Advancing the Development of Forestry and Land-Use Based Project Baseline Methodologies for the Developing CDM Regime

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Over the last decade, a significant number of climate change mitigation projects in a range of land-use change and forestry (LUCF) sectors have been pursued under the aegis of the Activities Implemented Jointly pilot phase or through other mechanisms. As development under the Kyoto Protocol proceeds, it is still unclear what the role of LUCF projects will be in achieving the objectives of the Protocol. To the extent that LUCF projects can be pursued, particularly through the Protocol's flexibility mechanisms, there is a fear among important interest groups to the policymaking process that forestry projects will overwhelm the nascent climate change mitigation marketplace. At worst, this outcome is seen as having the potential to undercut the environmental impact of the Kyoto Protocol; at best, it is viewed as undercutting the Protocol's technology transfer and other objectives.

One proposed approach to solving this potential problem is to simply eliminate the opportunity of LUCF projects to participate under the Protocol's flexibility mechanisms, including Joint Implementation under Article 6 and the Clean Development Mechanism under Article 12. An alternative approach would be to set project-level standards by which interest groups with concerns about the forestry sector can be assured that only "legitimate" projects are being granted mitigation status under the Protocol. The project-level additionality criterion stated in the Protocol is one of the standards being looked to for this purpose.

Although sometimes defined in different ways, additionality was required under the "activities implemented jointly" (AIJ) pilot phase and is required under Articles 6 and 12 of the Kyoto

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Protocol. Additionality is particularly important in the context of projects pursued under the Clean Development Mechanism (CDM) because the certified emissions reductions generated through the CDM will be used to help meet emissions reduction targets of Annex B Parties. If project activities are not additional, then global emissions will likely be higher than they would have been without the CDM project. Additionality is less of a policy concern for mitigation projects occurring within Annex B countries, assuming that those countries ultimately comply with their obligations under the Protocol, because additionality largely disappears as a concern in a capped emissions system. It does remain a practical issue for Annex B countries, however, since credits issued to non-additional JI or other projects will raise the future compliance hurdle for those countries.

Project-by-project additionality determinations through the creation of a variety of baseline cases have proven a particularly difficult concept to operationalize in the AIJ pilot phase. This is because of the unavoidable subjectiveness of estimating what would have happened "but for" any specific project, often referred to as the "baseline" or the "reference case." It is against this reference case that a project's greenhouse gas (GHG) benefits must be calculated. As many observers have pointed out, the difficulty of project-specific "additionality proofs" is compounded by the fact that parties to a CDM or other transaction may have an incentive to overstate a project's additionality and emission reduction benefits.

The Treatment of LUCF Mitigation Obligations and Options Under the FCCC and the Kyoto Protocol

Numerous studies, including those of the Intergovernmental Panel on Climate Change, have concluded that forestry-based and other biotic climate change mitigation measures have an important role to play in national and international climate change mitigation efforts. Estimates of the cost-effective global potential of forestry offsets often exceed one billion tons of carbon per year.

Reducing land use-related sources and enhancing land-use and forestry-related sinks are important

UNFCCC Article 4(2)(a): Parties shall adopt national policies and take corresponding measures on the mitigation of climate change by . . . protecting and enhancing its greenhouse gas sinks and reservoirs.

Kyoto Protocol, Article 2.1(a)(ii): Annex I Parties shall implement policies relating to protection and enhancement of sinks and reservoirs, and promotion of sustainable forest management practices, afforestation, and reforestation.

Kyoto Protocol, Article 3.3: Industrialized Parties shall net out forestry sources and sinks in calculating their emissions.

Kyoto Protocol, Article 6.1: Any Annex I Party may transfer or acquire emission reduction units from projects aimed at reducing anthropogenic emissions by sources or enhancing anthropogenic removals by sinks.

Kyoto Protocol, Article 12.3(b): Annex I Parties may use the certified emission reductions accruing from project activities to contribute to compliance with part of their quantified emissions reduction commitments.

components of the U.N. Framework Convention on Climate Change and of the Kyoto Protocol. The Kyoto Protocol mandates industrialized countries to account for forestry-related sources and sinks in demonstrating Protocol compliance.

Often overlooked in the debate over forestry under the CDM is the tremendous role that forestry-sector projects, appropriately designed and implemented, can play in biodiversity conservation, sustainable development activities, watershed protection, food production, and other areas that are high societal priorities.

There Are Many Different Kinds of LUCF and Forestry Projects, Each Presenting a Very Different Profile from the Perspective of the Technical Issues At Issue, Including Baseline Development.

In the political environment that surrounds today's carbon offset and joint implementation debates, biotic mitigation measures are often addressed as a monolithic block. What quickly becomes clear in any serious discussion of LUCF projects, however, is the variety of biotic mitigation technologies, and the diversity of their ability to compete in the developing mitigation marketplace. In considering forestry technical issues, it is important to recognize that the LUCF sector is made up of many sub-sectors, and it makes not sense to talk about LUCF potentials or issues in a generic way. These subsectors include:

- Forest conservation (potentially including park reserve establishment/expansion; agroforestry; commercial plantations; and forest management)
- Reforestation (potentially including forest restoration, afforestation, long-term rotations, and short-term rotations)
- Bioenergy (substituting for fossil fuels, or mined firewood)
- Forest management including (sustainable forest management and plantations)
- Harvesting Method (including reduced impact logging)
- Conservation tillage practices

Each of these LUCF technologies has very different technical and policy characteristics.

Relatively Little Technical Thought Has Gone into How to Address LUCF Technical Mitigation Issues; Even less than in the Energy Sector

Notwithstanding the cost-effectiveness and multiple benefits of forestry and other biotic offsets, their future as an accepted mitigation option remain uncertain. Individuals and organizations concerned about relying on forestry and land-use change projects for climate change mitigation have raised various policy and technical concerns:

- Can forestry and land use change projects be reliably quantified, monitored, and verified?

- Will pursuit of forestry and land-use change mitigation efforts impede basic economic development or result in negative environmental impacts in developing countries?

- Will pursuit of forestry and land-use change mitigation efforts impede progress on achieving actual emissions reductions and technology transfer objectives in the energy sector?

- Will land use-based mitigation measures be lost prematurely, leading to reversal of their mitigation benefits?

Dealing with these questions is often an exercise in speculation, primarily because there are still no commonly accepted standards for evaluating GHG offset projects, and existing offset projects vary widely in quality. Hence, most observers evaluate climate change mitigation projects through their ability to address several key questions:

- Are they supplemental to what would have happened but for the project?

- Are the project's benefits reliable and long-term?

- Can the project's benefits be accurately quantified, monitored, and verified?

- Do the projects provide significant co-benefits?

These questions apply to all categories of project-based mitigation measures, forestry-based and otherwise. What differs in some cases is how forestry and land-use projects are perceived to perform against some of these criteria. Thus, as projects have developed through the AIJ pilot phase, numerous studies have been conducted to measure and analyze important aspects of offset methodology. The most important issues identified in these studies are almost certainly to become important CDM methodological issues. Key issues are additionality, baselines, leakage, and monitoring and verification. LUCF projects are often singled out for particular attention in these areas, even if their being singled out is undeserved.

Technically and politically credible answers to these issues are clearly needed if forestry is to play a significant role in future climate change mitigation efforts. If this work is not accomplished, the result could be major societal losses in foregone cost-effective climate change mitigation opportunities, as well as foregone opportunities to simultaneously advance other important social objectives.

Additionality and Baselines for LUCF Projects

Although sometimes defined in different ways, additionality was required under the "activities implemented jointly" (AIJ) pilot phase and is required under Articles 6 and 12 of the Kyoto Protocol. Additionality is particularly important in the context of projects pursued under the Clean Development Mechanism (CDM) because the certified emissions reductions generated through the CDM will be used to help meet emissions reduction targets of Annex B Parties. If project activities are not additional, then global emissions will likely be higher than they would have been without the CDM project. Additionality is less of a policy concern for mitigation projects occurring within Annex B countries, assuming that those countries ultimately comply with their obligations under the Protocol, because additionality largely disappears as a concern in a capped emissions system.

Because determining what is additional is a significant challenge for both the forestry and energy sectors, an important first step involves addressing the concept of additionality as it is commonly discussed: 1) *Environmental additionality*, which refers to whether some or all of the CO_2 benefits would have occurred in the absence of the project; and 2) *Financial additionality*, which refers in some sense to whether the project would have happened anyway, and to whether the project's development and financing is truly motivated by CO_2 mitigation concerns. The principal motivation behind these additionality components is to avoid crediting investments that will not reduce the amount of carbon dioxide in the atmosphere under business-as-usual circumstances.

For some of the LUCF sectors mentioned above both financial and environmental additionality are clearly an issue, for others, however, the case is much less clear. Commercial plantations and forest management, for instance, can generate strong financial additionality concerns. Like the majority of energy-sector projects, these projects usually have an economic rationale motivating investment, therefore justifying the CO_2 benefit beyond standard business-as-usual circumstances can become important to meeting the additionality requirement. In contrast, forestry conservation projects, for example, generally have no economic rationale, and are far more rarely challenged on additionality grounds that energy-sector or commercially-oriented LUCF projects. The question then becomes one of environmental additionality, e.g. whether the land involved was truly threatened with destruction, and whether the proposed project would change that outcome.

The most widely accepted approach to demonstrating CO_2 additionality is by developing baseline emissions estimates, and comparing them to a "with project" case or cases. Baseline case and "with project" case establishment is widely recognized as being among the most difficult issues in creating an accepted carbon offset.

How are Baselines and "With Project" Cases Determined?

In estimating total carbon benefits of an offset project, a baseline of emissions or sequestration-related activity must be established against which to measure change. A project cannot claim emissions reductions unless a case is made that demonstrates that the proposed project practices

are “additional” to baseline circumstances. “The baseline is broadly defined as the collective set of economic, financial, regulatory and political circumstances within which a particular project operates.”(Costa, P.M., *et al., SGS Forestry: Carbon Offset Verification Services - Introduction*, SGS Forestry, Oxford, England (1997)). With forestry, the baseline is the level of carbon storage that would have existed in the absence of the offset.

Establishing the baseline scenario requires concrete knowledge of future trends including economic, sociological, and political practices. SGS Forestry has recently outlined a basic process by which it asserts this can be done: "[t]he project baseline should ultimately combine the evidence of the historical baseline together with potential future constraints, as appropriate to the situation" (Costa, *et al.,* 1997). SGS argues that project sponsors should identify potential future developments (political or economic) that might dramatically impact the project baselines and should define guidelines for adjusting the project baseline if or when the dramatic event occurs (Costa, *et al.,* 1997).

Baseline establishment for forestry projects is susceptible to being divided into two pieces:

* *First, the biophysical baseline projecting the vegetative "but for" case on the land-base in question.* It can be argued that the science exists to easily measure this aspect of the baseline on a project level.

* *Second, what has been defined as the socioeconomic baseline.* This baseline is more difficult to measure. First, it is difficult to identify human behavior in alternative policy or economic scenarios and the effects of those behaviors on the forestry project in question (Fearnside, 1997). Second it is difficult to identify the appropriate economic boundaries within which baseline assessments should be made. An overly narrow boundary could lead to severe leakage effects. Too broad a boundary might make it impossible to define and implement any offset project, including energy-sector projects. As the IEA has stated, "[s]ystem boundaries have to be drawn in a way which limit the relevance of effects outside of that system on the outcome of the assessment to a tolerable minimum” (International Energy Agency, 1997).

The History of Baseline Development in Forestry Projects

As it stands now, the Kyoto Protocol’s additionality standard appears stricter than that which was established for the AIJ pilot phase, which was interpreted by many observers to mean that the reclassification of overseas development assistance funding as joint implementation should be avoided. General approaches being suggested for additionality are displayed in Table 1. The Table is not limited to forestry projects.

Table 1
Summary of Methods for Evaluating Additionality

Method	Example
Quantitative Methods	
Establish a reference project	Projects already planned/approved; projects that satisfy return on investment criteria (Heister, 1996**)**
Develop sector-specific baselines	Host country would need to establish baseline emissions for sectors supporting JI projects before project approval (Carter, 1997; Wirl et al., 1996)
Qualitative Methods	
Establish guidelines	USIJI Program Criteria (USIJI, 1994); AIJ Japan Program (Environment Agency of Japan, 1997)
Demonstrate implementation barriers	Projects qualify if parties can show that a technological, financial, or institutional barrier is overcome (Martinot, 1997; Carter, 1997; IEA, 1997)
Narrow project categories that automatically qualify	Some projects such as wind and solar generation are generally unlikely and, therefore, most likely additional (Carter, 1997)

As already noted, financial additionality has not been a significant consideration in the evaluation of forest protection projects. Therefore few examples of such additionality "proofs" exist.

Several of the baseline definition approaches used in forest protection projects are provided below:

- *The Ecoland project in Costa Rica*. Baseline Case: It was argued that private inholdings within the Piedras Blancas National Park were under imminent threat of loss if not somehow protected. Logging permits were already being issued for some of the parcels, and agriculture already had a foothold within the Park. Landowners, who had been waiting for government buyouts for several years, were threatening to accelerate the pace of land use change if such buyouts were not accomplished. It was assumed for the Baseline Case that lands would be cleared over a 15 year period without a project intervention. "With Project" Case: Carbon offset funding was made available to purchase a portion of the private inholdings, which would then be turned over to the National Park service.

- *The Face Foundation project in Uganda*. Baseline Case: Although there is no private land within the Park, there are clear warnings that the park will be threatened by human-induced changes to the land and water ecosystems by the expansion of the neighboring communities. Most significant threats arise from traditional income generating activities rely on forest products (small-scale plantations, grazing livestock, and timber harvesting) and difficulties associated with rising populations in the region and potentially questionable land tenure patterns. "With Project" Case: The Ugandan government has not shown the capability to reforest and restore these national parks. The funding for this project is additional.

- *The Rio Bravo project in Belize*. Baseline Case: Multiple baselines were employed for different parts of the Rio Bravo project. In the case of Parcel A, it was argued that the land would be essentially clearcut for new agricultural development in the absence of project intervention. This would lead to the loss of existing biomass, and to foregone growth in standing biomass on the same parcel. In the case of Parcel B, it was argued that a status quo situation would have prevailed in the case of carbon levels. "With Project" Case: In the case of Parcel A, carbon offset funding was made available to purchase the parcel for the Programme for Belize, preventing its conversion to agriculture. In the case of Parcel B, carbon offset funding was made available to develop a sustainable forestry management program designed to increase the total pool of sequestered carbon.

- *Reduced Impact Logging in Malaysia*. Baseline Case: The forestry industry in Indonesia controls over 320 million ha of production forest. Current logging practices in Kiani Lestari involve felling trees in random directions, due in part to the trees being literally tied together by vines, and extraction by bulldozers, which results in damage to both the residual stand and the soil. Studies in neighboring Malaysia indicate that these conventional logging practices break and uproot as many as 50% of the remaining trees and disturb soils on up to 40% of the land area. The Malaysian studies found that harvesting as few as 10 to 15 trees per ha released as much as 300 - 350 t CO_2. In the absence of the project, uncontrolled and destructive logging practices are expected to continue in Kiani Lestari. "With Project" Case: Data developed in Malaysia show that there will be reduced carbon dioxide emissions and enhanced sequestration in RIL-harvested areas for decades. In addition to carbon benefits, there are social and economic benefits that would not be generated without the project. It is relatively certain, that RIL would not have occurred if not for the offset funding, but RIL's place in future regulatory regimes is far from certain.

- *The Noel Kempff Mercado project in Bolivia*. Baseline Case: Although there is no private land within the Park, there are clear warnings that the park will be threatened by human-induced changes to the land and water ecosystems by the expansion of the neighboring communities. Most significantly, recent colonization at the park's borders has

resulted in continued illegal extraction of mahogany and cedar, as well as hunting and trading of endangered species, in addition to agricultural and cattle ranching expansion on park lands. All of these activities have been made easier by the lack of Park authorities or infrastructure necessary to enforce protection along with increased road building and international demand for live animals and their products. The inaccessibility of sustainable livelihoods and increasing demands brought about by new communities in the area represent an imminent threat to this biological diverse area. "With Project" Case: Under the three tiered scope of the project, carbon offset funding was made available to avert imminent land-use changes through the buy out of concessionaires and the establishment of income-generating activities for local populations.

One conclusion of this brief review is that, as with energy sector projects, baseline approaches are basically customized to the circumstances of each project.

Thinking About Alternatives to Project-by-project Baseline Assessments for the LUCF Sector

One way to think about the importance of LUCF additionality is in the context of determining the relative magnitude of the two errors associated with additionality policy: 1) the emissions resulting from overly strict additionality policies that effectively prevent the crediting of legitimate and additional LUCF projects; and 2) the credits that might be inappropriately issued based on overly lax additionality criteria. It is possible, for example, to predict a scenario for tropical forest cover over the next several decades under a business as usual scenario. Food and Agriculture Organization (FAO) statistics on forest cover suggest that nearly 50% of global forest cover is threatened. If this the case, the emissions associated with a failure to credit legitimate forest conservation projects is very large. The credits that might be inappropriately issues through a failure to apply additionality criteria, however, is of roughly the same magnitude. Clearly, some approach to addressing additionality at the project level is important to minimize both errors.

As already noted, project-by-project additionality has proven a particularly difficult concept to operationalize in the AIJ pilot phase. This is because of the unavoidable subjectiveness of estimating what would have happened "but for" any specific project. The current project-by-project approach to baseline determination and additionality assessment for LUCF projects will almost certainly prove as unacceptable for forestry-sector mitigation efforts over the longer term as it is already proving for energy-sector mitigation efforts. This makes credible investigation of the application of alternative additionality screens a high priority.

Although there are many facets to the additionality issue, two primary approaches to the issue can be broken out:

Conducting project-by-project additionality determinations. As mentioned above, this approach has prevailed to date; it involves the construction of "best guess" reference cases at the project level. The difficulty with this approach is that "best guesses" can legitimately vary widely, allowing analysts to come to completely different conclusions with respect to both financial and emissions additionality of a project. It also creates an incentive for project developers to creatively overstate project benefits, and carries with it inordinately high transaction costs.

Apply sectoral or geographical additionality "benchmarks" in lieu of project-by-project additionality determinations. Such benchmarks have been discussed primarily in the context of energy-sector projects. Based on some projection of business-as-usual performance at the sectoral or country level, these benchmarks would establish the "standard-to-beat" for projects seeking CO_2 credits. Once established, projects meeting or going beyond the benchmarks would receive CO_2 credits for doing so. Although less site-specific than a project-level additionality review, and hence capable of missing important nuances specific to an individual project, the standardized benchmarking approach would presumably be less susceptible to project-level gaming, would be more conducive to guiding mitigation projects and activities in particular policy and project directions, and would presumably entail much lower transaction costs than true project-level analyses.

As with energy-sector interventions, LUCF benchmarks would be applied to all projects within a given sector, looking at historical and sectoral information to develop some sort of benchmark by which project developers and evaluators could assess the additionality of the projects without having to develop a project-specific methodology and assessment. As with energy-sector benchmarking, this approach applied to the LUCF sector implicitly assumes that the inaccuracy of the resulting benchmarks at the individual project level is statistically unimportant when averaged over many projects, or at least that the systematic error associated with the sectoral approach is less than the random or systematic error associated with project by project additionality assessments. Consolidating baseline-setting efforts across an entire class of projects should also offer the opportunity to achieve increased credibility and fewer transaction costs.

As in other benchmarking efforts, a number of analytical issues need to be addressed in considering LUCF benchmarks:

- What are the possible bases, strategies, and methodologies for constructing benchmarks?
    - Historical land use trends
    - LUCF related projections
    - Normative values

- How does LUCF benchmarking systematically differ, if at all, from energy-sector benchmarking? For example, is historical data more or less relevant to benchmark creation, and are LUCF trend projections more or less reliable?

- How aggregated can the benchmarks be made, whether sectorally or geographically?

- How often should LUCF benchmarks be updated?

- Which LUCF subsectors are most conducive to benchmarks, and which are simply not conducive?

In considering the development of LUCF benchmarks, it is important to be careful in defining what we are talking about. In many benchmarking discussions, several issues often get interchangeably discussed in ways that confuse rather than clarifies the issues. For example:

- *The feasibility of designing benchmarks:* Can a reasonable benchmarking approach be defined that plausibly reduces both the Type 1 and Type 2 errors referred to above to acceptable levels.

- *Benefit quantification*: Can the carbon benefit associated with meeting or exceeding the benchmark be quantified in a sufficiently robust manner? The issues of data availability, data accuracy, and data precision are very important to this determination, but are qualitatively different from the issues associated with whether a plausible benchmark can be designed in the first place.

- *Monitoring and verification*: Can the quantified benefits be sufficiently monitored and verified?

- *Policy relevance:* Even if benchmark can be designed, and the benefits sufficiently quantified, is the magnitude of the potential benefit (regionally or globally) sufficient to justify the effort to going through the benchmarking process. It may well be that the answer to this question varies considerably from LUCF subsector to subsector.

Overview of LUCF-Based Benchmarking

The conceptual basis for thinking about benchmarking in the LUCF sector is similar to that for the energy sector. Many issues that need to be addressed in assembling benchmarks can be the same, or at least similar, to those encountered in the energy sector. There is no inherent reason to suspect that LUCF-based benchmarks at the sectoral level are inherently more difficult or easier to arrive at than benchmarks for individual energy sectors. Sub-sector by sub-sector, however, some LUCF benchmarks are likely to be considerably more important, plausible, and cost-effective than

others. Indeed, it may turn out that some categories of LUCF projects are simply not susceptible to the development of effective benchmarks. Even where a benchmark may be achievable, it may be that the climate change mitigation benefit of the benchmark in question may not justify the effort required to develop the benchmark.

Because so little attention has been given to the issue of LUCF benchmarking, any tentative conclusions need to be treated with caution. A "from the ground up" assessment of forestry benchmarking is clearly needed.

Conclusions

Over the last decade, land use change and forestry (LUCF) projects have been subject to the same additionality reviews as have other types of mitigation projects. Several conclusions are evident:

1) *There is nothing qualitatively different in the issues to be addressed in assessing financial or emissions additionality for LUCF projects as compared to other project types.* The analytical steps are the same, and the subjectiveness tends to be parallel. Many of the socioeconomic variables that must be projected are different for LUCF projects, however, requiring different data and technical expertise, and potentially different techniques for evaluating additionality claims.

2) *In practice, LUCF projects have been easier to evaluate on financial additionality grounds than most other types of mitigation projects.* Many energy-sector projects pursued under the AIJ phase have been charged with being non-additional; relatively few LUCF projects have faced a similar challenge. This is because LUCF projects to date are generally not as commercially oriented as energy-sector projects. Few LUCF projects, particularly those involving forest conservation efforts, have offered any rate of return (or even repayment) to project funders. As such, the CO_2 mitigation motivation of the projects has been undisputed.

3) *As more potentially commercial LUCF projects are proposed for pursuit under Articles 6 and 12 of the Kyoto Protocol, the challenges facing financial additionality determinations in the LUCF and other sectors will become more similar.* It is hard to envision circumstances, however, in which LUCF projects pose more difficult additionality issues than those associated with projects in other sectors.

4) *Alternatives to project-specific additionality determinations, including technology and performance-standard benchmarking, should prove as applicable to LUCF projects as to other kind of mitigation projects.* For the same reasons that apply to other sectors, it is important to identify and develop alternatives to the current subjective approach to determining project-level additionality for LUCF projects.

Clearly, developing baseline methodologies to evaluate additionality will be an important component of implementing the CDM. Although experience with the AIJ pilot phase indicates that the additionality of LUCF projects is no more difficult to evaluate than that of other project types, it is important to ensure that credible but implementable methodologies are developed for dealing with the additionality issue in general.

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