Forum on Readiness for REDD
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Overview of Main Issues and Implications in Reference Level Development

Sandra Brown
sbrown@winrock.org
What are Reference Levels?

- Reference emissions levels (REL) or reference levels (RL)?
  - RELs: gross emissions in a given time period from deforestation and forest degradation
  - RLs: emissions and removals for all REDD+ activities

- Reference Levels (RLs) refer to business—as-usual (BAU) benchmarks without any REDD+ interventions

- RLs are the projected quantity of GHG emissions and removals against which actual emissions will be monitored and performance assessed

- RLs based on historic emissions and removals adjusted for national circumstances
Why Reference Levels Matter

• Historic emissions provide information on the magnitude, location, and causes of emissions/removals —helps identify strategies to have the most impact

• Contribute to developing LEDS by providing improved knowledge on the role of forests in national GHG inventory and potential of REDD+ activities to reduce net GHG emissions

• Establishing historic emissions provide opportunities to “learn by doing” and to design the MRV system

• Improve GHG inventory for forest sector of National Communications
How to develop the RLs?

Multi-step process

**Tools:** geospatial projections, economic analysis, etc. for development of scenarios

**Historic** Emissions Estimate

**Adjusted** Emissions based on National Circumstances

REL/RL
Guidance on Developing RLs?

- Two components:
  - **Decision Support Tools** for making key decisions that affect how the RL is developed
  - **Methodological Framework** for overall structure and details on steps involved
Component 1. Decision Support Tools

- Key decisions needed to start the process
- Can weigh-up advantages and disadvantages

1. Determine **Scope** of Activities
2. Finalize **Forest Definition**
3. Determine **Scale** (National or Summed Subnational)
4. Determine Which **Pools/Gases** to Include
5. Link RL/MRV to a **National Forest Inventory?**
6. Adjust for **National Circumstances?**
7. **Should a Location Analysis Be Included?**
1. Determine Scope of Activities

• Guidance on which activities to include
  – Deforestation?
  – Forest Degradation? Which degrading activities?
  – Enhancement of Carbon Stocks?

• Guidance on estimating the significance of activities with respect to potential emission reductions or increased removals of GHG
Q1. TIMBER EXTRACTION
What volume of timber do you produce on an annual basis that originates from natural forests?

Collect Data

DON’T KNOW

Are resources available to obtain these data for a recent time period?

YES

No, do not include degradation from timber harvesting, consider other forms of degradation

NO

Tool uses input from Q1 to automatically generate a first-order estimate of emissions

Does the resulting value represent a significant proportion of emissions from deforestation?

YES

Tool has option to identify subnational units where interventions would be most effective

NO

Yes, include degradation from timber harvesting in RL/REL.
2. Finalize Forest Definition

- COP Decision that countries should provide information on the definition of forest used in the construction of their RLs
- Guidance to assess advantages and disadvantages of:
  - Changing the national forest definition for REDD+ purposes
  - Using one national vs. different sub-national forest definitions
  - Using ground-based vs. remote-sensing based parameters to define forests
  - Using a broad definition (which maximizes forest area) versus a narrower definition
3. Choosing Pools/Gases to Include

Include Pool or Gas?

- If there is no significant change in this pool or gas between business as usual and REDD+ activity
- If key category analysis indicates that this pool/gas is insignificant
- If there is already a precedent to exclude a pool or gas for a given activity (e.g., under CDM)

Include
Data Needs for Historic Emissions

Estimate emission using the IPCC framework

Activity data (AD): obtained from change detection of remote sensing products or other sources such as timber extraction
Approach for Emission Factors

Stock-Change Approach for EF

• Deforestation
  – Difference in C stocks in a particular pool at two points in time
  – Data needed;
    • Pre and post deforestation C stocks in selected pools

Gain-Loss Approach for EF

• Forest Degradation
  – Net balance of additions to and removals from a carbon pool
  – Data needed
    • Gains: annual rates of growth
    • Losses: data on tree harvests and damage factors
Case study: Guyana

- Made key decisions: defined forests, national in scope, include deforestation and forest degradation, includes aboveground and below ground tree biomass, dead wood and soil pools
- Time period to be finalized—likely post-2000
- Inadequate existing data on forest C stocks so developed and implementing a system to fill gap—the forest carbon monitoring system (FCMS);
- Data generated from FCMS combined with past historic activity data to provide **historic emissions** (RL) and estimates of annual carbon emissions (MRV)
Main drivers of deforestation and forest degradation

- Identify main drivers as affect selection of pools and post D&D stocks

- Deforestation:
  - Mining—medium and large scale
  - Infrastructure—roads, settlements
  - Agriculture—permanent
  - Fire

- Degradation:
  - Forestry--for timber production
  - Mining—small scale
  - Shifting cultivation
  - Fire
Key outcome of FCMS: national tables of emission factors to meet standards

- Standards for level of uncertainty (e.g. precision of ground data)
- Produce QA/QC plans for all data collection, analyses, and archiving

<table>
<thead>
<tr>
<th>Stratum</th>
<th>Change agent/Driver – Deforestation (stock change)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed forests high potential for change</td>
<td>Mining (&gt;1 ha in size) (t CO₂e ha⁻¹)</td>
</tr>
<tr>
<td>Mixed forest medium potential for change</td>
<td></td>
</tr>
</tbody>
</table>

- Similar one developed for Degradation (gain-loss)
- Table will be filled in with EF based on ground data collection and analysis
- It will be used with activity data to generate estimates of historic emissions of GHG
Stratify by potential for deforestation

• Analysis to identify spatial patterns of change in relation to drivers and other factors and generate “threat map”
• Stratifying by “threat” allows for monitoring areas where changes have occurred and likely to occur in future
• Reduces sampling effort while maintaining low uncertainty in estimates of emission factors
Collect preliminary field data for plot design and number

**24 Single Plots—mean +/- 90% CI**

<table>
<thead>
<tr>
<th>Carbon Pool</th>
<th>Carbon Stock (t C ha(^{-1}))</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aboveground tree biomass</td>
<td>192.4 ± 30.0</td>
<td>73.1</td>
</tr>
<tr>
<td>Belowground tree biomass</td>
<td>45.2 ± 7.0</td>
<td>17.2</td>
</tr>
<tr>
<td>Saplings*</td>
<td>7.0 ± 1.3</td>
<td>2.7</td>
</tr>
<tr>
<td>Dead wood (standing)*</td>
<td>1.1 ± 1.0</td>
<td>0.4</td>
</tr>
<tr>
<td>Dead wood (lying)*</td>
<td>17.3 ± 7.1</td>
<td>6.6</td>
</tr>
<tr>
<td>Total</td>
<td>263.0 ± 37.0</td>
<td>100</td>
</tr>
</tbody>
</table>

**29 Cluster Plots—mean +/-90% CI**

<table>
<thead>
<tr>
<th>Carbon Pool</th>
<th>Carbon Stock (t C ha(^{-1}))</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aboveground tree biomass</td>
<td>190.6 ± 12.9</td>
<td>72.4</td>
</tr>
<tr>
<td>Belowground tree biomass</td>
<td>44.8 ± 3.0</td>
<td>17.0</td>
</tr>
<tr>
<td>Saplings*</td>
<td>5.2 ± 0.6</td>
<td>2.0</td>
</tr>
<tr>
<td>Dead wood (standing)*</td>
<td>3.3 ± 1.4</td>
<td>1.3</td>
</tr>
<tr>
<td>Dead wood (lying)*</td>
<td>19.3 ± 3.1</td>
<td>7.3</td>
</tr>
<tr>
<td>Total</td>
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Designed sampling plan for high threat forests

- Stratify by accessible versus less accessible forests in sampling design for cost effectiveness.
- Randomly selected number of grids in which to install plot clusters in high threat strata based on targeted precision.
- Repeat process for medium and low threat in phased approach.
Develop methods for estimating emissions from logging

- Use “change detection” to estimate carbon impact per area of gap and timber extracted

- Roads
- Skid trails
- Landing decks

Collateral damage

Carbon dioxide

Wood products
Estimating emissions from removals in selective logging

C emissions, t C/yr = [vol x WD x CF x (1-LTP)] +[vol x LDF ] +[vol x LIF ]

Where:
Vol = volume timber extracted over bark per logging block (m3); serves as activity data
WD = wood density (t/m3)
CF = carbon fraction
LTP = proportion of extracted wood in long term products (dimensionless)
LDF = logging damage factor (t C/m3)—dead wood left behind in gap
LIF = logging infrastructure factor (t C/m3)—dead wood produced by construction
Developed SOPs and tools to automate calculations for all field data

Worksheet links to data collected in use of Standard Operating Principles
Status of Guyana in process

• Preliminary field data for carbon stocks for deforestation activities collected and analyzed and used to estimate number of cluster plots needed
• Data for emission factors for logging have been analyzed (>120 logging gaps have been measured) and more are being collected to reach precision target
• Method for estimating regrowth in gaps after logging has been developed and data in process of being collected (chronosequence of logging gaps)
• Sampling design plan finalized and being implemented
Ongoing challenges in Guyana

• Quantify forest degradation—area and carbon impacts for activities other than selective logging—e.g. in buffers around infrastructure; promising results from detailed interpretation of higher resolution imagery
• Impact of mining on soil carbon stocks
• How to estimate carbon impact of shifting cultivation and escaped fires
LEAF Overview

- 5 year, $20m program
- Implementing partners
  - Winrock International
  - SNV (Netherlands Development Organisation)
  - Climate Focus
Target Countries

Core Countries (light blue):
Thailand, Vietnam, Cambodia, Laos, Malaysia, Papua New Guinea

Replication countries (dark blue):
India, Bangladesh, Bhutan, Nepal, Indonesia, Philippines
LEAF’s goal is “to strengthen capacities of developing countries in the Asia region to produce meaningful and sustainable reductions in greenhouse gas (GHG) emissions from the forest-land use sector”.

Employs a regional approach to meet this goal. (e.g. trans boundary landscapes, similar ecosystems and drivers, common issues).
The goal of the Lowering Emissions in Asia’s Forests (LEAF) Program “To achieve meaningful and sustainable reductions in greenhouse gas (GHG) emissions from the forestry-land use sector in Asia”

Model Actions Demonstrated
- Improved livelihoods
- Policy and Market Incentives
  - Enabling Conditions
- Human and Institutional Capacity Strengthened
  - Increased individual and institutional capacity
  - Increased gender equality, inclusion and leadership
- Regional Platforms & Partners Strengthened to Catalyze and Sustain Change

Replication

Innovations and models shared

Replication
Summary on RLs

• Reference levels useful for multiple purposes in planning development
• A series of key decisions have to be made to start process and before filling data gaps
• Can be established at any scale but need to have national set of standards so as to scale-up to national scale
• Harmonizing existing data from a variety of sources and of varying qualities may be difficult and not meet international standards—better to design the plan and determine where existing quality data fit into this plan and what new data are needed
• The LEAF project’s goals can assist the regional countries in developing their RLs at various scales.