Capacity development in national forest monitoring

Experiences and progress for REDD+

Edited by
Brice Mora, Martin Herold, Veronique De Sy,
Arief Wijaya, Louis Verchot and Jim Penman

Printed in Indonesia
ISBN: 978-602-8693-86-8

Mora, B., Herold, M., De Sy., V., Wijaya, A., Verchot, L. and Penman, J. 2012 Capacity development in national forest monitoring: Experiences and progress for REDD+. Joint report by CIFOR and GOFC-GOLD. Bogor, Indonesia.

Photo credit:
Cover © Brice Mora
Parts 1–4. Neil Palmer/CIAT

CIFOR
Jl. CIFOR, Situ Gede
Bogor Barat 16115
Indonesia
T +62 (251) 8622-622
F +62 (251) 8622-100
E cifor@cgiar.org

cifor.org

Chapter 11

Developing REDD+ reference levels

A data-driven, stepwise framework

Martin Herold, Veronique De Sy, Arild Angelsen and Louis Verchot

11.1 Introduction

Forest reference levels (RLs) and forest reference emission levels (RELs)[1] are most commonly used as a business as usual (BAU) baseline to assess a country's performance in implementing REDD+ (Meridian Institute 2011; UNFCCC 2011). RLs are needed to establish a reference point or benchmark against which actual emissions (and removals) are compared. The RL also serves as a benchmark for compensation or payments in a results-based REDD+ mechanism. This financial incentives benchmark (FIB) determines the emission levels after which a country, subnational unit or project should start being paid for their results. The way the FIB is set has implications for REDD+ transfers, and ultimately for environmental integrity (carbon effectiveness), cost efficiency and equity (benefit sharing).

One way to deal with limitations in the available data and uncertainties inherent in the REL/RL development process is to adopt a stepwise approach (Herold *et al.* 2012; UNFCCC 2011). This approach aims to better structure and deal with the variety of RL methods, the variability in data and their quality, uncertainties and country circumstances. Stepwise progress should help to stimulate broad country participation in estimating RLs and provide a starting point, even with limited data, from which to improve RL setting as countries progress through the REDD+ implementation phases and build capacity.

1 The difference between reference level (RL) and reference emissions level (REL) is not always clear. The distinction is often made that REL refers to gross emissions from deforestation and forest degradation, while RL refers to deforestation and forest degradation, as well as other REDD+ activities related to enhancement of carbon stocks, sustainable management of forests and forest conservation. Here, we use RL as a general term, which encompasses RELs; much of the discussion here focuses on emissions (UNFCCC 2010).

11.2 Scoping a stepwise framework

The UNFCCC (2011) refers to stepwise progress in establishing REL/RLs, as indeed is the case with many aspects of REDD+ implementation. As countries move through their REDD+ implementation phases, they have to develop national, or as an interim measure subnational, forest RLs. The understanding, reliability and validity of data for RLs are bound to improve through that phased process. A stepwise approach to developing forest RLs provides a starting point for all country situations (Table 11.1), taking into account the variability in available data used to estimate future trends and the lack of capacity in many countries (Romijn *et al.* 2012).

Table 11.1. Some dimensions of a stepwise approach to developing forest reference levels (adapted from Herold *et al*. 2012)

	Step 1	Step 2	Step 3
Activity data/ area change	Possibly IPCC Approach 1 (national net change) but also Approach 2 (national gross changes) or 3 (national gross changes, spatially explicit data)	IPCC Approaches 2 or 3 (to estimate gross changes)	IPCC Approach 3 (spatially explicit data required)
Emission factors/ carbon stocks	IPCC Tier 1 (defaults) but also Tier 2 or 3 (national data) if available	Tier 2 or 3 (national data)	Tier 2 or 3 (national data)
Data on drivers and factors of forest change	No driver data available or used	Drivers at national level known with quantitative data for key drivers	Quantitative spatial assessment of drivers/ activities; spatial analysis of factors
Approaches as guidance for developing reference levels	Simple trend analysis/projection using national statistics, based on historical data	Country-appropriate methods for interpolation/ extrapolation using historical data and statistical approaches	Potential to use options such as spatially explicit modelling and other statistical methods for considering both drivers and other factors of forest change
Adjustments/ deviations from the historical trend	Simple rules (in technical terms)	Assumptions and evidence for adjustments to key drivers/activities	Analysis and modelling by drivers and activities
Uncertainty assessment	No robust uncertainty analysis possible; use of default uncertainties and/or conservative estimates	Modelling to accommodate uncertainties and testing using available data	Independent and quantitative uncertainty analysis possible, sensitivity analysis and verification using available data

Step 1 provides a potential starting point for countries to engage in RL setting and can be based on coarse national-level data only. It will be challenging for some countries to provide quantitative evidence for their deviation from the projected historical trend; they can therefore start with simple rules. All countries should be able to undertake a Step 1 approach with only modest effort using available data, even if those data are uncertain. Examples of a Step 1 methodology can be taken from the Brazilian Amazon Fund (a subnational approach) and Guyana (a national approach). The Amazon Fund REL is based on gross deforestation and a conservative estimate of aboveground carbon stocks of 100 tC/ha. The annual deforestation rates used in the calculation of emission reductions are compared with the average deforestation rates over 10-year periods, which are updated every five years (Amazon Fund 2009).

Step 2 progressively includes national data and circumstances quantitatively, that is, by undertaking evidence- or driver-based assessments to adjust historical rates, and by using better country data (e.g. Tier 2 for carbon stocks). However, at this stage, data on historical trends are likely to dominate estimates of future trends. This is exemplified in the results of regression analyses (Herold *et al*. 2012), where predictions were made based on subnational activity data.

Step 3 builds upon Step 2, using higher-quality data that give a wider choice of modelling methods. In particular, more spatially explicit activity data and driver-specific information support, for example, the use of more complex spatially explicit regression or simulation models, which should then lead to a more robust and forward-looking estimate.

The idea of the stepwise framework is to provide a pathway for reducing uncertainty and moving to higher steps over time, which will allow countries to develop more accurate forest RLs for assessing the impact of their policies and measures. With proper support, countries should be able to acquire data to develop forest RLs at higher steps fairly quickly and at a reasonable cost (UNFCCC 2009).

11.3 Linking uncertainty in stepwise RLs and FIBs

The reasons for setting the FIB differently from the BAU baseline are discussed in Herold *et al*. (2012). One key issue is that an FIB might be a BAU baseline adjusted to reflect uncertainty in the data and approaches to developing REL/RLs. In this context, the stepwise approach provides RL development options ranging from approaches based on simple and (likely) uncertain data (Step 1) to those using more complex data and a rigorous uncertainty analysis (Step 3). It is reasonable for higher levels of certainty to be rewarded by higher rates of payment. This incentive is important for encouraging countries to graduate to higher steps in order to develop higher-quality RLs. Step 1 RLs may, in many instances, be considered too uncertain to be used or accepted in a REDD+ payment scheme. The stepwise system has to take uncertainty into account for reasons of effectiveness and efficiency and for 'fair risk sharing' between the parties of the agreement. Several options have been proposed for dealing with uncertainty (summarised in Table 11.2).

Table 11.2. Options for dealing with uncertainty in setting RLs (Herold *et al*. 2012)

Option	Elaboration	Pros	Cons	Most applicable for
1. *Ex post* adjustment of RL	RL formula agreed *a priori*; final RL set when parameters (e.g. agricultural prices) are known	Predictable; adjustments made as more data become available	Hard to establish the formula	Steps 2 and 3
2. Corridor approach	Gradually increasing payments within an RL corridor	Flexible; payments also mimic marginal cost curve	Political acceptability	Steps 1–3
3. Uncertainty or conservativeness factor adjustment	Estimated difference between the outcome and RL multiplied by an uncertainty or conservativeness factor (<1), based on assessment of data quality	Reduced risk of overpayment and 'hot air' (unfounded claims); incentives to produce better data; somewhat accepted by UNFCCC; easy to implement	Makes REDD+ less attractive for countries with poor data	Steps 1–3
4. Renegotiation	Renegotiate RL during the course of implementation of a REDD+ agreement	Flexible, can incorporate unforeseen factors	Political game-playing	Steps 1 and 2
5. Insurance	Could design insurance contract–based approaches in Steps 1 and 2	Well-developed markets for insurance	Probably expensive; complex contract	Steps 2 and 3

One proposal is to allow an *ex post* adjustment of the RL, originally termed 'compensated successful efforts' (Combes Motel *et al*. 2009). Deforestation pressures in, for example, the Brazilian Amazon are closely linked to the profitability of cattle and soybean production; allowing the adjustment of RLs based on the prices of these commodities would better reflect the true BAU scenario and therefore allow better estimation of real emission reductions.

The corridor approach, proposed by Schlamadinger *et al.* (2005), recognises that any point estimate of the RL will be uncertain. A factor is therefore introduced where greater emission reductions get increasingly lower discount factors (i.e. higher price per tCO_2). This approach defines an interval (corridor) around the point estimate of the RL, with the discount factor increasing from 0 to 1 (zero to full payment) within this interval.

Another approach is to use uncertainty or conservative adjustments. In this context, an adjustment to the RL could reflect the degree of uncertainty, such that countries with the poorest data would apply a multiplicative discount based on the degree of uncertainty,

for example in the form of a lower price per tCO_2. This approach addresses one of the problems of uncertainty, namely the risk of overpayment and unjustified REDD+ credits. The use of conservative assumptions is reflected in the recent UNFCCC decision (UNFCCC 2011) concerning the possibility of omitting non-significant carbon pools or specific REDD+ activities in developing RLs. Thus, this approach is, at least in principle, already used by the UNFCCC; it currently provides the simplest and most suitable option to account for uncertain RLs in payment schemes (Grassi *et al.* 2008) and allows participation in REDD+ while better inventory systems are being developed.

Other options for dealing with uncertainty are contract renegotiation or insurance, but these have not been explored in the context of REDD+ RLs. The question of insurance in relation to permanence is discussed by Dutschke (2008); options reviewed there are relevant to RLs as well.

Included in Table 11.2 is the applicability of the various adjustments to particular steps. Given that many countries will start with a Step 1 or 2 approach, conservative adjustment currently provides the simplest solution. Regular renegotiations may also be an option, but are vulnerable to political bias. The corridor approach, which has several attractive features, can be considered an elaborated variant of the conservative adjustment approach (with progressive adjustments).

11.4 Concluding remarks

Establishing forest RLs for developing countries is among the most urgent and challenging tasks in REDD+. A stepwise approach to developing forest RLs can help to overcome the challenges of lack of data, uncertainty and competing interests, and could encourage wider participation by countries in REDD+. It is a data-driven approach; as such, the availability of more and higher-quality data will increase the robustness of the RLs over time. While Step 1 methods are simple and may generate results with a high level of uncertainty, Step 1 does allow countries to at least initiate RL activities and provides a benchmark for assessing trends and interim performance. Step 2 allows greater incorporation of national circumstances and links RLs to known drivers of deforestation and degradation as a means of adjusting historical land use change rates. Step 3 develops this approach further, with more spatially disaggregated data and a more explicit analysis of drivers and factors. Step 3 could be implemented, for example, through the use of spatial simulation models that also allow a more forward-looking modelling component.

The stepwise approach, by nature, will result in RLs of varying levels of uncertainty, and this should be taken into account in any payment scheme. Where uncertainty varies (between countries, for example), an FIB that modifies the BAU baseline provides a means of rewarding efforts to reduce uncertainties and move to higher-step RLs over time. There are several approaches for dealing with RL uncertainty; the conservative adjustment factor currently provides the most suitable option. This approach is, at least in principle, already being discussed and considered by the UNFCCC (Grassi *et al.* 2008; UNFCCC 2011).

11.5 References

Amazon Fund. 2009. The Amazon Fund's annual report 2009. http://www.amazonfund.gov.br/FundoAmazonia/export/sites/default/site_en/Galerias/Arquivos/Boletins/Rafa_2009_versxo_final_inglxs.pdf.

Combes Motel, P., R. Pirard and J.L. Combes. 2009. A methodology to estimate impacts of domestic policies on deforestation: Compensated Successful Efforts for 'avoided deforestation' (REDD). *Ecological Economics* 68:680–91.

Dutschke, M., S. Wertz-Kanounnikoff, L. Peskett, C. Luttrell, C. Streck and J. Brown. 2008. Mapping potential sources of REDD financing to different needs and national circumstances. CIFOR, Bogor, Indonesia; Amazon Environmental Research Institute, Brasilia; and Overseas Development Institute, London.

Grassi, G., S. Monni, S. Federici, F. Achard and D. Mollicone. 2008. Applying the conservativeness principle to REDD to deal with the uncertainties of the estimates. *Environmental Research Letters* 3:035005

Herold, M., A. Angelsen, L. Verchot, A. Wijaya and J.H. Ainembabazi. 2012. A stepwise framework for developing REDD+ reference levels. *In:* Angelsen, A., M. Brockhaus, W. Sunderlin and L. Verchot, L. (eds). *Analysing REDD+: challenges and choices*, 279–99. CIFOR, Bogor, Indonesia.

Meridian Institute. 2011. Modalities for REDD+ reference levels: technical and procedural issues. Prepared for the Government of Norway by Angelsen, A., D. Boucher, S. Brown, V. Merckx, C. Streck and D. Zarin. http://www.REDD-OAR.org.

Romijn, E., M. Herold, L. Kooistra, D. Murdiyarso and L. Verchot. 2012. Assessing capacities of non-Annex I countries for national forest monitoring in the context of REDD+. *Environmental Science and Policy* 19–20:33–48.

Schlamadinger, B., L. Ciccarese, M. Dutschke, P.M. Fearnside, S. Brown and D. Murdiyarso. 2005. Should we include avoidance of deforestation in the international response to climate change? *In*: Murdiyarso, D. and H. Herawati (eds). *Carbon forestry: who will benefit?* CIFOR, Bogor, Indonesia.

United Nations Framework Convention on Climate Change (UNFCCC). 2009. UNFCCC/SBSTA technical paper on costs of monitoring for REDD. http://unfccc.int/resource/docs/2009/tp/01.pdf.

United Nations Framework Convention on Climate Change (UNFCCC). 2010. Outcome of the work of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention – Policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries, UNFCCC COP 16 Cancun. http://unfccc.int/2860.php.

United Nations Framework Convention on Climate Change (UNFCCC). 2011. Draft decision on guidance on systems for providing information on how safeguards are addressed and respected and modalities relating to forest reference emission levels and forest reference levels as referred to in decision 1/CP.16, appendix I COP 17 decisions. http://unfccc.int/files/meetings/durban_nov_2011/decisions/application/pdf/cop17_safeguards.pdf.