Practical approaches for REDD project development and Capacity Building

KEY CONCEPTS TO UNDERSTANDING REDD AS A STRATEGY FOR MITIGATION OF CLIMATE CHANGE

Dr. Graham Sem
Sustainable Environmental Management Ltd
Auckland, New Zealand
gsem@xtra.co.nz

A. Key Concepts in REDD Projects

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1. Drivers/Sources of DD

Anthropogenic sources
- Shifting cultivation
- Logging
- Large-scale commercial Agriculture
- Burning
- Mining and Petroleum exploration and development
- Infrastructure developments
- Settlements and urbanization

Natural sources
- Earth quakes
- Volcanic eruptions
- Land movements
- Landslips
- Burning
- Flooding

PNG has yet to establish the extent and rates of deforestation and degradation.

2. Additionality

1. Only activities that are **additional** to those already ongoing or planned are eligible to be considered for carbon credits

2. Establishing national REDD baseline rates, the additionality of efforts to reduce deforestation can be judged quickly and accurately while underpinned by clear reduction targets. Using these baselines, we can determine, at a national level, whether REDD has in fact been reduced from historical level

3. Continuation of current good practice (e.g. a well-implemented protected area program) is **not additional**

4. When claiming credit for emission reductions, the claimant must show that the relevant activities **would not have happened** in the absence of the carbon market mechanism

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3. Leakage

1. Increases in deforestation and forest degradation rates which occur outside the project boundary, and which are attributable to the project activity.

2. By addressing REDD on the national level, leakage will be captured in a manner not possible with project-based accounting.

Three types of 'leakage':
a) *Activity Leakage:* Where an activity moves to outside the project boundaries.
b) *Market Leakage:* Where the REDD activity reduces supply from the project area resulting in increased demand for the products outside the project area.
c) *International Leakage:* Where logging companies move to other countries or continents.

4. Permanence

1. PERMANENCE relates to the duration of the positive effects of a climate change mitigation activity. Permanence implies that these effects will last indefinitely.

o *Ecological risk:* Forest fires, natural disasters, diseases (die-back)
o *Government risk:* A change in government could overturn prior commitments
o *Demand-side (Market) risk:* If the value of a competing product (such as palm oil) increases, storing carbon may stop being profitable.

2. Establishment of a carbon banking mechanism that credits early action and debits compliance failures. Further, leveraging the insurance markets to address traditional risks such as fire, flood, etc.

Direct and 'root' causes of deforestation must be understood and tackled in national policy and international negotiations

5. Baselines

A baseline is a plausible and consistent description of how a system might evolve into the future in the absence of explicit new GHG mitigation policies. Baseline scenario(s) will provide information against which mitigation scenarios (i.e. REDD+) will be evaluated.

o **Historical baseline** = Actual recorded rates of deforestation and forest degradation in the past

o **Business As Usual baseline (BAU)** = Projected future rates of deforestation and forest degradation in the absence of REDD

o **Crediting baseline** = The rate of future deforestation and forest degradation below which a REDD project may claim credits (a negotiated baseline, lower than the BAU). May also be termed the Reference Emission Level (REL)

6. Monitoring

1. Includes monitoring and measuring the various pools of carbon in forests (above and below ground biomass, dead wood, litter and soil).

2. This could be determined through measuring and monitoring emissions from REDD due to changes in forest cover, forest area, changing in carbon stocks and emissions of non-CO_2 gases.

3. A system for monitoring and reporting emissions from REDD will need:
   ◦ Credibility
   ◦ Transparency
   ◦ Accuracy with high certainty (i.e. use of higher tiers and national values)
   ◦ Good science
   ◦ Compliance to the requirements of the REDD Policy

7. REDD+ Activities

1. To prove the additionality of all REDD activities.
2. Leakage can be minimized through landscape management and a national accounting system. The more countries that participate in a climate change regime, the lower the risk of leakage.
3. There are several possibilities to address issues of permanence of forest carbon including:

✓ issue of temporary credits that would expire after a few years (as with AR-CDM),
✓ credit buffers in which some credits are put aside as insurance in case of future loss of forest carbon and
✓ risk pooling by combining REDD with different activities such as afforestation and energy efficiency projects

B. Methods for Estimating GHG Emissions and/or Removals from Forests

1. Methods/Guidelines

1) Revised 1996 IPCC guidelines for National Greenhouse Gas Inventories (IPCC Guidelines) – **1996GL**

2) IPCC Good Practice Guidance and Uncertainty Management (IPCC GPG)

3) IPCC Good Practice Guidance on Land Use, Land Change and Forestry (IPCC GPG LULUCF) – **GPG2003**

4) 2006 IPCC Guidelines for National Greenhouse Gas Inventories

2. Forest under the UNFCCC/Kyoto Protocol

Minimum area: 0.05 – 1.00 ha
Minimum crown cover 10 – 30%
Minimum potential height 2 – 5m
Young forests with the potential to meet the above 3

Deforestation
"The long-term or permanent conversion of land from forested to non-forested"

Degradation
"Changes within the forest which negatively affect the structure or function of the stand or site, and thereby lower the capacity to supply products and/or services"

3. Estimating GHG Emissions

Fundamental basis for inventory methodology rests upon two linked themes

▸ Flux of CO_2 to/from atmosphere assumed to be equal to changes in C-stocks in existing biomass and soils

▸ Changes in C-stocks can be estimated by establishing rates of change in land use and practices that bring about change in land use

Estimating C-stocks in land-use categories:
- *that are not subjected to change*
- *that are changed*

4. IPCC Guidelines

1. **LUCF (Land-Use Change and Forestry)** – Land use is the type of activity being carried out on a unit of land, such as forest land, cropland and grassland. The IPCC 1996GL refers to sources and sinks associated with GHG emissions/removals from human activities, which:
   ◦ Change the way land is used (e.g., clearing of forest for agriculture, conversion of grassland to forest)
   ◦ Affect the amount of biomass in existing biomass stocks (e.g., forest, village trees, savanna) and soil carbon stocks

2. **LULUCF (Land Use, Land-Use Change and Forestry)** – This includes GHG emissions/removals resulting from managed land (involving no change in use, such as forest remaining forest land) and land-use changes (involving changes in land-use, such as grassland converted to forest land or forest land converted to cropland).

5. Definitions

- **Source** – Any process or activity that releases a GHG (such as CO_2 and CH_4) into the atmosphere. A carbon pool can be a source of carbon to the atmosphere if less carbon is flowing into it than is flowing out of it.

- **Sink** – Any process, activity or mechanism that removes a GHG from the atmosphere. A given pool can be a sink for atmospheric carbon if during a given time interval more carbon is flowing into it than is flowing out of it.

6. Definitions

- **Activity data** – Data on the magnitude of human activity, resulting in emissions/removals taking place during a given period of time (e.g., data on land area, management systems, lime and fertilizer use).

- **Emission factor** – A coefficient that relates the activity data to the amount of chemical compound, which is the source of later emissions. Emission/removal factors are often based on a sample of measurement data, averaged to develop a representative rate of emission or removal for a given activity level under a given set of operating conditions.

- **Removal factor** – Rate at which carbon is taken up from the atmosphere by a terrestrial system and sequestered in biomass and soil.

7. Basic Equation

1. Most basic method to calculate emissions from a given source:

   Emission estimate = Activity data (AD) x Emission factor (EF)

2. Different methods that depend on the desired degree of estimation details, AD and EF availability, and the financial and human resources available

3. In IPCC terminology, simplest method is Tier 1:

   ◦ Uses IPCC default EF and require least disaggregated AD.
   ◦ Higher tiers requires more elaborated methods and source specific, technology specific, region specific, and/or country specific EFs

8. IPCC96GL

1. Changes in forest and other woody biomass stocks due to
   – commercial management
   – harvest of industrial roundwood (logs) and fuelwood
   – establishment and operation of forest plantations
   – planting of trees in urban, village and non-forest locations

2. Forest and grassland conversion
   – the conversion of forests and grassland to pasture, cropland etc. can significantly change C-stocks in vegetation and soil

3. Abandonment of cropland, pasture, plantation forests, or other managed lands

4. CO_2 emissions and removals from soils
   – cultivation of mineral soils
   – cultivation of organic soils
   – liming of agricultural soils

9. GPG2003

1. *Three hierarchical tiers of methods* - range from use of default data and simple equations to use of country-specific data and models to accommodate national circumstances
   - *Land-use-category-based approach for organizing methodologies*

2. Land-use categories:
   - *Forest land, cropland, grassland, wetland, settlements and others*

3. Each land-use category is further disaggregated to reflect the past and the current land use

   - *Forest land remaining forest land*
   - *Lands converted to forest land*

10. CO_2 Pools, Non–CO_2 Gases and Sources of Non–CO_2 Gases

1. CO_2 emissions and removal are estimated for all the C-pools:
   a) *Above-ground biomass*
   b) *Below-ground biomass*
   c) *Soil carbon*
   d) *Dead organic matter*
   e) *Woody litter*

2. Non-CO_2 gases estimated include:
   - *CH_4, N_2O, CO and NO_x*

3. Sources of non-CO_2 gases:
   a) *N_2O and CH_4 from forest fires*
   b) *N_2O from managed (fertilized) forests*
   c) *N_2O from drainage of forest soils*
   d) *N_2O and CH_4 from managed wetland*
   e) *Soil emissions of N_2O from land-use conversion*

Forest Land

- Estimates carbon stock changes and GHG emissions/removals associated with changes in biomass and soil organic carbon on forest land and lands converted to forest land
  - *Forest land remaining forest*
  - *Land converted to forest*
- Provides methodology for five carbon pools
- Links biomass and soil carbon pools for the same land areas (at higher tiers)

Cropland

- Provides methods for estimating annual N_2O emissions from mineral soils due to addition of N (in the form of fertilizer, manure and crop residue) and N released by soil organic matter mineralization

- *These categories are estimated and reported in agriculture sector in IPCC 1996GL*

Grassland

- Estimates annual change in carbon stocks in living biomass and soil carbon (mineral soils and cultivated organic soils) in grassland remaining grassland and lands converted to grassland

- Provides methodology for estimating non-CO_2 emissions from vegetation fires based on:
  - area of grassland burnt,
  - mass of available fuel,
  - combustion efficiency and emission factor for each GHG from grassland remaining grassland and land converted to grassland

Wetlands

- The GHGs estimated include CO_2, CH_4 and N_2O
- Estimates changes in carbon stocks in lands converted to wetlands due to peat extraction and land converted to flooded land
- Estimates N_2O emissions from peatland drainage and flooded land and CH_4 emissions from flooded land

Settlements and Other Lands

Settlements
◦ Methods for estimating Annual change in carbon stocks in living biomass in 'forest lands converted to settlements' based on area of land converted and carbon stock in living biomass immediately before and after conversion to settlements

Other land
◦ Methodology provided for estimating annual change in carbon stocks in 'land converted to other land' based on estimates of change in carbon stocks in living biomass and SOC

Methodological Issues/Problems

1. Compatibility of IPCC land categories to national classification
2. High uncertainty of inventory, AD and EF
3. Lack of disaggregated data, particularly on vegetation types
4. Lack of clarity for reporting estimates of emissions/removal in managed natural forest
5. Lack of consistency in estimating/reporting total biomass or only above-ground biomass
6. Lack of methods for below-ground biomass and for incorporating non-forest areas, such as coffee, tea, coconut, cashew nut
7. Difficulty in differentiating managed (anthropogenically impacted) and natural forests
8. Ambiguity in terminology, e.g. forest, afforestation, reforestation, managed forest
9. Complexity of the methodology

What do we need to do??

- Resolve technical/methodological issues/problems
- Develop Activity Data and Emission/Removal Factors
- Develop a policy for climate change mitigation
- Capacity building and training
    - national inventory of carbon stocks
    - Development of REDD projects