areas of Indonesian Borneo. *Science* **303**: 1000

Understanding the potential amount of carbon in an ecosystem and the difference between the economic value of its full protection and restoration compared to status quo management, is critical to ensuring that parties participating in REDD schemes adopt well-informed policies.

Logging and associated road building in tropical forests is, in many instances, the precursor to accelerated degradation due to additional intensive human land use activities, culminating in deforestation^{16, 17, 18}. Krug 2008¹⁹ illustrates this quantitatively. She demonstrates that 30% of the areas studied progressed to full deforestation within the study period, another 40% had an ambiguous outcome, while only 30% recovered after logging was abandoned in its early stages.

The implications are clear: degradation entails a reduction in carbon stock, compared to the carbon carrying capacity of the forest. In some circumstances the reduction in carbon stocks can be long term or permanent, implying that management has modified the forest ecosystem to an extent that exceeds the thresholds of its natural resilience. Thus, carbon stocks are unlikely to fully recover, the composition and structure of the forest ecosystem is permanently modified, and in more extreme (though still common) cases a natural forest is not maintained. This is why it is useful to see that degradation is often the beginning of a process on a continuum which begins with a forest undisturbed by human activity and ends with even less forest cover than an arbitrary deforestation threshold. Consequently, successful REDD requires early intervention to replace conventional logging practices and forest conversion with a combination of forest conservation (protection), traditional forest subsistence practices (which can help to permanently suppress additional intensive forest land use activities), and a dramatic reduction in the extent and intensity of logging. Accounting protocols to ensure that this can happen will need to be developed.

The optimal outcome for reducing the concentration of greenhouse gases in the atmosphere has two components. First, is to maintain forests that are currently at carbon carrying capacity in that condition. Second, is to restore the carbon carrying capacity of forests that have been degraded to the point of being incapable of natural regeneration.

¹⁷ Foley et al. (2007). Amazonia revealed: forest degradation and loss of ecosystem goods and services in the Amazon Basin. *Frontiers in Ecology and the Environment* **5(1)**: 25–32.

¹⁸ Bikié, H., et al. (2000). An Overview of Logging in Cameroon. World Resources Institute, Washington DC.

¹⁹ Krug, T. (2008). Detection of Selective Logging for Estimating and Monitoring Forest Degradation: methodologies and experiences in Brazil. Paper presented to the UNFCCC Workshop on Methodological Issues relating to Reducing Emissions from Deforestation and Forest Degradation in Developing Countries. Tokyo, Japan, 25-27 June, 2008.

Activity-based approaches to reducing emissions from degradation

Forest degradation due to logging and other intensive activities is the source of significant carbon emissions.

Assertions have often been made that, for example sustainable forest management does not harm or may enhance forest carbon. A claim made that any given activity does not degrade forest carbon and or the carbon carrying capacity of a forest needs to be capable of being empirically validated.

There are human activities in natural forests that may cause minimal forest degradation as defined here, i.e. in terms of reducing current carbon stocks below their carbon carrying capacity. It is logical to treat low thresholds of degradation that cannot be detected (e.g. some human forest subsistence practices), as effectively zero. Importantly, the communities in which these practices are common can play a significant role in ensuring that intensive land-uses and related degradation does not occur; particularly if the real value of the carbon stock is established and they are beneficiaries of its protection.

Successfully monitoring forest degradation

It is difficult to monitor and account for the carbon stock of a partially degraded natural forest and to predict its future dynamics under a particular harvesting or extractive regime. However, reference sites in undisturbed areas can be used to establish forest carbon carrying capacity for previously disturbed forests.

Consequently, it is very important to establish at the earliest opportunity a list of forest degrading activities whose emissions have been quantitatively established, rather than to rely on unsubstantiated claims that certain activities have negligible, temporary and naturally reversible impacts on carbon stocks and the carbon carrying capacity of the forests. The use of both field plots and remote sensing data will be critical in establishing these data at appropriate scales for all relevant forested landscapes.

The use of appropriate scales of assessment is important because very few landscapes are naturally homogenous. The Canadian boreal is a good example. When determining carbon carrying capacity at the whole of landscape scale then CCC will reflect the fact that these ecosystems naturally contain a matrix of ecosystem types and age classes as the result of natural disturbance regimes and different substrates, amongst other factors that cause landscape heterogeneity in carbon stocks. However if the land use activity, for example logging, is targeting predominantly old-growth - the most carbon dense element of the forested landscape - then the activity will have a disproportionate impact on the carbon carrying capacity of the landscape as whole.

Research work should focus on differentiating the vegetation ecosystem elements in the landscape. Vegetation maps not only provide an important tool for forest carbon assessments but are also invaluable in helping set priorities for biodiversity

conservation²⁰. Field plots used to validate or create vegetation maps should be established as full ecological plots in largely undisturbed areas so that they can be used to establish carbon carrying capacity. When monitored over time these plots can provide information about how carbon carrying capacity is being affected by climate change in otherwise undisturbed sites.

Research to establish the natural carbon carrying capacity of forested landscapes, described by Mackey et al^{1,21} as the “green carbon baseline” can be carried out now so that when large financial resources are mobilized for REDD then activities can be appropriately incentivized to reflect their relative benefit in emissions reduction. This work while vital should not prevent early action by parties provided a precautionary approach is taken with the emphasis on protection of forests.

How Does the Definition Relate to Others?

A review of existing definitions of forest degradation was carried out in 2007 by FAO²² for the UNFCCC.

The FAO identified a set of criteria that should be applied to definitions for use in UNFCCC negotiations and processes:

- they should be unambiguous and serve the purpose, i.e. assessment of carbon stock changes and greenhouse gas emissions and removals resulting from an activity;
- definitional parameters should be measurable during assessments;
- definitions should permit synergies and cost effective assessment and reporting, e.g. by being compatible with, or building on, related assessment and reporting processes.” (*op. cit.* p. 1)

The focus of REDD is emission reductions from forest degradation and forest deforestation. Forest degradation is a continuum with deforestation being the fairly arbitrary end point in that continuum. The last two decades have seen a large increase in the conversion of natural forests to industrial fuel/food and fiber plantations. Forest conversion produces very large emissions of CO₂ even though the woody crop that replaces the natural forests meets the definition of forest under the current canopy structure and height based definition and therefore is not regarded as deforestation. This serves to highlight the need to define forest degradation in terms of carbon, not

²⁰ Decision on Biodiversity and Climate Change UNEP/CBD/COP/9/L.36, Decision on Biodiversity and Climate Change UNEP/CBD/COP/9/L.36 Annex III

²¹ See also Roxburgh, S.H., Wood, S.W., Mackey, B.G., Woldendorp, G. & Gibbons, P. (2006) Assessing the carbon sequestration potential of managed forests: A case study from temperate Australia. *Journal of Applied Ecology* 43:1149-1159.

²²Schoene, D., W. Killmann, H. von Lüpke, M. LoycheWilkie. (2007). Definitional issues related to reducing emissions from deforestation in developing countries. *Forests and Climate Change Working Paper 5*. Food and Agriculture Organization of the United Nations. Rome.

forest structure. In this context conversion to plantations not only produces high emissions but ensures that stocks of carbon remain well below the carbon carrying capacity of the forests that have been replaced.

In addition, definitions that focus solely on canopy extent grossly misrepresent the carbon dynamics of the greatest sources of emissions from deforestation and forest degradation: tropical forested peat lands. The majority of emissions from peat soils are responses to disturbance of their hydrological regime, independent of their forest cover.

The definition proposed in this paper focuses on the mitigation issue facing Parties to the UNFCCC, which is the response of carbon stocks in forests to direct human induced disturbance. Introducing carbon carrying capacity as the baseline allows a consistent relative assessment of the impact of all such activities, including logging and the conversion of natural forests to plantations

The proposed definition of forest degradation is closely aligned with two definitions proposed by the Intergovernmental Panel on Climate Change (IPCC)²³:

“direct human-induced activity that leads to a long-term reduction in forest carbon stocks” (IPCC, 2003:14); and,

“the overuse or poor management of forests that leads to long-term reduced biomass density (carbon stocks) (IPCC, 2003:15).

The proposed definition is focused on the role of humans and on reductions in carbon stocks. The definition of degradation should not include a ‘long-term’ time frame because at this point the natural functionality of the forest may well have collapsed. The two definitions above do not have a baseline against which to measure (long-term) reductions. We argue that the carbon carrying capacity of the undisturbed forest is a logical baseline and entirely consistent with the Framework Convention’s ultimate mitigation goal - allowing ecosystems to adapt naturally. Most importantly the proposed definition is capable of being implemented.

²³ IPCC, 2003. Definitions and methodological options to inventory emissions from direct human-induced degradation of forests and de-vegetation of other vegetation types. Institute for Global Environmental Strategies, Japan.