

LEAF Technical Training on Reference Level Development

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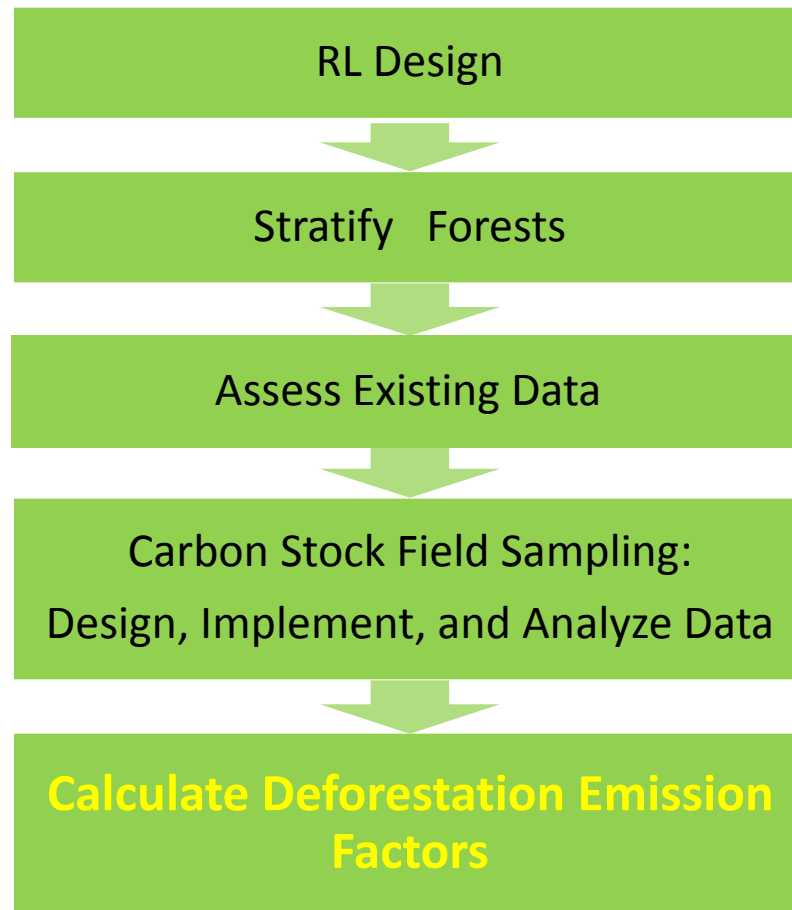




Calculating Deforestation Emission Factors



Steps for Emission Factor (EF) Creation



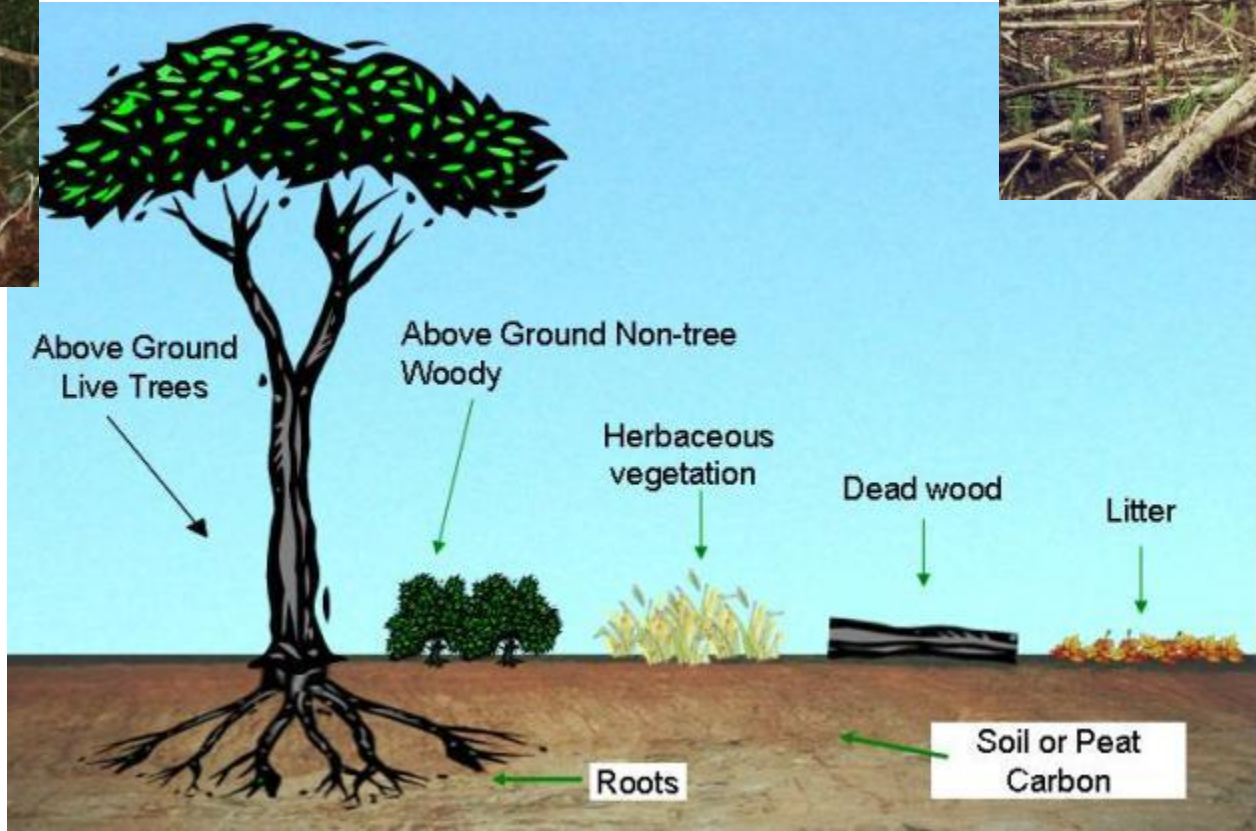
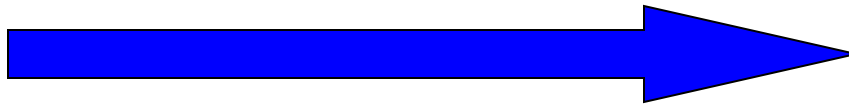
Calculating Emission Factors

- Calculate pre-deforestation carbon stocks for each pool
- Identify carbon stocks of post-deforestation land use
- Estimate carbon stocks stored as wood products
- Determine soil carbon emitted as a result of deforestation, if significant
- Sum carbon stock changes across pools



Emission Factors

- The carbon stocks for each forest stratum undergoing change is determined to define emission factors



Carbon Stocks to Emission Factors

$EF_{\text{deforestation}}$

$$= (C_{\text{bio.pre}} - C_{\text{bio.post}} - C_{\text{wp}} + C_{\text{soc}}) * \frac{44}{12}$$

Where:

$EF_{\text{deforestation}}$ = Emission factor for deforestation, tCO_2ha^{-1}

$C_{\text{bio.pre}}$ = Carbon stock in biomass prior to deforestation, $t C ha^{-1}$

$C_{\text{bio.post}}$ = Carbon stock in forest biomass after deforestation, $t C ha^{-1}$

C_{wp} = Carbon stock in wood products following deforestation, $t C ha^{-1}$

C_{soc} = Soil carbon stocks emitted, $t C ha^{-1}$

$\frac{44}{12}$ = conversion factor from carbon to CO_2

Include emissions from non- CO_2 gases if relevant

Pre-deforestation C stocks

$$C_{bio.pre} = (C_{agb} + C_{bgb} + C_{dw} + C_{lit} + C_{sap})$$

Where:

$C_{bio.pre}$ = Carbon stock in biomass, $t C ha^{-1}$

C_{agb} = Carbon stock in aboveground biomass, $t C ha^{-1}$

C_{bgb} = Carbon stock in belowground biomass, $t C ha^{-1}$

C_{dw} = Carbon stock in deadwood pools, $t C ha^{-1}$

C_{lit} = Carbon stock in litter, $t C ha^{-1}$

C_{sap} = Carbon stock in saplings, $t C ha^{-1}$

Post deforestation C stocks

$$C_{bio.post} = (C_{agb} + C_{bgb} + C_{dw} + C_{lit} + C_{sap})$$

- Use carbon pool stocks from appropriate post-deforestation land use
 - May include more herbaceous vegetation and fewer trees, such as in agriculture
- Proxy areas may be measured
- Default values – from IPCC or regionally developed

Carbon in wood products

- Harvested carbon may be stored in short and long term wood products - C_{wp}
- Landfilled wood also stores harvested carbon
- Need to account for life span of wood products
- Default values – from IPCC or regionally developed



Carbon Stocks to Emission Factors

$$C_{SOC} = [C_{soil} - (C_{soil} * F_{LU} * F_{MG} * F_l)]$$

Where:

C_{SOC} = Soil carbon stocks emitted, $t CO_2 ha^{-1}$

C_{soil} = Carbon stocks in soil organic matter pool (to 30 cm), $t C ha^{-1}$

F_{LU} = IPCC stock change factor for land-use systems for a particular land-use, dimensionless

F_{MG} = IPCC stock change factor for management regime, dimensionless

F_l = IPCC stock change factor for input of organic matter, dimensionless

Soil Factors (IPCC 2006)

| Converted to | F_{LU} | F_{MG} | F_I | Combined factors |
|--------------------------------------|----------|----------|-------|------------------|
| Permanent agriculture | 0.48 | 1.00 | 1.00 | 0.48 |
| Unpaved roads | 0.82 | 1.00 | 0.92 | 0.75 |
| Shifting cultivation- long cycle | 0.80 | 1.00 | 1.00 | 0.80 |
| Shifting cultivation- short cycle | 0.65 | 1.00 | 1.00 | 0.65 |

Example

- Excel worksheet and exercise



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