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POLICY BRIEF

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Reference Emission Levels for REDD

Incentive Implications for Differing Country Circumstances

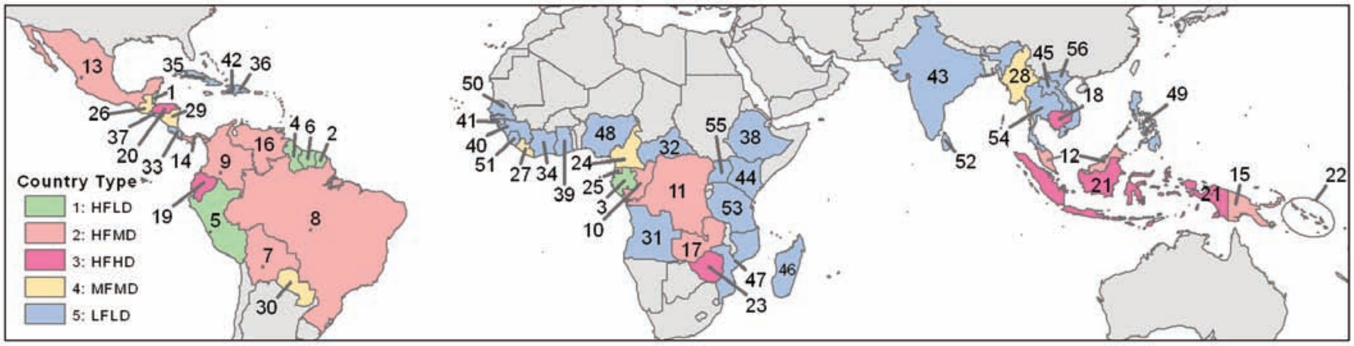
KEY POINTS

- Careful consideration should be given to the implications of proposed baseline methods. In our analysis, the total credited emissions avoided ranged over two orders of magnitude for the same quantity of actual emissions reductions, depending upon the baseline method used.
- A simple average historic rate of deforestation was a highly accurate predictor of global deforestation rate during the next five year period, offering an intuitive, simple, and credible reference for measuring emissions avoided.
- Adjustments of national baselines involve a delicate trade-off between maintaining the credibility of credits and avoiding creating a perverse incentive. Thus, adjustments from historic emissions baselines should be limited and/or avenues outside of baseline adjustment should also be explored for addressing equity.
- Assumptions behind generalized forest transition models, derived from the experience of developed countries, should be questioned when applied to developing countries. For example, contrary to the prediction of generalized forest transition models, countries with high remaining forest and low deforestation (HFLD) as a group are not experiencing increasing rates of deforestation..

A REDD baseline, (used here as synonym of "reference level") defines an expected emission rate of CO2e from deforestation and forest degradation in the absence of interventions to reduce those emissions. There are a number of proposed methods for establishing such baselines and these proposals differ a great deal in terms of credits generated from REDD activities.

One of the primary policy questions that these proposals attempt to address is how to set credible national baselines and concurrently deal with differing country circumstances. Countries with high past rates of deforestation will have ample incentives from a baseline set relative to historic deforestation rates, while countries with low rates of past deforestation would gain from baselines that are projected based on assumptions of increased future rates of deforestation. Yet many are concerned that to remain consistent with a credible global baseline, any increases in baseline rates to allow for future potential emissions increases would need to be counterbalanced with decreases in baseline rates in other countries.

This brief is based on analysis from Griscom, B., Shoch, D., Stanley, B., Cortez, R., Virgilio, N. Implications of methods for establishing baseline forest carbon emissions levels for different non-Annex 1 country circumstances during an initial performance period. Submitted to Journal of Environmental Science and Policy, March, 2009.



Type 1: HFLD
1 - Belize
2 - French Guiana
3 - Gabon
4 - Guyana
5 - Peru
6 - Suriname

Type 2: HFMD
7 - Bolivia
8 - Brazil
9 - Colombia
10 - Congo
11 - Congo, DRC
12 - Malaysia
13 - Mexico
14 - Panama
15 - Papua New Guinea
16 - Venezuela
17 - Zambia

Type 3: HFHD
18 - Cambodia
19 - Ecuador
20 - Honduras
21 - Indonesia
22 - Solomon Is.
23 - Zimbabwe

Type 4: MFMD
24 - Cameroon
25 - Equatorial Guinea
26 - Guatemala
27 - Liberia
28 - Myanmar
29 - Nicaragua
30 - Paraguay

Type 5: LFLD
31 - Angola
32 - Central African Republic
33 - Costa Rica
34 - Cote d'Ivoire
35 - Cuba
36 - Dominican Republic
37 - El Salvador
38 - Ethiopia
39 - Ghana
40 - Guinea
41 - Guinea-Bissau
42 - Haiti
43 - India
44 - Kenya
45 - Laos
46 - Madagascar
47 - Mozambique
48 - Nigeria
49 - Philippines
50 - Senegal
51 - Sierra Leone
52 - Sri Lanka
53 - Tanzania
54 - Thailand
55 - Uganda
56 - Vietnam

Figure 1

Geographic distribution of countries with high remaining forest and low deforestation rates (HFLD), high remaining forest and medium deforestation rates (HFMD), high remaining forest and high deforestation rates (HFHD), medium remaining forest and medium deforestation rates (MFMD), and low remaining forest and low deforestation rates (LFLD). Note that deforestation rates were calculated as a function of original forest area. Source: Griscom, et al. 2009 (submitted manuscript).

This brief analyzes how well various baseline methods deal with these challenges. Our analysis focuses on the implications of different baselines methods for a) the distribution, or equity, of offset credits as a function of country circumstances and b) the accuracy of emission estimates. To analyze the distribution of offset credits, we quantitatively classified countries into five different types based on remaining forest cover and deforestation rates and then identified how many credited avoided emissions each baseline method would generate for each type of country. To analyze the accuracy of emissions estimates, we compared the amount of credits each method would generate for the period of 2000-2005 with the known actual emissions reductions for that same period. Thus, with the benefit of hindsight, we can determine whether the amount of credits generated by each baseline method closely matched actual emissions reductions and how various baseline method impact the credits received by different types of countries.

Differing Country Circumstances

In order to determine the implications of each baseline methodology for differing country circumstances, we developed a quantitative classification of country types. Through this analysis, we derived five natural groups of tropical countries based on two key variables: deforestation rates and remaining forest cover. These groups are summarized in **Figure 1**.

Countries with high forest cover and low deforestation rates (HFLD) are the most critical to an analysis of the equity/credibility trade-off, but a subset of countries with high forest cover and medium deforestation rates (HFMD) also face the same problem. These countries would have little REDD incentive based on purely historical data. Yet, they need to be included in the mechanism in order to avoid creating a perverse incentive that would encourage them to rapidly increase deforestation rates in order to be included in the mechanism in the future. The rest of the HFMD countries, and all countries with high remaining forest and high rates of deforestation (HFHD) are the core "REDD countries" and would be expected to

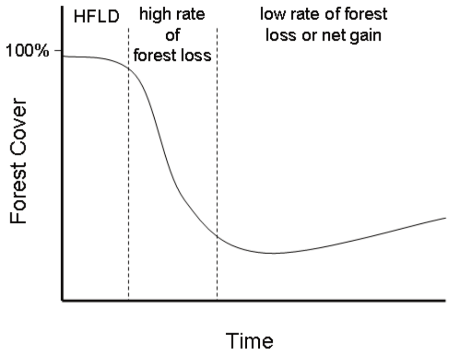


Figure 2

Generalized forest transition model, which is often used to predict trends in deforestation rates with relation to remaining forest cover.

reap the greatest benefits from a REDD framework, simply because there is substantial opportunity for avoided emissions. Countries with medium remaining forest and medium rates of deforestation (MFMD) have experienced more past deforestation, and continue to actively deforest, but still retain about 40% of their original forest that could be eligible for REDD incentives. The final category, low forest, low deforestation countries (LFLD), would be primarily eligible for land-based carbon sequestration through reforestation and/or improved management of agricultural landscapes and would benefit more from a mechanism that included those activities.

A generic forest transition model (shown in **Figure 2**) is often used to describe trends in forest cover and deforestation rates and has recently been used in REDD negotiations by HFLD countries to show that they face a future deforestation pathway. We analyzed these trends using the various country categories we quantitatively determined. Trends in the change of deforestation rates were consistent with the forest transition model for some categories but not for others. Notably, the very low rate of deforestation in HFLD countries has actually been decreasing slightly according to FAO data while the forest transition curve predicts that HFLD countries would be showing at least slight increases in deforestation rates. At the other end of the continuum, LFLD countries, as a group, show increasing rates of net deforestation, despite limited remaining forest, while the forest transition model predicts that LFLD countries would be showing declining rates of deforestation. These exceptions to the conceptual forest transition model suggest that there are important differences between the forest transition patterns that today's developed countries passed through (from which the forest transition curve was derived) and the experience of current developing countries. This raises concerns about applying the generalized forest transition curve to non-Annex 1 countries as part of REDD policy development.

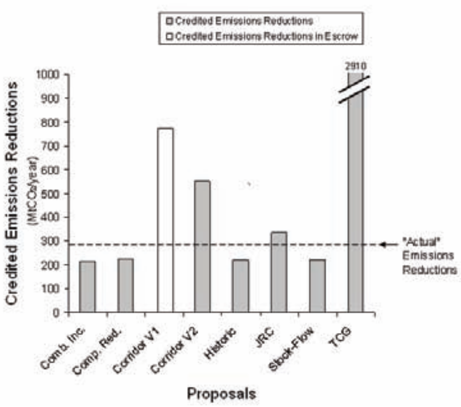


Figure 3

The estimated total emissions reductions credits generated by each of the seven proposals, as well as the "simple historic" approach, are compared using the results of our 10% REDD scenario.

Comparison of Baseline Methodologies

With the benefit of objectively defined country types, it is possible to consider how many credited emissions reductions each baseline methodology would generate for each type of country and how those credits compare to actual emissions reductions. We address this question with a quantitative comparison of seven baseline proposals. Box 1 summarizes those proposals. In our analysis, we developed a retrospective scenario in which a REDD framework was instituted in the year 2000. In this scenario, the actual emissions scenario is known: it is the reported emissions during the period 2000-2005. We then assumed that all countries succeed in reducing their emissions by 10% below that known scenario – thus 10% represents the actual emission reductions achieved during the period. We can then compare those actual emission reductions with the amount of credited emission reductions that each baseline methodology generates. The credibility of each approach can thus be compared by assessing how accurately they reflect the actual emissions. This comparison, for total emissions reductions credits generated across all country types, is presented in **Figure 3**.

Three of the proposals (Combined Incentives, Compensated Reductions, and Stock-Flow) generated total emissions equal or close to actual emissions reductions. One proposal, (Corridor V1) generated no credits during the first performance period, but generated over twice the actual emissions reductions as credits in escrow (redeemable only if further reductions were achieved). The remaining three proposals (Corridor V2, JRC, TCG) generated more credits than the actual emission reductions.

[1] Environmental Defense and the Instituto de Pesquisa Ambiental da Amazonia. 2007. Reducing Emissions from Deforestation in Developing Countries: Policy Approaches to Stimulate Action. Submission to the XXVI Session of the Subsidiary Body on Scientific and Technological Advice of the UNFCCC.

[2] Mollicone, D., F. Achard, S. Federici, H. Eva, G. Grassi, A. Belward, F. Raes, G. Seufert, G. Matteucci, and E. Schulze. Avoiding deforestation: An incentive accounting mechanism for avoided conversion of intact and non-intact forests.

[3] The Terrestrial Carbon Group. 2008. How to Include Terrestrial Carbon in Developing Nations in the Overall Climate Change Solution

[4] Joanneum Research, Union of Concerned Scientists, Woods Hole Research Center, and the Instituto de Pesquisa Ambiental da Amazonia. 2006. Reducing Emissions from Deforestation in Developing Countries: potential policy approaches and positive incentives.

[5] Strassburg, B., R.K. Turner, B. Fisher, R. Schaeffer. An Empirically-Derived Mechanism of Combined Incentives to Reduce Emissions from Deforestation. CSERGE Working Paper ECM 08-01

[6] Woods Hole Research Center and IPAM. 2008. How to Distribute REDD Funds Across Countries? A Stock-Flow Approach.

Seven Proposed Baseline Methodologies

Simple Historic: Historic average emissions

Compensated Reductions[1]: Historical average emissions, with 10% adjusted increase for countries with historically low rates of deforestation

Joint Research Centre (JRC)[2]: For countries with deforestation rates greater than ½ the global average, historical rates are used. For countries with deforestation rates less than ½ the global average, ½ the global average deforestation rate is used as their baseline.

Terrestrial Carbon Group (TCG)[3]: A portion of forests are put in reserve and not eligible for crediting. Annual tradable carbon is defined as 1/50th stocks outside the reserve.

Corridor Approach[4]: Countries establish upper and lower baselines. Reductions below the lower baseline are compensated. Two options for reductions within and above the corridor: V1: debit is accrued if emissions exceed upper limit; credits for keeping emissions within the corridor accrue but can not be sold until emissions fall below the lower boundary. V2: No debits accrue for surpassing upper baseline. Emissions within the corridor are credited, but at a discounted rate.

Combined Incentives[5]: Overall credits are generated by performance against a global baseline. Credits are allocated to countries based both on performance against a country baseline and against the global baseline.

Stock-Flow[6]: Total global REDD credits are pegged to global emission reductions. Credits are allocated to countries as a function of both reductions against a historical baseline and for remaining carbon stocks.

In Figures 4 and 5 we compare results by country type for each proposal. **Figure 4** represents the four proposals that generated fewer credits than actual emissions reductions. They differ principally in how a similar quantity of total credits were distributed among country types. **Figure 5** represents the four proposals that generated more credits than actual emissions reductions. These proposals all include specific adjustments to simple historic baselines in order to generate incentives for countries with historically low rates of deforestation.

Conclusions

Baselines methodologies are incredibly important for ensuring credible credit generation. A simple average historic rate of deforestation was a highly accurate predictor of global deforestation rate during the next five year period, offering an intuitive, simple, and credible reference for measuring emissions avoided. Adjustments to historical baselines to include countries with historically low rates of emissions tend to reduce the accuracy of emissions estimates and therefore should be limited and/or avenues outside of baseline adjustment should also be explored for addressing equity.

Figure 4

Estimated quantity of credited emissions during the first 5-year performance period are displayed by country type for three proposals (b, c, and d) with total credited emissions close to (within 10%) of emissions that would be credited using a simple historic baseline (a).

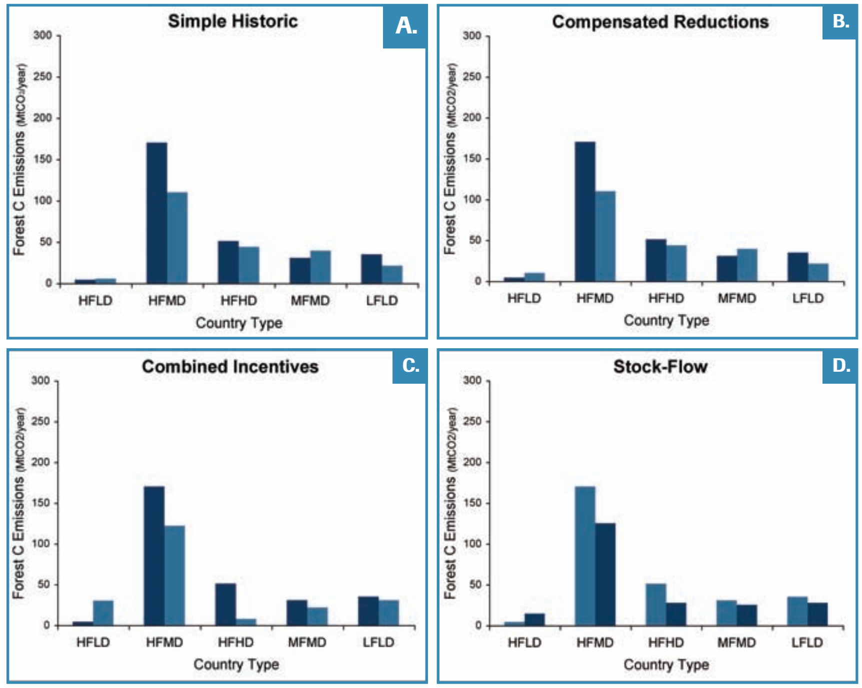


Figure 5

Estimated quantity of credited emissions during the first 5-year performance period are displayed by country type for four proposals, all of which have total credited emissions not close to (± 50% or more) of emissions that would be credited using a simple historic baseline (3a). These proposals differ both on the quantity of total emissions credits that should be allocated during the initial performance period, and how these credits should be distributed among country types. Note that range of the y-axis varies among these four graphs.