

# LEAF Technical Training on Reference Level Development

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# Combining Activity Data and Emissions Factors



# Overview

- Review of Reference Level Development
- Review of Activity Data and Emission Factors
- Combining AD and EF to Estimate Emissions/Removals
- Example

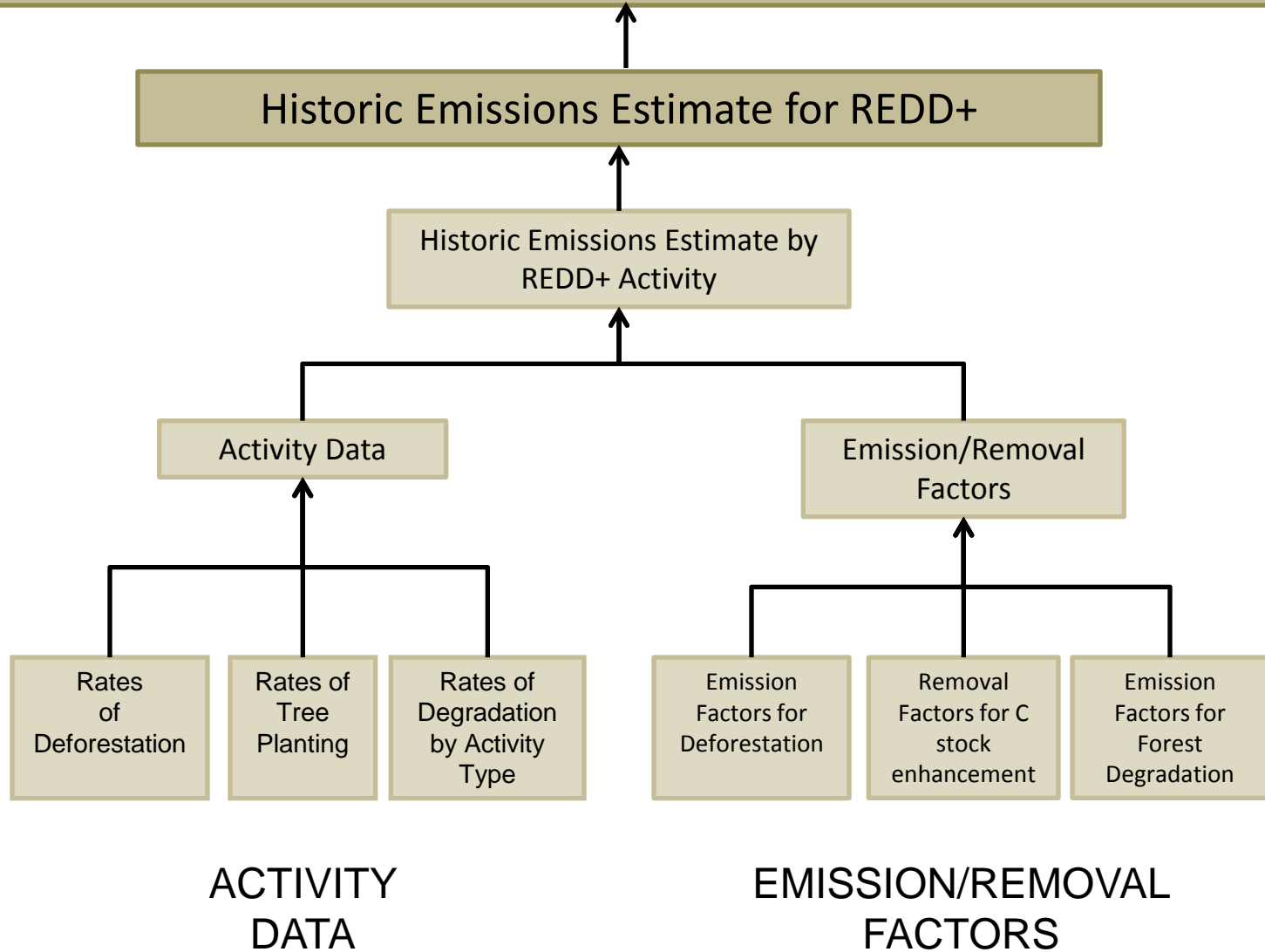
# What are reference levels?

- Basis for calculating emission reductions
- Reference Levels (RLs) refer to business-as-usual benchmarks
- Ultimately compared to REDD+ implementation captured by MRV
- Derived from account historical data and adjusted for national circumstances

# Establishing a Reference Level (RL) - Steps

1. Delineate roles and responsibilities
2. Increase needed capacity
3. Create Activity Data
  - Land use/cover categories
  - Standardized Land Use maps, 'Benchmark Map'
  - Determine historic LU activity and change
4. Create Emission Factors / Removal Factors
  - Collaborate with RS/GIS to determine LU transitions
  - Collect field measurements
  - Calculate EF and RF for each LU transition
5. Estimate Historical Emissions
6. Project future emissions - RL

# Emissions Estimate Projected into Future / Adjusted for National Circumstances



# Capacity Required

- Financial System
- Components of REDD+ program
- Remote Sensing
  - Land cover classification / carbon stratification
- GIS
  - Link RS with field measurements
  - Spatial Modeling of Future Projections
- Field Measurements
- Emission Factor calculation
- Hardware / Software upgrade

# RL and MRV technical inputs

- For each activity RL is an annual emission composed of :
  - **Activity data (AD) – measure of extent of activity**
    - Obtained from change detection of remote sensing products or other sources such as timber extraction statistics
  - **Emission factors (EF) – emissions/removals of GHG per unit activity**
    - Obtained from field data on carbon stocks, tree removals, regrowth rates etc.





# IPCC framework refers to three Approaches and three Tiers for data for estimating emissions

Approach for activity data: Area change

1. Non-spatial country statistics (e.g. FAO)-generally gives net change in forest area
2. Based on maps, surveys, and other national statistical data
3. Spatially specific data from interpretation of remote sensing data-only approach to use for D&D

# IPCC framework refers to three Approaches and three Tiers for data for estimating emissions

## Tiers for emission factors: Change in C stocks

1. IPCC default values at a continental scale-high uncertainty
2. Country specific data for key factors-medium to low uncertainty
3. National inventory of key carbon stocks, repeated measurements or modeling-medium to low uncertainty

# Combining activity data and emission factors for the RL and MRV

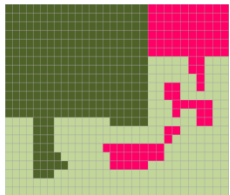
- Activity data is combined with emission factor data to estimate greenhouse gas emissions/removals

$$\begin{aligned} &\text{Emissions/removals (t CO}_2\text{e)} \\ &= \text{Emission Factor} \times \text{Activity Data} \end{aligned}$$

# Emissions from deforestation

Activity  
data

1000 ha

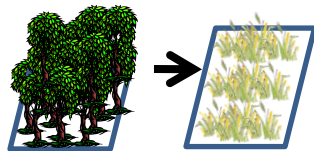


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\*

Emission  
factor

495 t  
CO<sub>2</sub>/ha



=

=

Emissions  
from  
Deforestation

495,000 t CO<sub>2</sub>e

# Example

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Goslee, K. , Petrova, S. (2012). LEAF Technical Training on Reference Level Development.