REDD+ Decision Support Toolbox

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World Bank/FCPF FMT

REDD+ Monitoring and MRV Workshop
Training of Trainers
Bangkok
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REDD+ Decision Support Toolbox

- Created to help FCPF countries explore where the greatest opportunities for emission reductions or removals may be.
- Practical guidance based on UNFCCC, FCPF, and VCS standards.
- Produces customized estimates of emissions from REDD+ activities and builds basic REDD+ reference levels.

URL: www.forestcarbonpartnership.org/dst

The REDD+ Decision Support Toolbox

REDD+ Decision Support Toolbox

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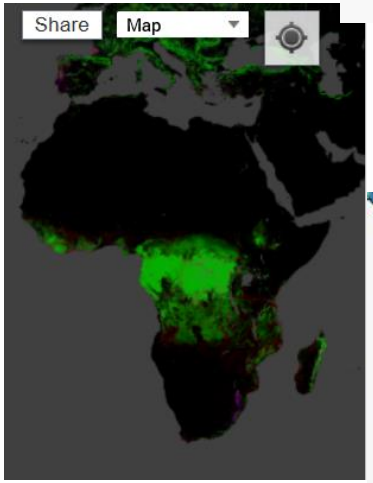
www.forestcarbonpartnership.org/dst

Online tool with a simple interface, supported by a comprehensive database, that

- **Informs** the technical approach for reference levels (RL), forest monitoring, and measurement reporting and verification (MRV)
- **Facilitates** technical and policy decisions related to RL and MRV

The tool draws on publically available and spatially referenced information

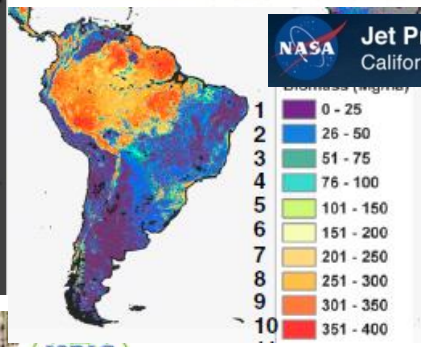
- IPCC
- FAO
- Research and Data Initiatives
- Satellite-based data products
- National Statistics
- Published literature
- Others



REDD+ Decision Support Toolbox

Global Forest Change
Published by Hansen, Potapov, Moore, Hancher et al.

UNIVERSITY OF MARYLAND
DEPARTMENT OF GEOGRAPHICAL SCIENCES



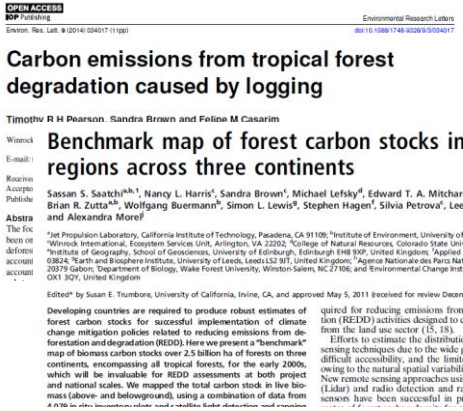
NASA Jet Propulsion Laboratory
California Institute of Technology

ISRIC World Soil Information

WISDOM
Woodfuel Integrated Supply/Demand Overview Mapping

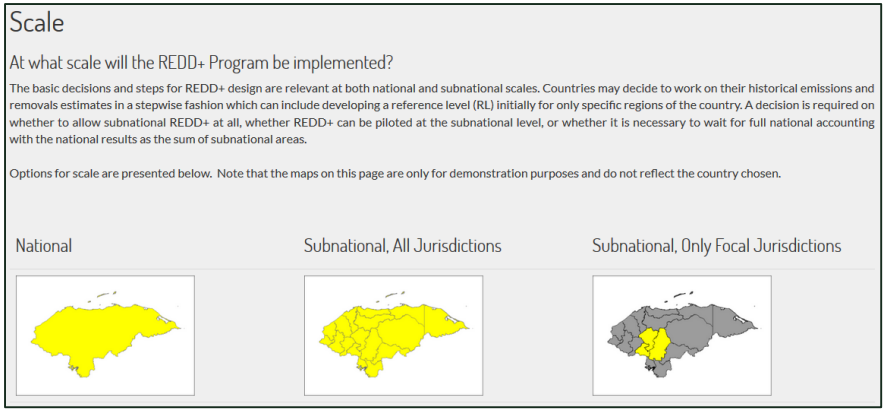
FAO FIAT PANIS

UNFCCC

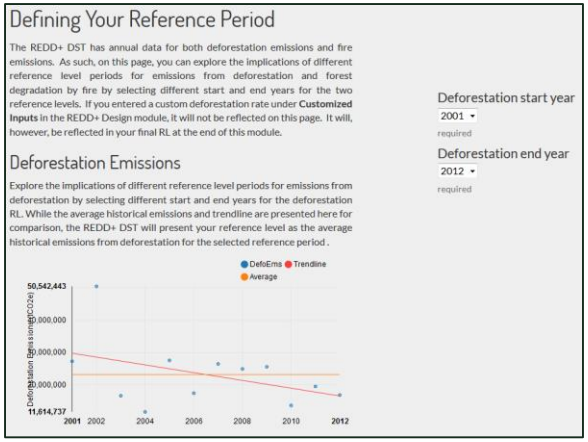


REDD+ DST MODULES

1. REDD+ Design
   - Choose scale
   - Choose forest definition (10,20,30%)
   - Choose REDD+ activities
   - Choose Carbon Pools
   - Choose GHGs
   - Choose to include all managed land



2. Reference Levels
   - Select historical time period for RL
   - Explore options for adjustments



3. National Forest Monitoring System
   - Generating AD
   - Developing EFs
4. Reporting and Verification
   - Uncertainty
   - Verification

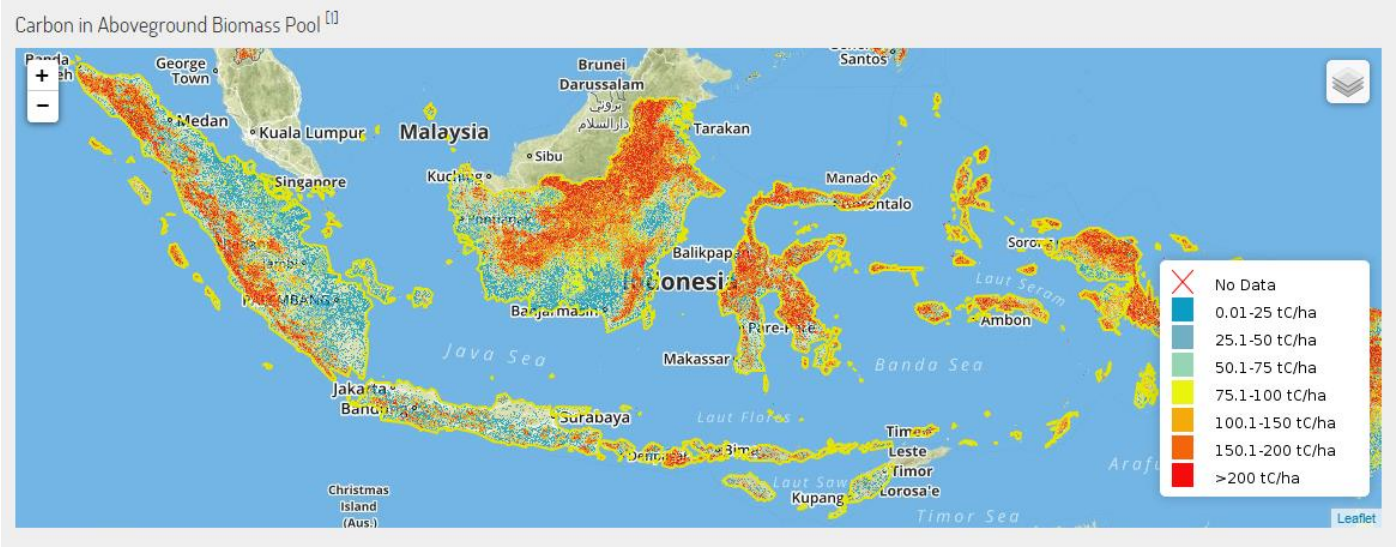
REDD+ Activities

- Deforestation
- Degradation
  - Degradation from timber harvesting
  - Degradation from fuelwood collection/use
  - Degradation from forest fire
- Enhancements

REDD+ Activities: Deforestation

- **AD:** Hansen, M., et al. 2013. “High-Resolution Global Maps of 21st-Century Forest Cover Change.” Science 342 (15 November): 850–53. (annual data from 2001-2012)

- **EFs**: Saatchi, SS, et al. 2011, "Benchmark map of forest carbon stocks in tropical regions across three continents" Proceedings of the National Academy of Sciences of the United States of America - PNAS, vol 108, no. 24, pp. 9899-9904., 10.1073/pnas.1019576108



REDD+ Activities: Forest Degradation Timber Harvesting

Pearson, et al, 2014. "Carbon emissions from tropical forest degradation caused by logging" (Published in Environmental Research Letters)

- EF **(t C/m³): ELE + LDF + LIF**

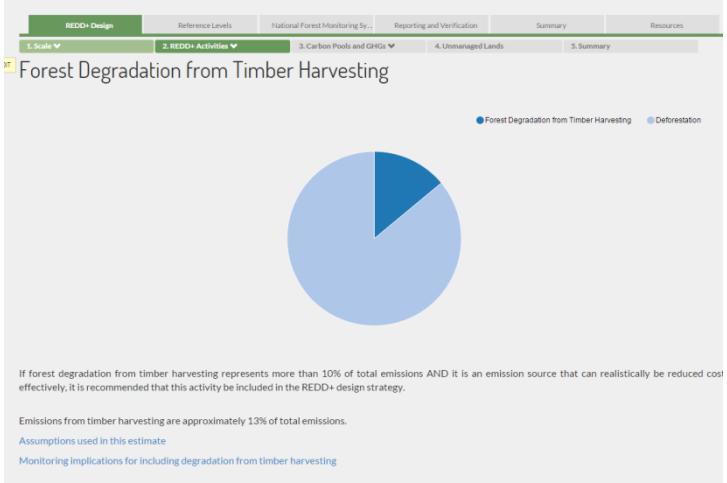
ELE: Extracted log emissions (emissions from extracted log, minus C storage in long-term wood products, per unit of wood extracted)

LDF: Logging damage factor (incidental damage caused by felling of tree, per unit of wood extracted)

LIF: Logging infrastructure factor (roads, decks, skid trails per unit of wood extracted)

- **AD:** FAO Stat harvest volume data

*FAO stat data only available at the national scale, so emissions area-weighted across countries according to forest cover



REDD+ Activities: Forest Degradation from fire

Global Fire Emissions Database (http://www.globalfiredata.org/)

- Emissions from the forest land cover class
- Three main gases included: carbon dioxide, methane, and nitrous oxide.
- Methane and nitrous oxide were converted to carbon dioxide equivalent, and total emissions per hectare were averaged over each subnational unit

-Fire data resolution 50 km vs. 30m for deforestation

(Van der Werf, G.R., Randerson, J.T., Giglio, L., Collatz, G.J., Mu, M., Kasibhatla, P.S., Morton, D.C., DeFries, R.S., Jin, Y., van Leewen, T.T. 2010. "Global fire emissions and the contribution of deforestation, savannah, forest, agriculture, and peat fires (1997-2009)." Atmospheric Chemistry and Physics, 10, 11707-11735. doi:10.5194/acp-10-11707-2010)

REDD+ Activities: Forest Degradation from fuelwood

Emissions based on **Woodfuels Integrated Supply/Demand Overview Mapping (WISDOM)** approach developed though the Yale-UNAM Project.

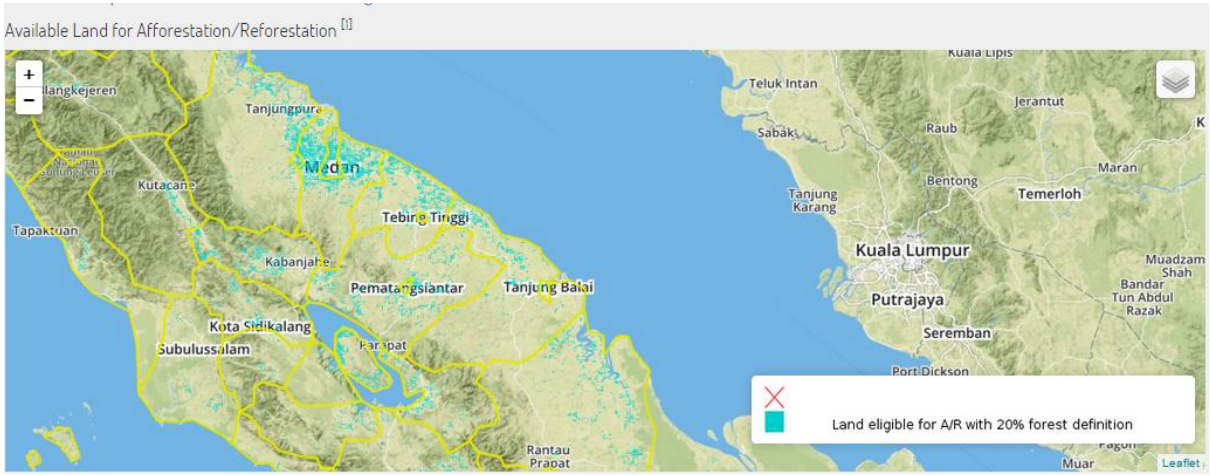
- Spatially explicit global dataset of woodfuel demand, supply, and non-renewable biomass (NRB) consumption at national/subnational levels.
- This means in the REDD+ DST, areas with high biomass increment and low population density show low emissions from fuelwood consumption.

(Drigo, R. 2014. "Elaboration of the pan-tropical analysis of NRB harvesting (Tier 1 data, version 01 April 2014)." Produced by the Yale-UNAM GACC Project: Geospatial Analysis and Modeling of Non-Renewable Biomass: WISDOM and Beyond for Global Alliance for Clean Cookstoves)

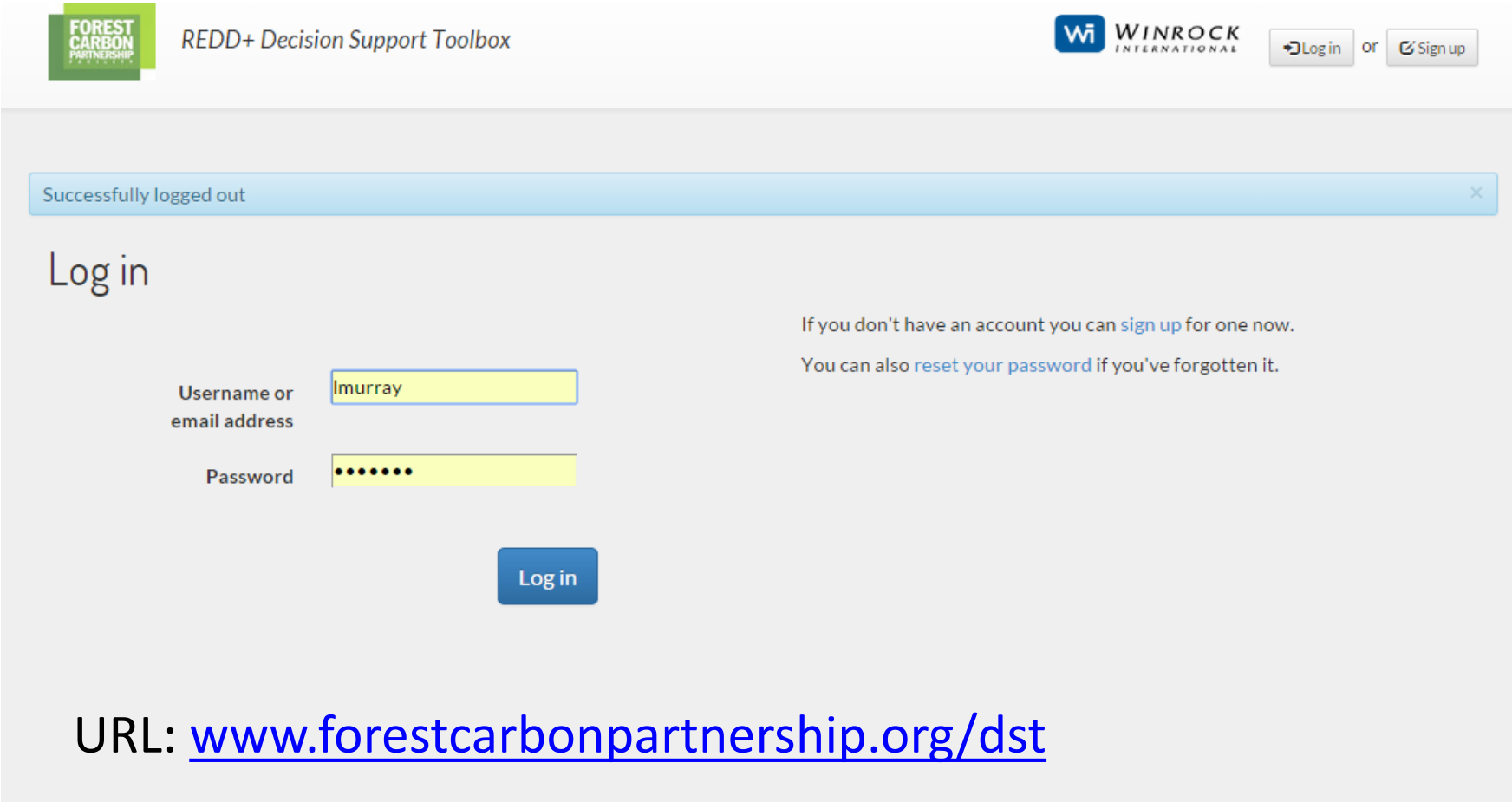
REDD+ Activities: Enhancements

AD: Zomer RJ, et al. 2008. Climate Change Mitigation: A Spatial Analysis of Global Land Suitability for Clean Development Mechanism Afforestation and Reforestation. Agric. Ecosystems and Envir. 126: 67-80.

EFs: IPCC default annual average AGB increment by region and precipitation regime.

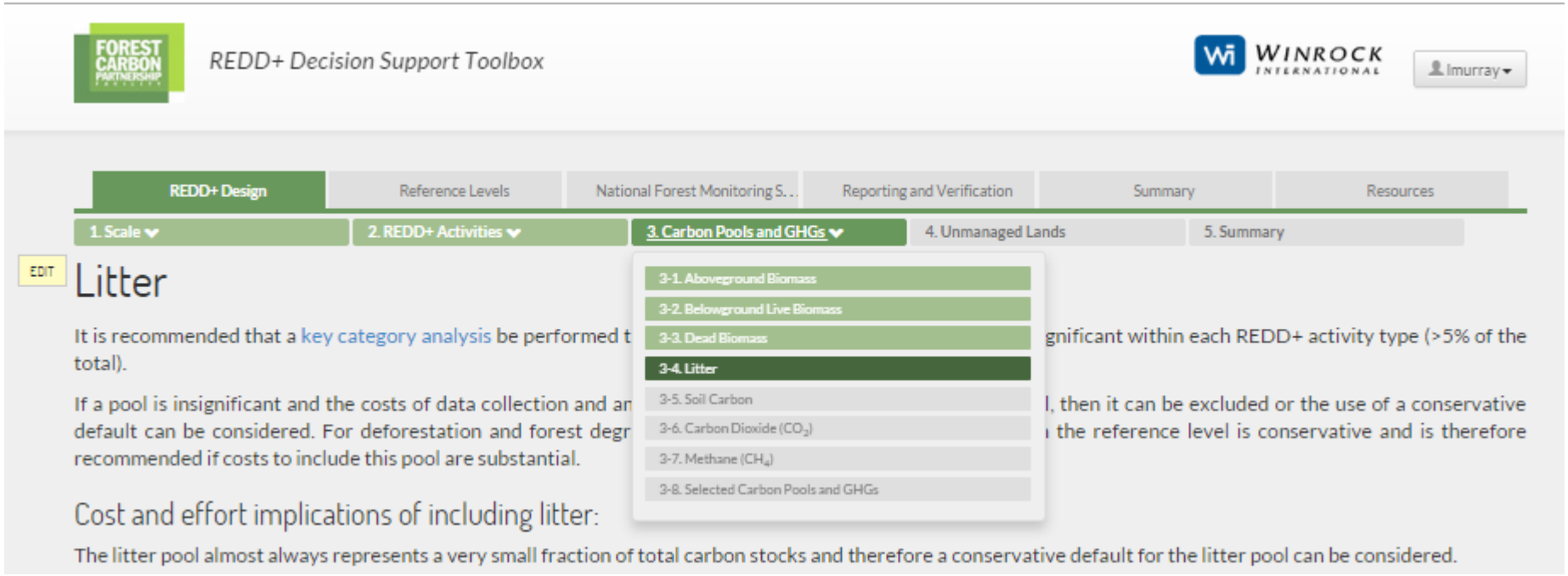


Login



URL: www.forestcarbonpartnership.org/dst

Navigating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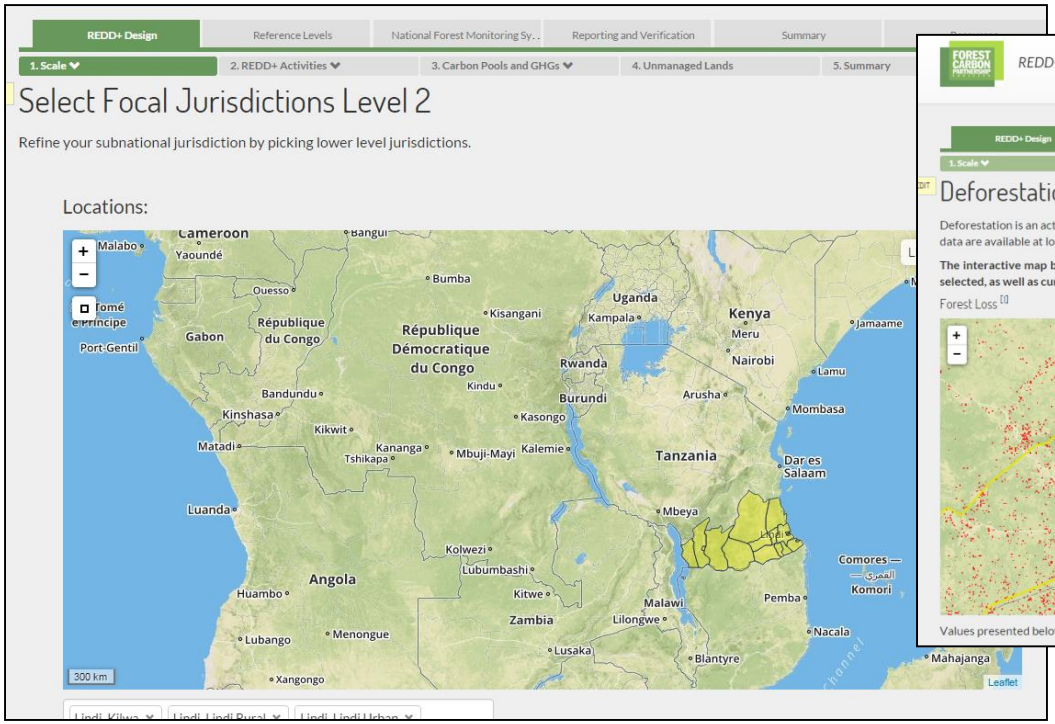
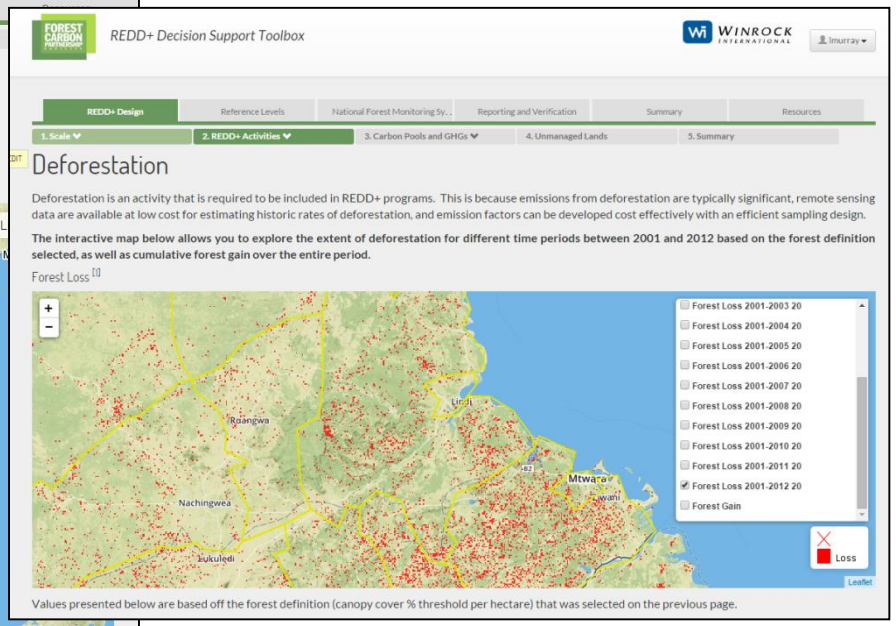
EDIT
Litter
3-1. Aboveground Biomass
3-2. Belowground Live Biomass
3-3. Dead Biomass
3-4. Litter
3-5. Soil Carbon
3-6. Carbon Dioxide (CO_2)
3-7. Methane (CH_4)
3-8. Selected Carbon Pools and GHGs
It is recommended that a key category analysis be performed t
gnificant within each REDD+ activity type (>5% of the total).
If a pool is insignificant and the costs of data collection and ar
l, then it can be excluded or the use of a conservative default can be considered. For deforestation and forest degr
the reference level is conservative and is therefore recommended if costs to include this pool are substantial.
Cost and effort implications of including litter:
The litter pool almost always represents a very small fraction of total carbon stocks and therefore a conservative default for the litter pool can be considered.

Spatially Explicit & Interactive

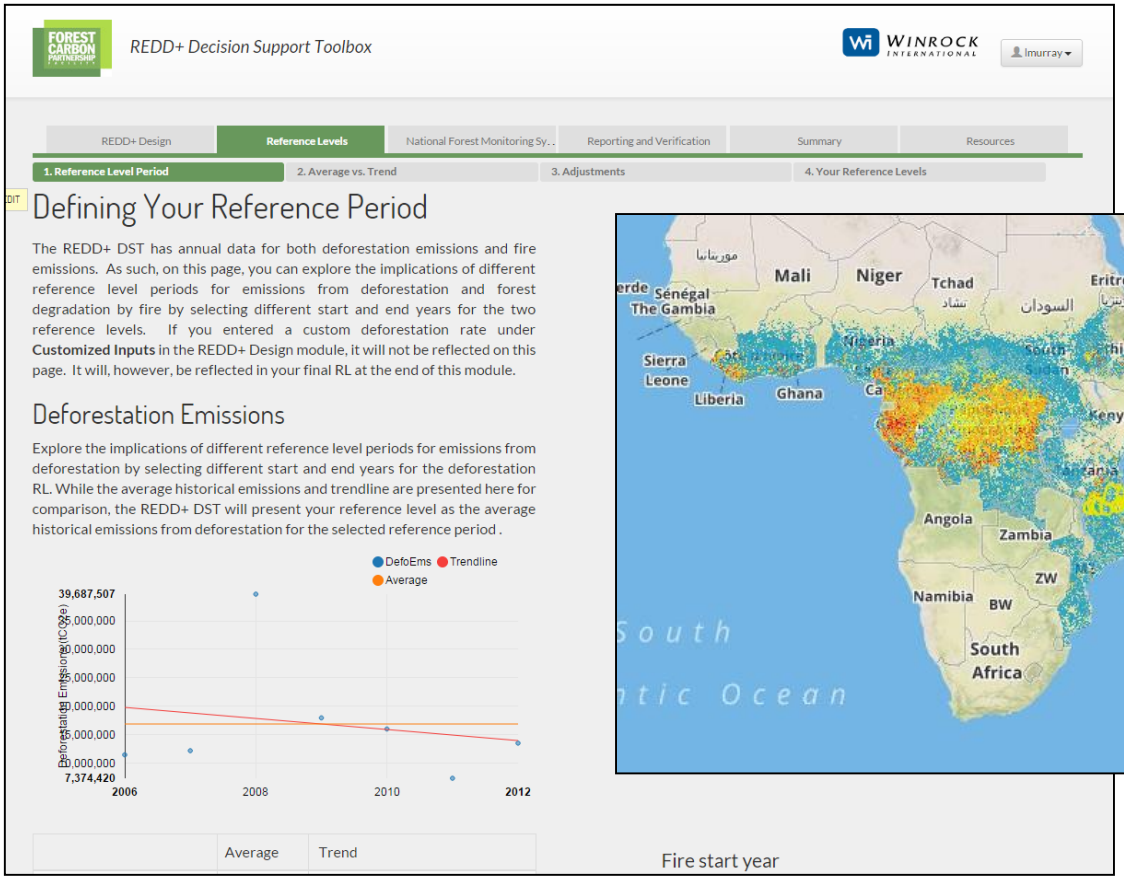
- Users choose the FCPF country and jurisdictions and/or municipalities to include
- Estimates specific to selected geography

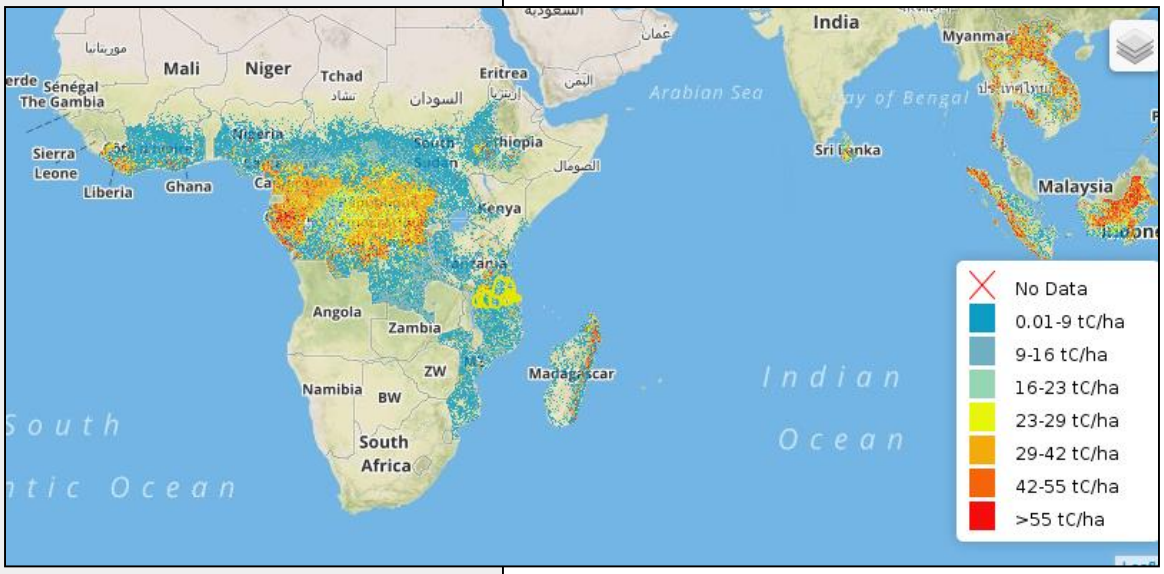




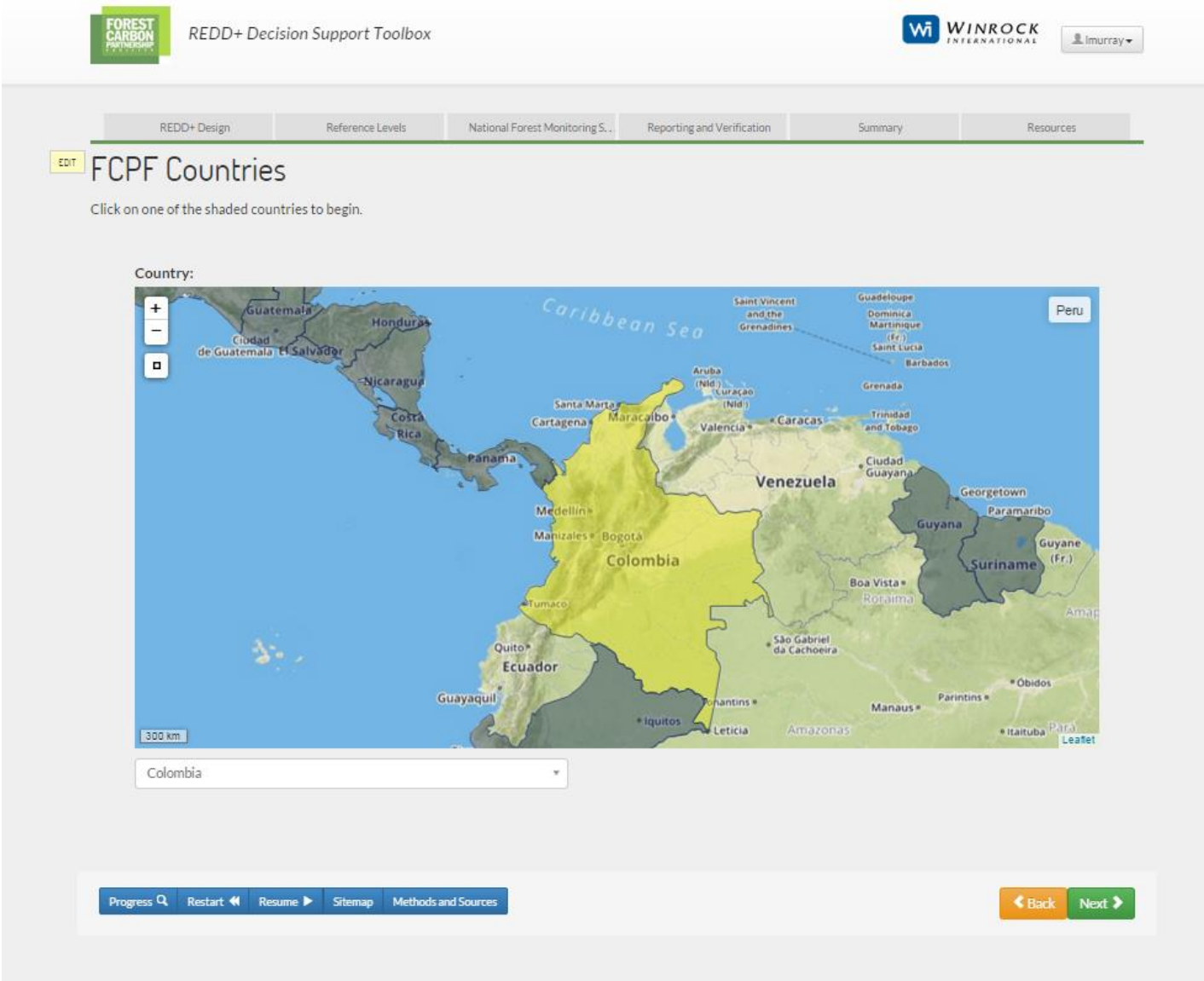
Consistency

- Consistent methods and data, allowing comparison of emissions and pools across geographies





Select a country



REDD+ Design Module - Scale

REDD+ Design | Reference Levels | National Forest Monitoring S.. | Reporting and Verification | Summary | Resources

1. Scale | 2. REDD+ Activities | 3. Carbon Pools and GHGs | 4. Unmanaged Lands | 5. Summary

EDIT

Scale

At what scale will the REDD+ Program be implemented?

The basic decisions and steps for REDD+ design are relevant at both national and subnational scales. Countries may decide to work on their historical emissions and removals estimates in a stepwise fashion which can include developing a reference level (RL) initially for only specific regions of the country. A decision is required on whether to allow subnational REDD+ at all, whether REDD+ can be piloted at the subnational level, or whether it is necessary to wait for full national accounting with the national results as the sum of subnational areas.

Options for scale are presented below. Note that the maps on this page are only for demonstration purposes and do not reflect the country chosen.

National

REDD+ accounting and reporting occurs at the national scale. A single national RL and MRV system is developed. Subnational REDD+ can still occur, but is limited to subnational planning and implementation of emission reduction and carbon sequestration programs and the associated distribution of benefits. More about national scale

Subnational, All Jurisdictions

REDD+ is implemented within individual jurisdictions within the national boundary and national level accounting occurs as the sum of subnational totals. Subnational participation occurs only as part of full national accounting and subnational jurisdictions do not report separately from the national system.

Where subnational participation is incomplete, non-participating jurisdictions would have a RL assigned nationally and would be monitored under the national Reporting and Verification program. More about subnational scale (all jurisdictions included)

Subnational, Only Focal Jurisdictions

REDD+ is implemented within select individual jurisdictions within the national boundary, and subnational reporting precedes national level reporting. More about subnational scale (focal jurisdictions only)

Is there a role for privately financed REDD+ projects?

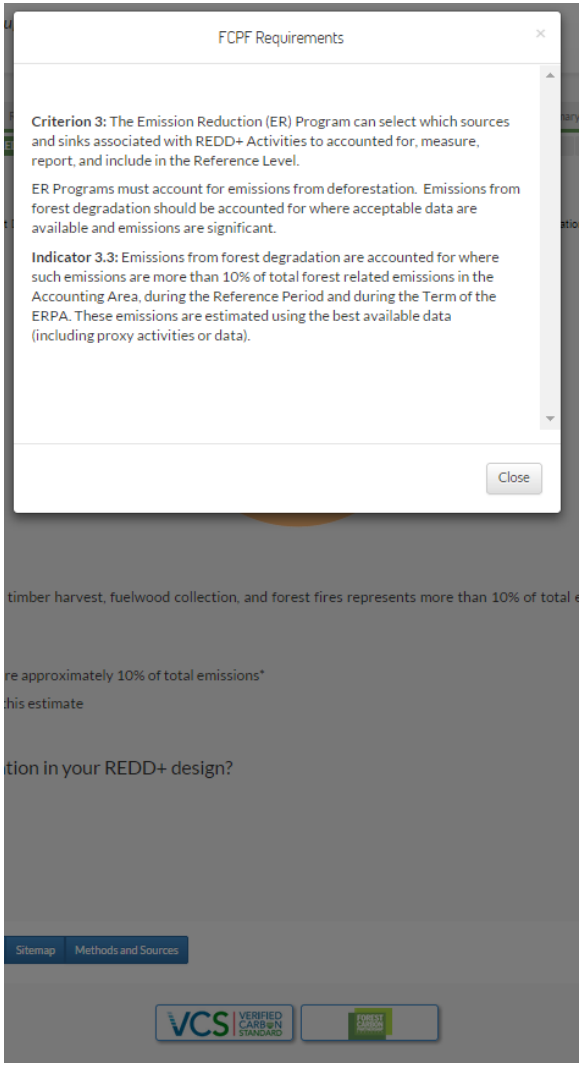
What role should the national government play?

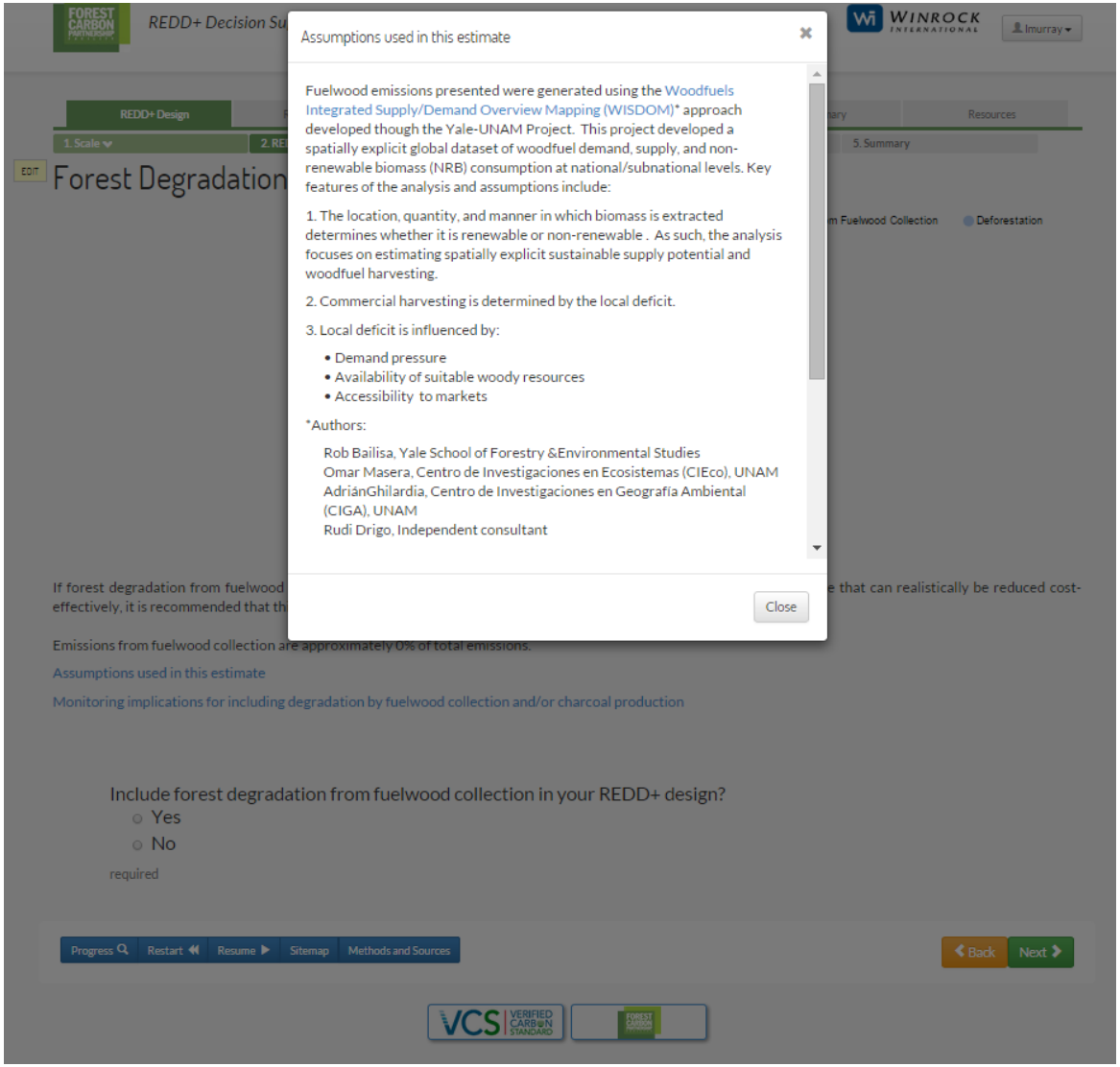
How should subnational boundaries be determined?

Scale:

- National
- Subnational (All Jurisdictions)
- Subnational (Focal Jurisdictions Only)

Pop-ups


FCPF Requirements
Criterion 3: The Emission Reduction (ER) Program can select which sources and sinks associated with REDD+ Activities to accounted for, measure, report, and include in the Reference Level.
ER Programs must account for emissions from deforestation. Emissions from forest degradation should be accounted for where acceptable data are available and emissions are significant.
Indicator 3.3: Emissions from forest degradation are accounted for where such emissions are more than 10% of total forest related emissions in the Accounting Area, during the Reference Period and during the Term of the ERPA. These emissions are estimated using the best available data (including proxy activities or data).
Close
timber harvest, fuelwood collection, and forest fires represents more than 10% of total
re approximately 10% of total emissions*
his estimate
tion in your REDD+ design?
Sitemap
Methods and Sources
VCS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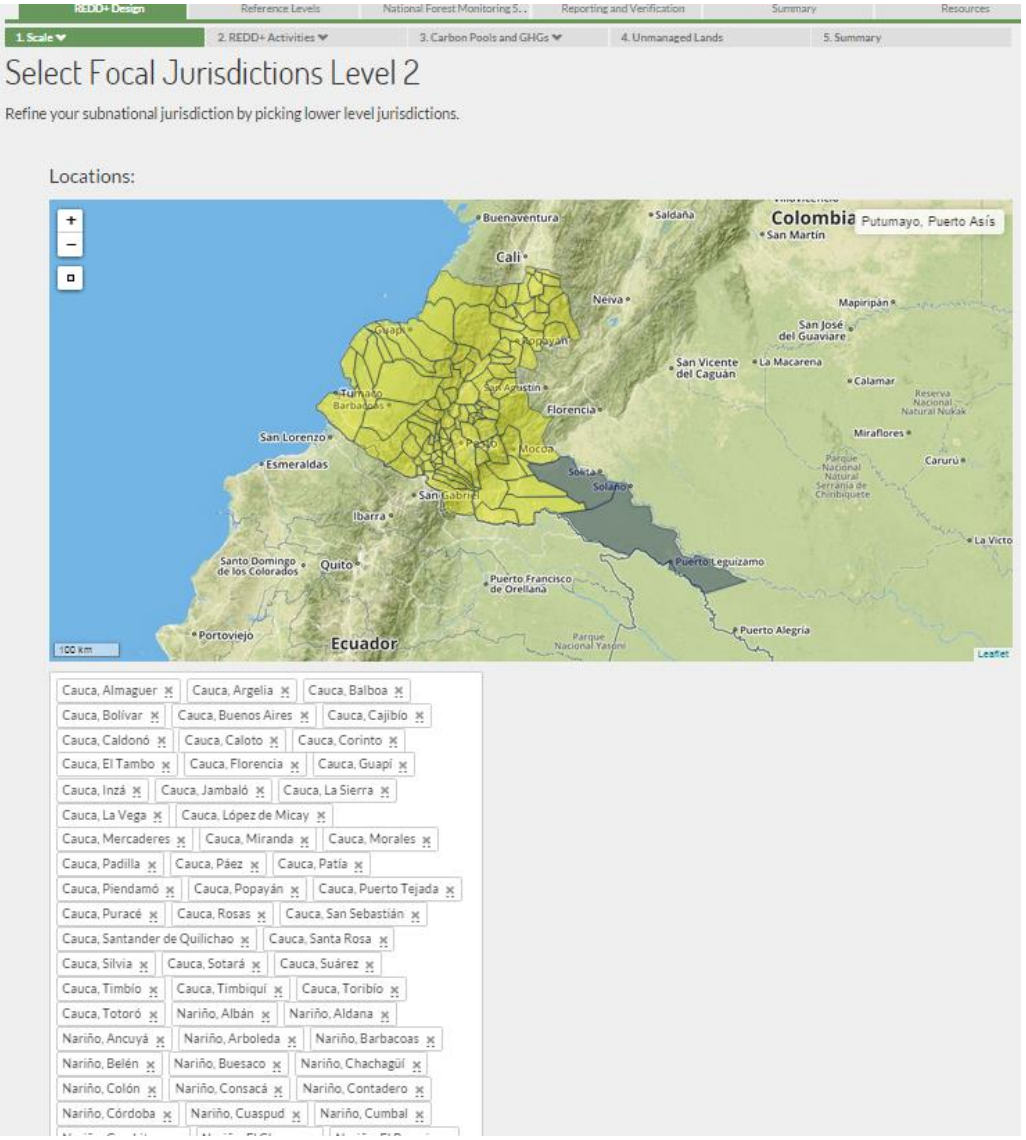
EDIT
Forest Degradation
Fuelwood Collection
Deforestation
Assumptions used in this estimate
Fuelwood emissions presented were generated using the Woodfuels Integrated Supply/Demand Overview Mapping (WISDOM)* approach developed though the Yale-UNAM Project. This project developed a spatially explicit global dataset of woodfuel demand, supply, and non-renewable biomass (NRB) consumption at national/subnational levels. Key features of the analysis and assumptions include:
1. The location, quantity, and manner in which biomass is extracted determines whether it is renewable or non-renewable . As such, the analysis focuses on estimating spatially explicit sustainable supply potential and woodfuel harvesting.
2. Commercial harvesting is determined by the local deficit.
3. Local deficit is influenced by:
• Demand pressure
• Availability of suitable woody resources
• Accessibility to markets
*Authors:
Rob Bailisa, Yale School of Forestry &Environmental Studies
Omar Masera, Centro de Investigaciones en Ecosistemas (CIEco), UNAM
AdriánGhilardia, Centro de Investigaciones en Geografía Ambiental (CIGA), UNAM
Rudi Drigo, Independent consultant
Close
If forest degradation from fuelwood
effectively, it is recommended that th
e that can realistically be reduced cost-
Emissions from fuelwood collection are approximately 0% of total emissions.
Assumptions used in this estimate
Monitoring implications for including degradation by fuelwood collection and/or charcoal production
Include forest degradation from fuelwood collection in your REDD+ design?
Yes
No
required
Progress
Restart
Resume
Sitemap
Methods and Sources
Back
Next
VCS

Selecting Jurisdictions



First-order estimates

Deforestation

Activity	Metrics	First-order Estimate	% of Total Emissions	Potentially Significant? [1]
Deforestation	tons CO_2e / year	15,062,000 * [2]	91%	Yes
Emissions from Peat Forests	tons CO_2e / year	0 [3]		

Degradation

Activity	Metrics	First-order Estimate	% of Total Emissions	Potentially Significant?[4]
Timber Harvesting / Forest Management	tons CO_2e / year	1,459,900 [5]	9%	Yes
Fuelwood/Charcoal Production	tons CO_2e / year	12,400 [6]	0%	No
Forest Fire	tons CO_2e / year	20,900 [7]	0%	No
Total Degradation	tons CO_2e / year	1,493,200	9%	No

Summary

Activity	Metrics	First-order Estimate	% of Total Emissions	Potentially Significant?[8]
Deforestation	tons CO_2e / year	15,062,000	91%	Yes
Total Degradation	tons CO_2e / year	1,493,200	9%	No
Total Emissions	tons CO_2e / year	16,555,100	N/A	
Potential Removals / Sequestration based on Available Land *	tons CO_2e / year	2,103,700 [9]	N/A	

Choose a forest definition

REDD+ Design | Reference Levels | National Forest Monitoring Sy.. | Reporting and Verification | Summary | Resources

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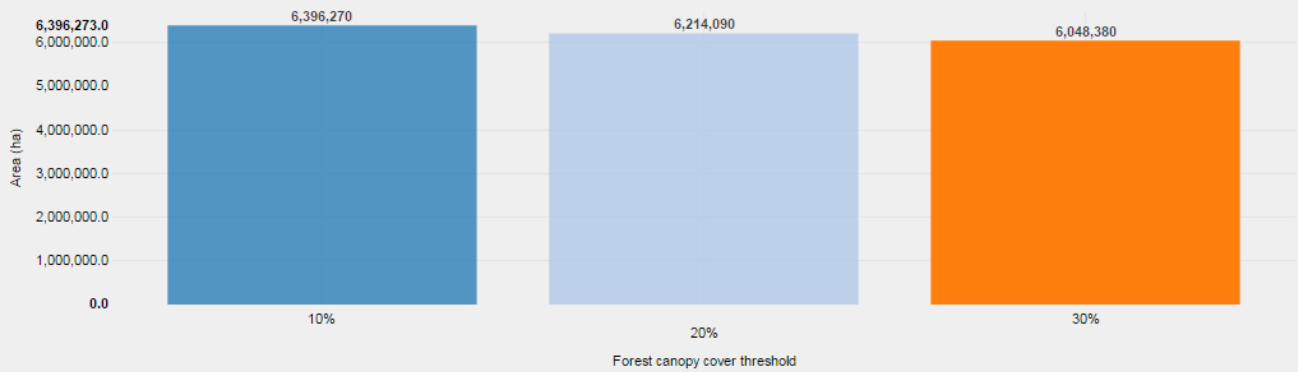
Choosing a Forest Definition

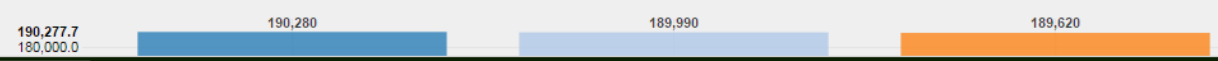
How forests are defined lies at the heart of which national areas will qualify to participate in REDD+. Within REDD+, it will also determine what counts as deforestation as opposed to forest degradation. How a country sets up its forest definition will affect the total area of the country that is considered forest. Using a very inclusive or broad definition will maximize forest area within the country by including both lands that have high tree cover as well as lands that are more open, degraded, marginal, or with trees of shorter stature. Using a very strict or narrow definition will minimize forest area within the country by excluding the most highly degraded or open lands that could perhaps be classified instead as open woodland, savanna, shrubland, or degraded land.

The United Nations Food and Agriculture Organization (FAO) defines forest as land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use. **The DST allows you to select one of three forest definitions based on a 10%, 20%, and 30% canopy cover threshold and presents forest loss and enhancements accordingly.** Below are some estimates that demonstrate how different forest definitions would impact the REDD+ Program.

Total Forest Area



Forest Loss 2001-2012



Choose Activities

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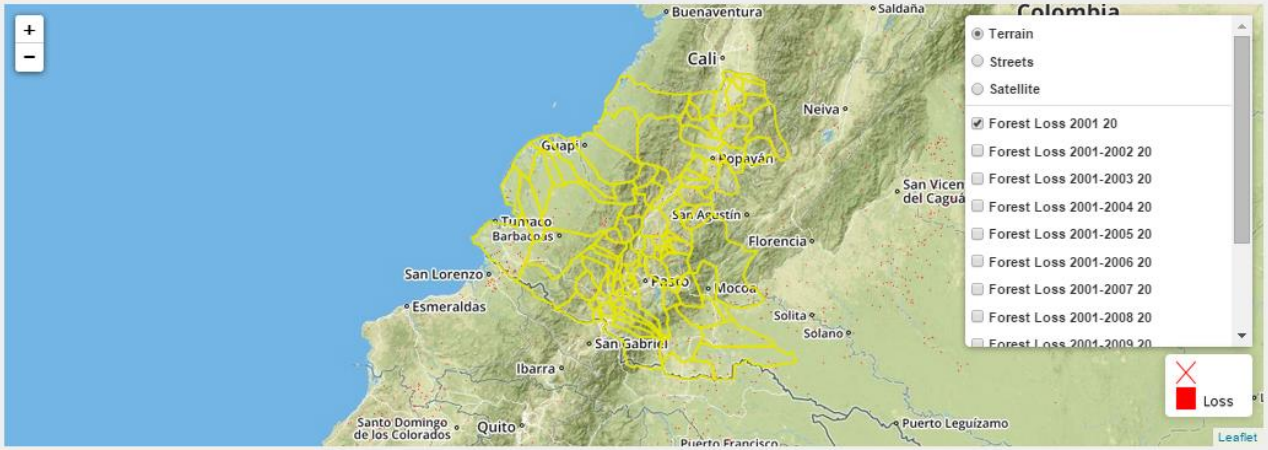
Deforestation

Deforestation is an activity that is required to be included in REDD+ programs. This is because emissions from deforestation are typically significant, remote sensing data are available at low cost for estimating historic rates of deforestation, and emission factors can be developed cost effectively with an efficient sampling design.

The interactive map below allows you to explore the extent of deforestation for different time periods between 2001 and 2012 based on the forest definition selected, as well as cumulative forest gain over the entire period.

Forest Loss [1]

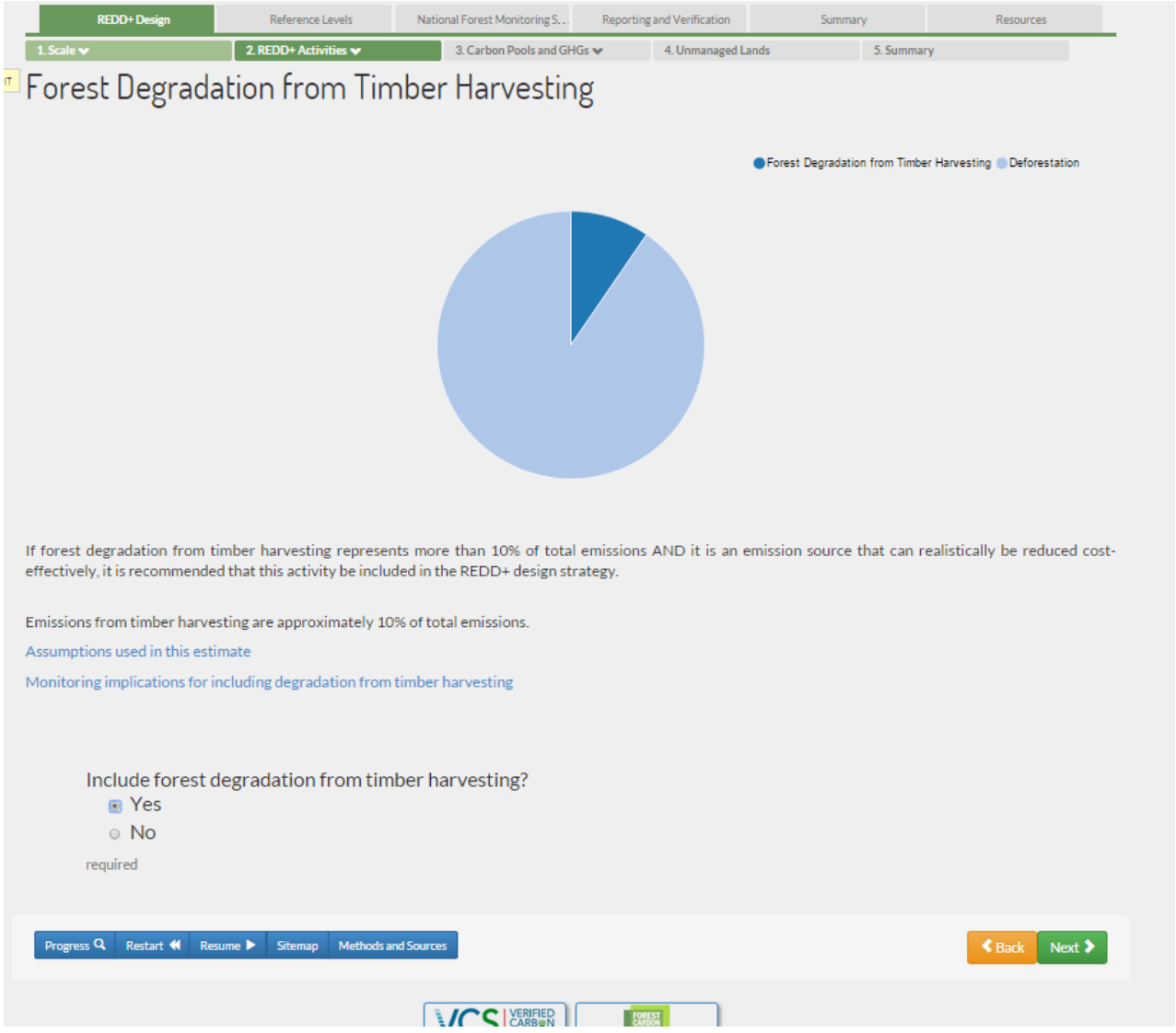


Values presented below are based off the forest definition (canopy cover % threshold per hectare) that was selected on the previous page.

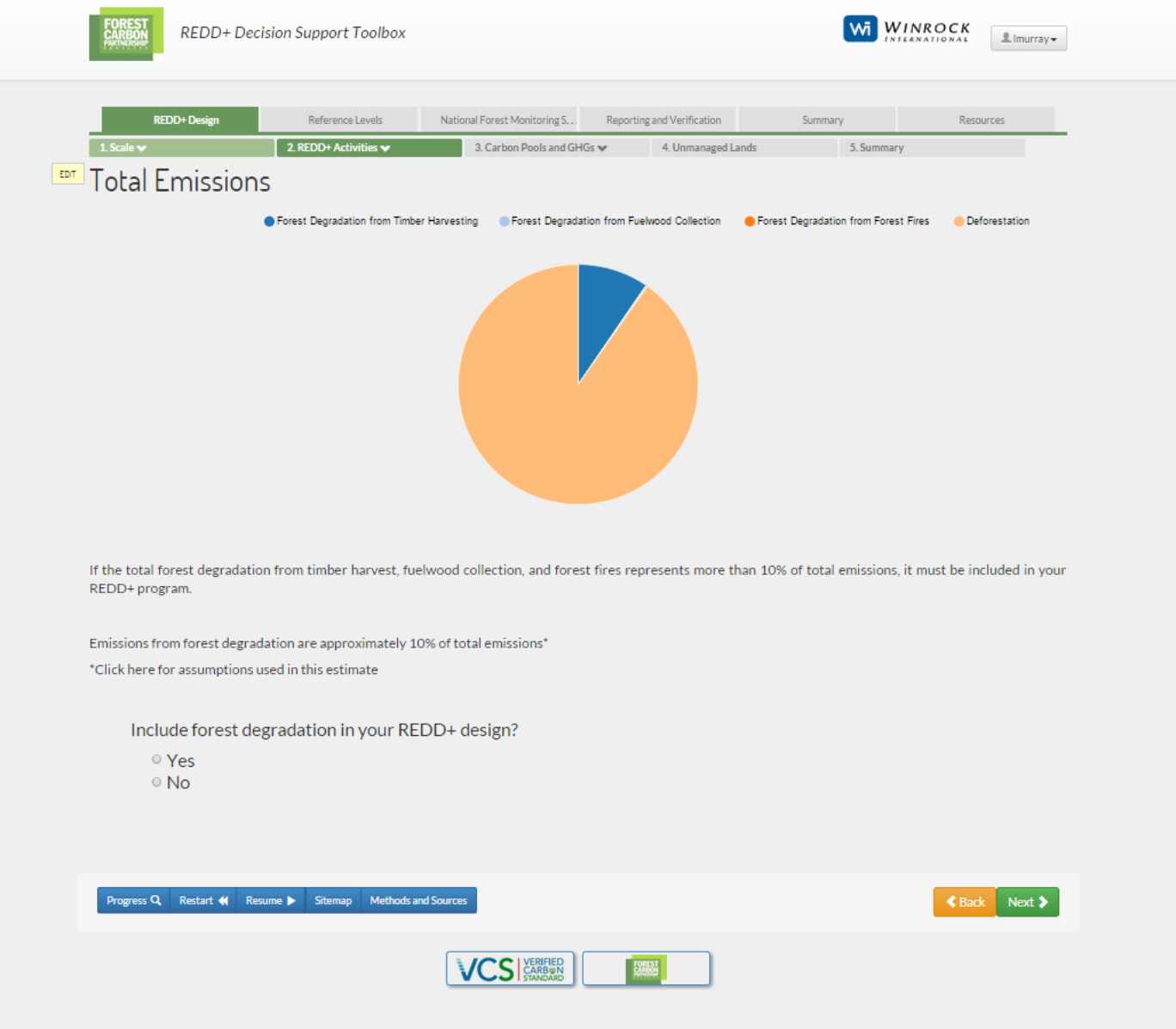
CO_2 Emissions from Forest Loss

Year	Area of forest loss (ha)	CO_2 emissions (t CO_2)

Choose Activities



Total Emissions



Enhancements

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REDD+ Design | Reference Levels | National Forest Monitoring S... | Reporting and Verification | Summary | Resources

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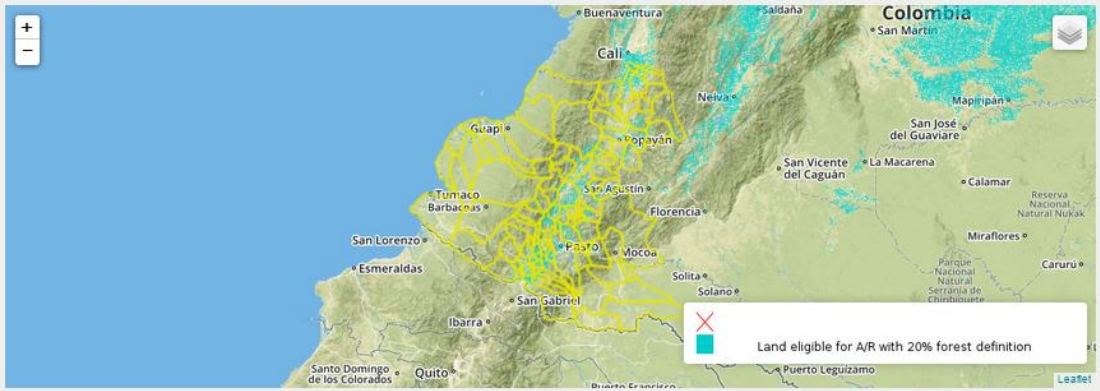
EDIT

Enhancements

In most cases, enhancements will refer to afforestation/reforestation activities given the complexities of preparing and justifying a baseline of forest growth for enhancement in existing forests. The per unit area benefits of enhancements will be small in comparison to the per unit area benefits of preventing deforestation. However, tree planting can be implemented on marginal lands and so many incur low opportunity costs. In addition, where few opportunities exist to impact remaining deforestation or forest degradation, opportunities in enhancement potentially will dominate. Finally, unlike deforestation, enhancement benefits will occur annually for the same area.

What is the impact of forest definition on resulting estimates?

Available Land for Afforestation/Reforestation [1]



% of eligible A/R areas planted	Annual sequestration potential, t CO_2
10%	1,051,900
25%	2,629,600
50%	5,259,300
100%	10,518,500

Include carbon stock enhancements in your REDD+ design?

- Yes
- No

Carbon Pools and GHGs

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Dead Biomass

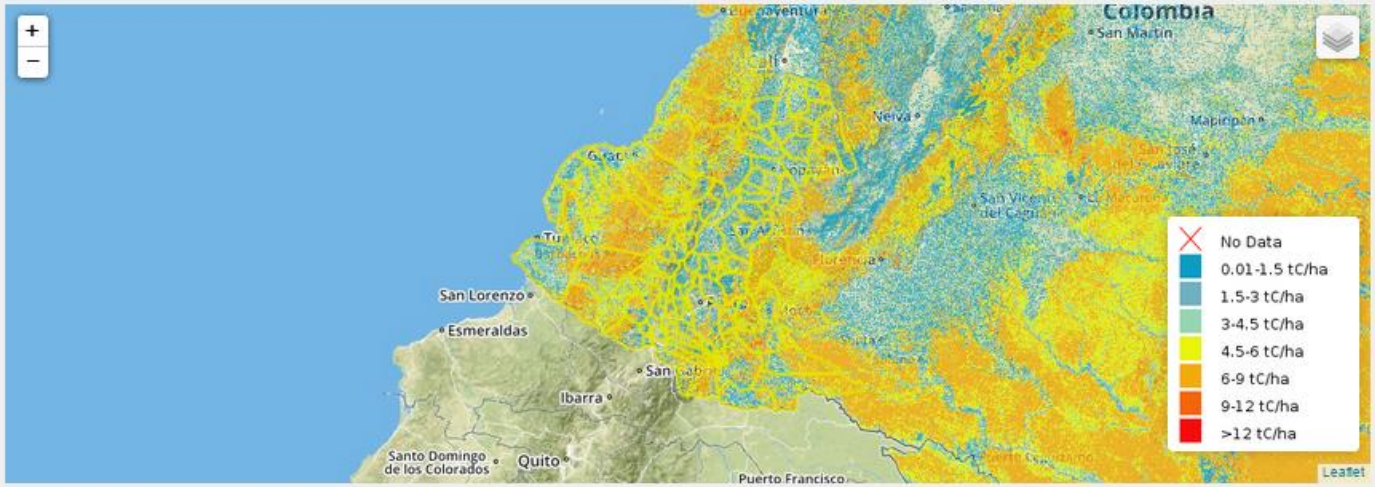
It is recommended that a key category analysis be performed to determine whether or not the dead biomass pool is significant within each REDD+ activity type (>5% of the total).

Cost and effort implications of including dead biomass:

A cost effective approach for measuring and monitoring dead biomass may be to conduct an initial study correlating biomass in the dead biomass pool with the aboveground tree biomass. Once this correlation is established it can be applied across remeasurements or increases in age in carbon stock enhancement strata. The dead bioimass pool will usually represent a small fraction of total carbon stocks and therefore a conservative default can be considered.

Alternatively, omitting the dead biomass pool altogether is a conservative approach, and is therefore recommended if costs to include this pool are substantial.

Carbon in Dead Biomass Pool [1]



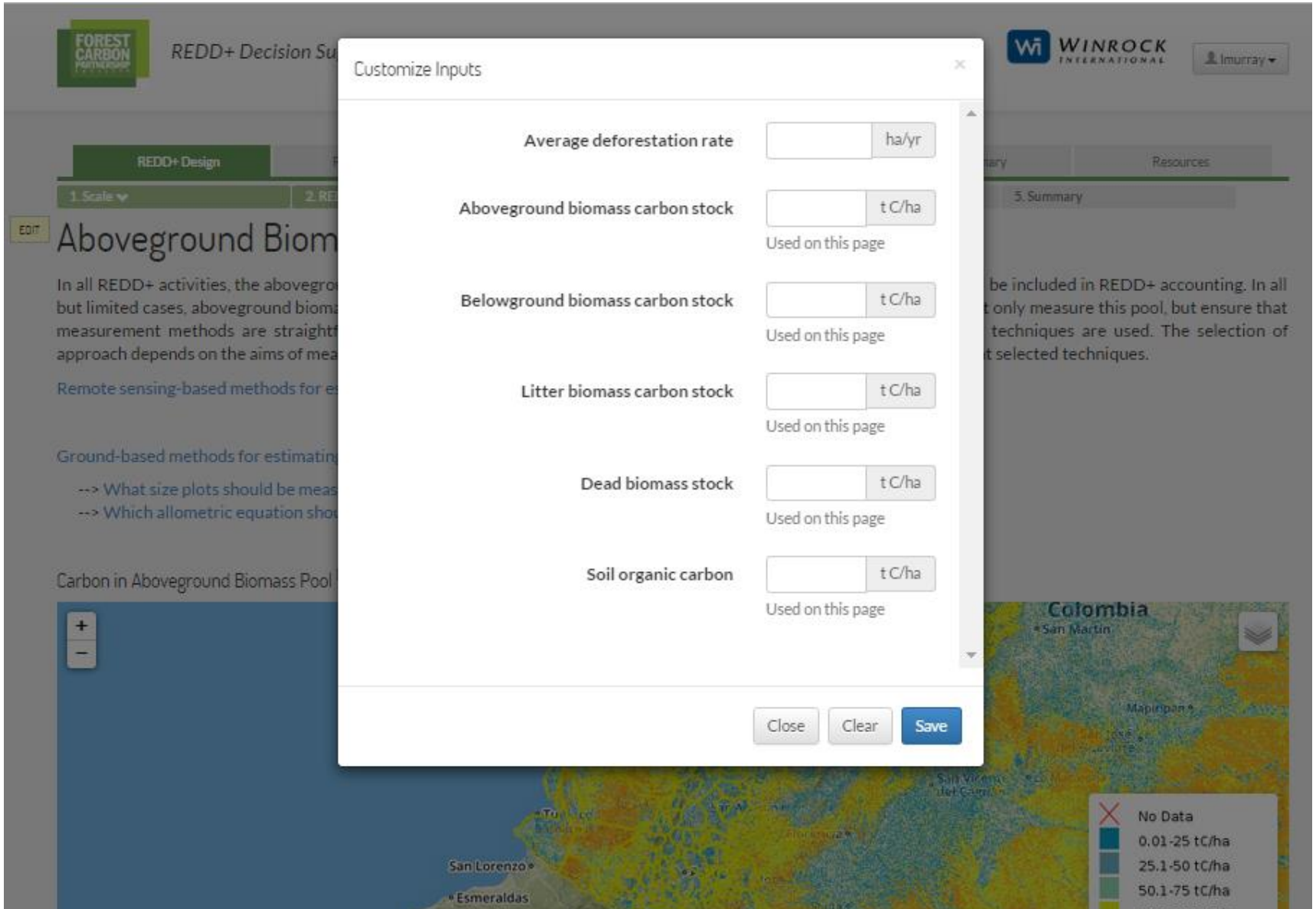
Average dead biomass C stock in forest areas: 5.59 t C/ha
Estimated % of total C: 1.32 %

If you wish to enter a specific value for dead biomass carbon stocks in your focal jurisdictions, click the blue **Customize Inputs** button below.

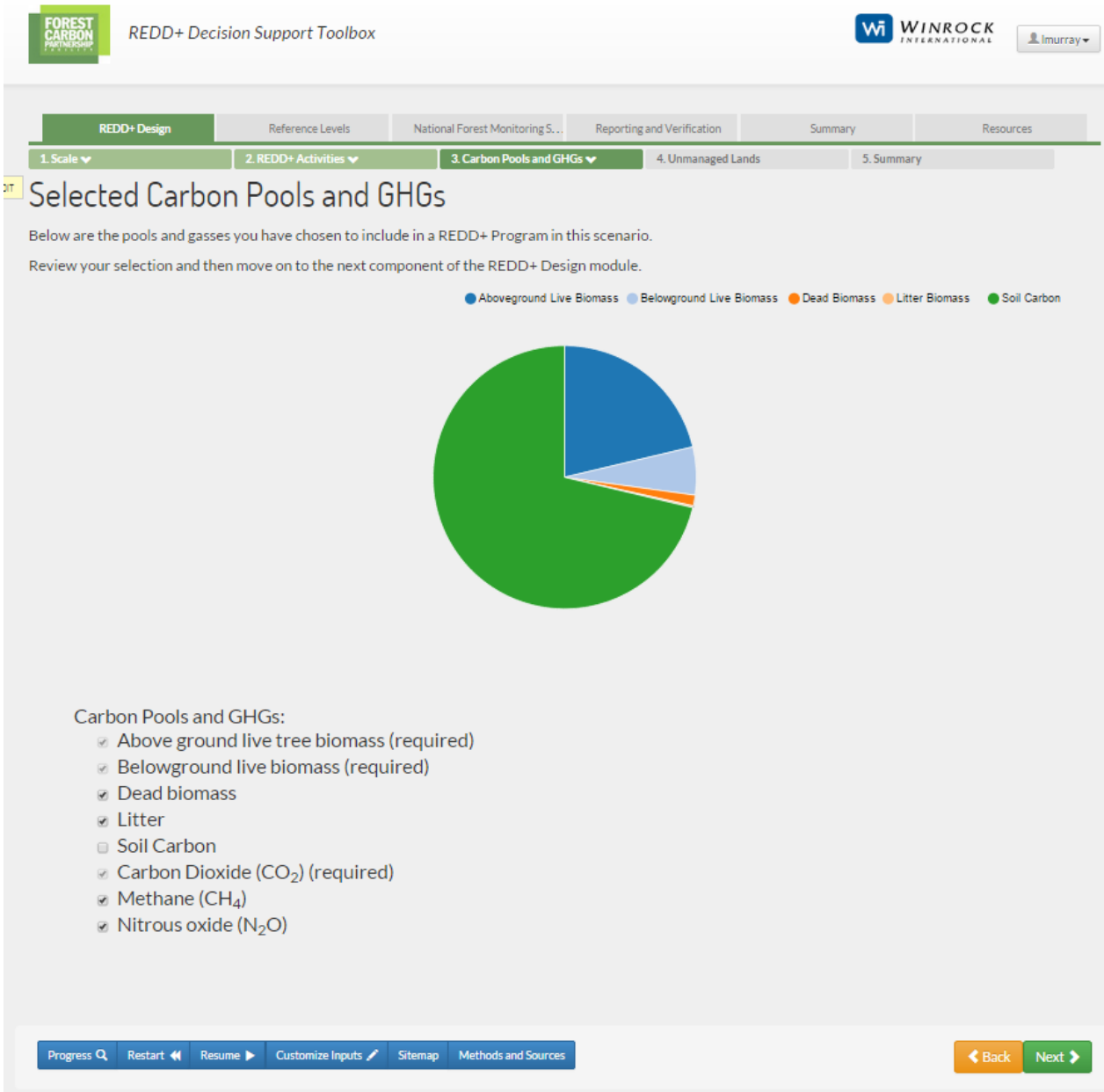
Include emissions from the dead biomass in my reference level for deforestation

- Yes
- No

Customizing Inputs



Carbon Pools and GHGs



Reference Level Module

REDD+ Design | Reference Levels | National Forest Monitoring S... | Reporting and Verification | Summary | Resources

1. Reference Level Period | 2. Average vs. Trend | 3. Adjustments | 4. Your Reference Levels

EDIT

Defining Your Reference Period

The REDD+ DST has annual data for both deforestation emissions and fire emissions. As such, on this page, you can explore the implications of different reference level periods for emissions from deforestation and forest degradation by fire by selecting different start and end years for the two reference levels. If you entered a custom deforestation rate under **Customized Inputs** in the REDD+ Design module, it will not be reflected on this page. It will, however, be reflected in your final RL at the end of this module.

Deforestation start year

2001

required

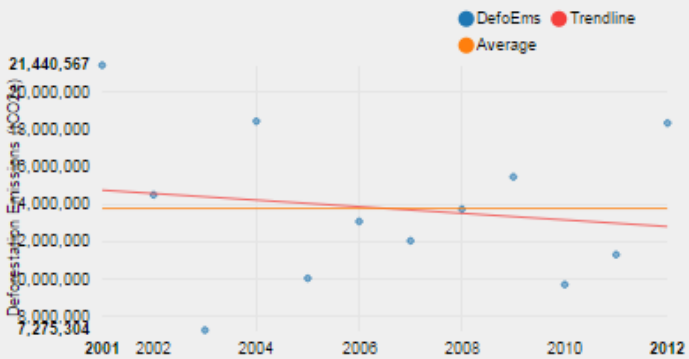
Deforestation end year

2012

required

Deforestation Emissions

Explore the implications of different reference level periods for emissions from deforestation by selecting different start and end years for the deforestation RL. While the average historical emissions and trendline are presented here for comparison, the REDD+ DST will present your reference level as the average historical emissions from deforestation for the selected reference period .



	Average	Trend
Forest Loss (FL) (ha/yr)	15,832	FL = -283*YEAR + 584,249; R^2 = 0.04, P = 0.53
CO_2 emissions (t CO_2/yr)	13,788,012	Ems = -176,636*YEAR +

Fire start year

1997

required

Fire end year

Guidance on Adjustments

REDD+ Design | Reference Levels | National Forest Monitoring S... | Reporting and Verification | Summary | Resources

1. Reference Level Period | 2. Average vs. Trend | 3. Adjustments | 4. Your Reference Levels

EDIT

Adjustments

For the FCPF, the only countries eligible for an adjustment are High Forest, Low Deforestation (HFLD) countries. In this situation all HFLD countries with an increasing rate of emissions from deforestation or degradation in the historical reference period should include an adjustment. For the VCS and potentially for the UNFCCC, an increasing trend simply reflects what has happened during the historical period and therefore does not qualify as an official "adjustment".

Outside of the World Bank Carbon Fund, adjustments may be considered in instances where history does not accurately reflect emissions and removals expected to happen in the upcoming years. For the majority of countries and subnational jurisdictions, the past provides a realistic reflection of the future and **the initial assumption should be that no adjustment should take place as it would not be justifiable.**

To make an adjustment to the reference level, the following realities must be adequately justified:

- The drivers of deforestation and degradation are NOT expected to be the same in the reference level period as for the historical reference period.
- The impact of drivers IS expected to result in a step increase in emissions relative to the historical reference period.

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VCS VERIFIED CARBON STANDARD

Reference Levels

Your Reference Levels

Your reference levels are shown below. This uses either data from international databases and/or any data you entered under customized inputs as well as the decisions you made in the REDD+ Design module and Reference Levels module.

Your deforestation period has been defined between years 2001 and 2012.

Your fire period has been defined between years 1997 and 2011.

Activity	Metric	First-order estimate	% of Total Emissions
Deforestation	t CO_2e/yr	7,059,600	83%
Timber Harvesting/Forest Management	t CO_2e/yr	1,459,900	17%
Fuelwood/Charcoal Production	t CO_2e/yr	Excluded	0%
Forest Fire	t CO_2e/yr	Excluded	0%
Enhancement of C stocks through forest gains? *	t CO_2e/yr	2,103,700	

* assuming 20% of area eligible for enhancements is afforested or reforested

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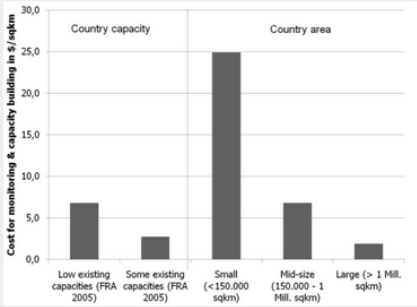
National Forest Monitoring System Module

Cost of Monitoring and Capacity Building

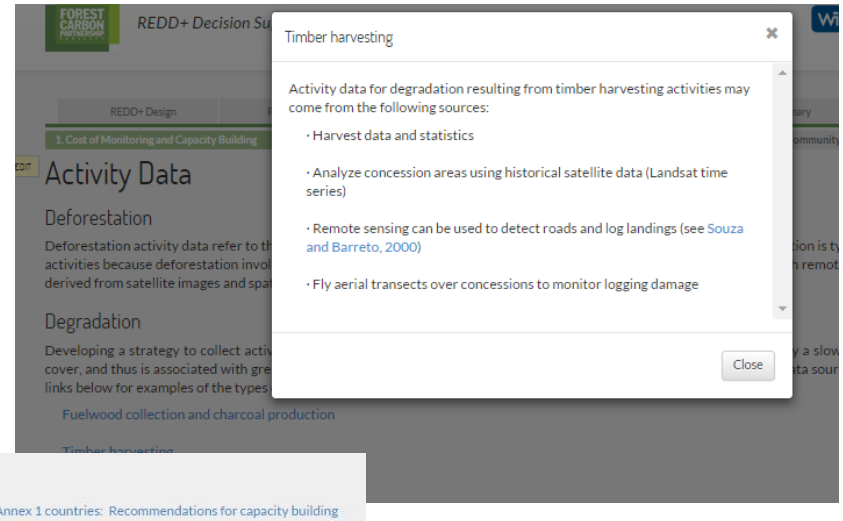
Various factors contribute to the costs of establishing and operating a NFMS compatible with REDD+ requirements and those costs may be significant, especially in the start-up phase.

These factors include:

- Existing capacity and resources
- Quality and quantity of existing data
- Size of monitoring area
- Hardware and software selection and availability



GOFC-GOLD Sourcebook, 2013. Figure 4.3.1

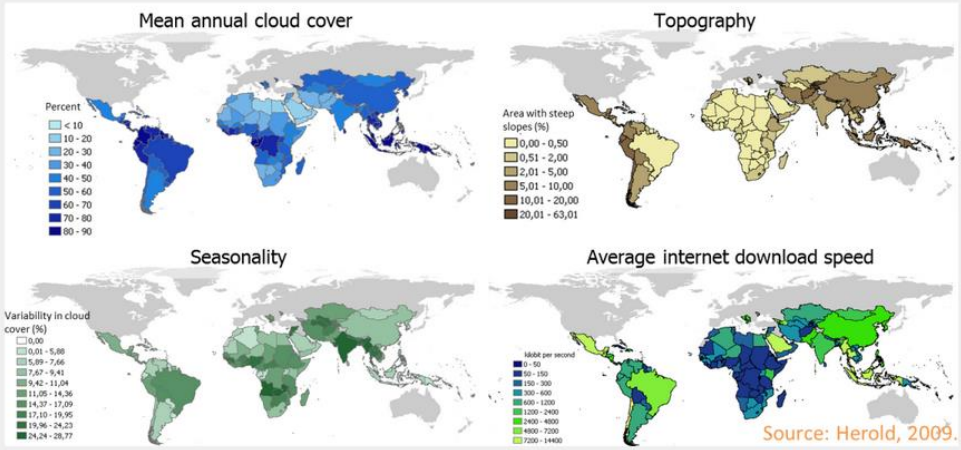


Remote Sensing Considerations

Taken from Herold, M., 2009. An assessment of national forest monitoring capabilities in tropical non-Annex 1 countries: Recommendations for capacity building

Technical challenges:

1. **Cloud cover**: It is not possible to take measurements through clouds with optical RS technology. Radar RS technology must be used instead.
2. **Topography:** Highly variable topography presents challenges in analyzing the remote sensing signal
3. **Seasonality**: Vegetation and cloud cover may vary depending on the time of year (i.e. a distinct dry season where trees drop their leaves).
4. **Remote sensing data availability and access:** Remote sensing data files are large and require good internet connectivity to download



National Forest Monitoring System Module

1. Cost of Monitoring and Capacity Building | 2. Activity Data | 3. Emission Factors | 4. Community Participation

National Forest Inventory (NFI)

Traditionally, national and subnational forest inventories in the past were conducted with the purpose of estimating quantities of commercial timber. The design of these inventories is statistically sound and provides for systematic sampling across forest areas, and the data collected can be used for estimating the carbon stocks of the aboveground biomass.

Where an inventory system has been in place and monitored over time, the compatibility of goals and statistical sampling design for historical emission estimation and emission factor development need to be evaluated.

Continuous forest inventories with permanent plots can serve as a good source of data for the development of emission factors for forest carbon stock enhancement. They can provide data on a forest at different ages, and can be used for the development of growth curves.

Forest inventories without permanent plots may also be used to compare forest types and to develop an approximatic different ages.

Forest degradation emission factors are activity specific, so it is generally necessary to collect new data. The units of em activity data.

Questions to ask before using NFI data for emission/removal factors

Advantages and disadvantages of integrating a NFI in the NFMS

Progress | Restart | Resume | Sitemap | Methods and Sources

REDD+ Design | Reference Levels | National Forest Monitoring S... | Reporting and Verification | Summary | Resources

1. Cost of Monitoring and Capacity Building | 2. Activity Data | 3. Emission Factors | 4. Community Participation

Stratification

Stratification of forest areas in the creation of NFMS is the dividing the forest into subunits that are relatively homogeneous with little internal variation in carbon stocks. The purpose is to facilitate accounting, decrease measurement costs and decrease total measurement uncertainty.

Land cover maps likely classify forest into one or more class. Traditionally, forest classes are based on things such as the biome, dominant species, and timber potential. However, such existing divisions may or may not be appropriate for the purpose of REDD+ accounting. Click on the options below to explore some stratification options for REDD+ accounting.

Stratification by carbon stocks

Stratifying areas eligible for A/R activities

Stratification by Threat/Accessibility

On the broadest level three choices exist for REDD+ stratification: no stratification, use of existing land cover classes, and additional stratification.

Stratification Approach	Consequences	Recommendations
No Stratification All forest would be assigned to a single forest type. A single emission factor would be developed for all deforestation	- Except for countries with extremely invariable environmental and forest management conditions, estimates of forest carbon stocks and resulting deforestation emissions would likely have high variability, and therefore high uncertainty. - Likely precludes the use of a land-based approach.	- This approach is generally not recommended except for select countries.
Apply an existing forest classification The forest may have been classified during land cover map creation or the forested areas may have been classified in the past for a variety of purposes such as biome, species composition, and land use designation. However, the existing classification was not designed	- Using existing forest classes may be appropriate or could lead to very high uncertainty - Where historical data (e.g. carbon stock and activity data) exists, using this forest classification system, such data may more	- A test should be conducted to determine validity for accounting. This may then require further splitting of forest classes or clumping of classes into fewer strata.

Reporting and Verification Module

1. Uncertainty | 2. IPCC Reporting Principles | 3. Verification

Uncertainty

Uncertainty is the lack of knowledge of the true value of a variable. Greenhouse gas emissions, both with and without REDD+ activities, are estimates and it is n possible to quantify them with 100% certainty. It is therefore important to assesses the level of confidence in the emissions estimates using an uncertainty analys Uncertainty results from random and systematic error and exists to some degree in all of the data which feed into reference level development and all subseque MRV.

Three key statistical concepts relevant to uncertainty are accuracy, precision, and confidence interval.

1. Accuracy details the agreement between the true value and repeated measured observations or estimations of a quantity. It is a measure of how close t recorded is to the actual value.
2. Precision identifies how well a value is defined. In sampling, precision illustrates the level of agreement among repeated measurements of the same quantit This is represented by how closely grouped the results from the various sampling points or plots are.
3. A confidence interval provides an estimated range of values, calculated from a set of sample data, that is likely to include the unknown population parameter.

Accurate but not precise | Precise but not accurate

In the context of REDD+, values are either completely enumerated, such as with wall-to-wall measured in order to understand the whole, and within the subset there will be a range of num

Where complete enumeration occurs, it may be possible to assess accuracy in the method that the estimation of the result may be assessed. Ultimately, all uncertainties are combined to giv percent of the mean at an acceptable confidence interval, for instance, 10% of the mean at

1. Uncertainty | 2. IPCC Reporting Principles | 3. Verification

Verification

The process of verification for REDD+ is not determined at this time. Verification will almost certainly, however, involve independent experts ex datasets for accuracy and consistency. Regardless of verification process, clear and transparent archiving of all data is essential. This means:

- Establishing labeling schemes for spreadsheets consistently applied and documented
- Clear filing systems carefully described to allow identification at all times of locations of data, documents and other forms of evidence
- Quality assurance and quality control must be carefully implemented and documented

For more on REDD+ verification approaches, see:

Streck,C., Harris, N., Hayward, J., and Brown, S. 2013. 'Analysis of Approaches for REDD+ Verification.'

IPCC LULUCF-GPG Guidelines on Verification

Final Summary

Final summary includes customized reference levels and key decisions.

REDD+ Design | Reference Levels | National Forest Monitoring Sy.. | Reporting and Verification | Summary

EDIT

Summary

Download PDF

Congratulations! You have completed all modules in the REDD+ Decision Support Toolbox. Below is a summary of the decisions you have m
reference levels of selected REDD+ activities.

Country: Colombia

Scale: Subnational, selected jurisdictions

Jurisdictions:

Forest definition: 20% canopy cover

Include unmanaged lands? None

Deforestation

	Estimate (tons CO_2e/year)	% of Total Emissions	Info
Reference Level	7,059,561	82.54%	This is an estimated deforestation reference level for the geographic area sele forest definition and carbon pools included. Estimates were produced by comb derived from Hansen, et al. 2013. with Emission Factors derived from Saatchi, et
Emissions from Peat Forests	0	0.00%	This is an estimated reference level for the emissions resulting from deforestati the geographic area selected. Estimates were produced by combining activity Hansen, et al. 2013 and a Map of Histosols from the Harmonized World Emission Factors derived from IPCC 2013 Wetlands Supplement
Carbon Pools/GHGs	Dead biomass, Litter, Methane (CH_4), Nitrous oxide (N_2O)		
Reference Level Period	2001-2012		

REDD+ DST Summary Report

Congratulations! You have completed all modules in the REDD+ Decision Support Toolbox. Below is a summary of the decisions you have made and customized reference levels of selected REDD+ activities.

Country: Colombia

Scale: Subnational, selected jurisdictions

Jurisdictions:

Forest definition: 20% canopy cover

Include unmanaged lands? None

Deforestation

	Estimate (tons CO_2e/ year)	% of Total Emissions	Info
Reference Level	7,059,561	82.54%	This is an estimated deforestation reference level for the geographic area selected, based on the forest definition and carbon pools included. Estimates were produced by combining Activity Data derived from Hansen, et al. 2013. with Emission Factors derived from Saatchi, et al. 2011
Emissions from Peat Forests	0	0.00%	This is an estimated reference level for the emissions resulting from deforestation on peat lands in the geographic area selected. Estimates were produced by combining activity data derived from Hansen, et al. 2013 and a Map of Histosols from the Harmonized World Soil Database with Emission Factors derived from IPCC 2013 Wetlands Supplement
Carbon Pools/GHGs	Dead biomass, Litter, Methane (CH4), Nitrous oxide (N2O)		
Reference Level Period	2001-2012		

REDD+ Decision Support Toolbox

WINROCK INTERNATIONAL

FCPF

REDD+ Design | Reference Levels | National Forest Monitoring | Reporting and Verification | Summary | Resources

Reference Level Period | Defining Reference Period | Average vs. Trend | Adjustments | Build my Reference Level | Summary

First-order estimates

Build my Reference Level

Your default reference level is shown below. This uses default databases and includes the decisions you made about ties, carbon pools, and the reference period.

Your deforestation period has been defined between years 2001 and 2012.

Your fire period has been defined between years 2001 and 2011.

Activity	Metric	First-order estimate	% of Total Emissions
Deforestation	t CO_2e/yr	8,529,864,029	99.72%
Timber Harvesting/Forest Management	t CO_2e/yr	9,959,769	0.12%
Fuelwood/Charcoal Production	t CO_2e/yr	4,789,085	0.06%
Forest Fire	t CO_2e/yr	9,155,002	0.11%
Enhancement of C stocks through forest gains? *	t CO_2e/yr	24,101,216	

* assuming 20% of area eligible for enhancements is afforested or reforested

View Your Progress | Info

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Final summary of decisions made

Final summary includes customized reference levels and key decisions.

REDD+ Design | Reference Levels | National Forest Monitoring Sy.. | Reporting and Verific

Summary

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Congratulations! You have completed all modules in the REDD+ Decision Support Toolbox. Below is
reference levels of selected REDD+ activities.

Country: Madagascar

Scale: National

Forest definition: 20% canopy cover

Include unmanaged lands? None

Deforestation

	Estimate (tons CO_2e/year)	% of Total Emissions	Info
Reference Level	75,385,411	67.77%	This is an estimated deforestation reference lev definition and carbon pools included. Estimates Hansen, et al. 2013. with Emission Factors derived f
Emissions from Peat Forests	192,295	2.07%	This is an estimated reference level for the emissions resulting from deforestation on peat lands in the geographic area selected. Estimates were produced by combining activity data derived from Hansen, et al. 2013 and a Map of Histosols from the Harmonized World Soil Database with Emission Factors derived

REDD+ DST Summary Report

Congratulations! You have completed all modules in the REDD+ Decision Support Toolbox. Below is a summary of the decisions you have made and customized reference levels of selected REDD+ activities.

Country: Madagascar

Scale: National

Forest definition: 20% canopy cover

Include unmanaged lands? None

Deforestation

	Estimate (tons CO_2e/ year)	% of Total Emissions	Info
Reference Level	75,385,411	67.77%	This is an estimated deforestation reference level for the geographic area selected, based on the forest definition and carbon pools included. Estimates were produced by combining Activity Data derived from Hansen, et al. 2013. with Emission Factors derived from Saatchi, et al. 2011
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Carbon Pools/GHGs	Dead biomass, Litter, Soil Carbon, Methane (CH4), Nitrous oxide (N2O)		
Reference Level Period	2001-2012		

- Cool, no?!
- But note:
  - The tool does not ‘make’ decisions; nor is it meant to ‘set’ a country’s reference level
    - … this requires more technical work.
    - … and a due process in-country.
  - The tool can help facilitate both.
- And ….

REDD+ training materials

Coordinated by:
GOFC-GOLD LC PO & Wageningen University
In partnership with the World Bank FCPF

Version 1, April 2015

GOFC-GOLD Sourcebook

- Provides **guidance** from the global community of earth observation and carbon experts on how to obtain **credible estimates** of forest carbon stocks and related changes using satellite remote sensing as an important tool for monitoring changes in forest cover
- Builds on IPCC Guidelines for estimating and reporting GHG emissions and removals from forest lands

The sourcebook is the product of a working group of **Global Observation of Forest and Land Cover Dynamics** (GOFC-GOLD) http://www.gofcgold.wur.nl/

Objectives of Training Manuals

- Provide a user-friendly set of **modular** training materials that can be **tailored** to country needs and be flexibly used in different settings (workshops, technical support missions etc.)
- Provide technical and practical guidance that is thoroughly **peer-reviewed** by a global network of experts

Overview of Modules

REDD+ background and design

1 UNFCCC context and requirements & introduction to IPCC guidelines
2 Framework for building national forest monitoring systems for REDD+
3 Assessing and analyzing drivers of deforestation and forest degradation

REDD+ measuring and monitoring

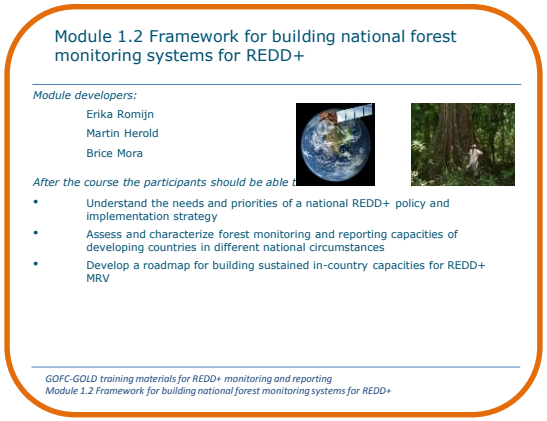
4 Monitoring activity data for forests using remote sensing
5 Monitoring activity data for forests remaining forests
6 Estimating emission factors for forest cover change
7 Incorporating community based approaches in national monitoring
8 Estimation of carbon emissions from deforestation and forest degr.
9 Estimation of GHG emissions from biomass burning
10 Estimation of uncertainties
11 Overview and status of evolving technologies

REDD+ assessment and reporting

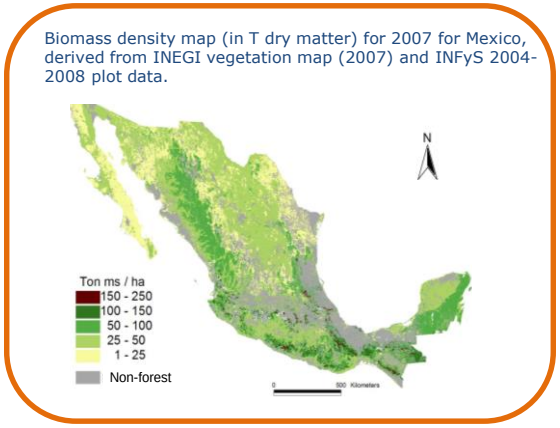
12 National data organization and management
13 Data and guidance on developing REDD+ reference levels
14 Reporting REDD+ performance using IPCC Guidelines and Guidance

Module Structure

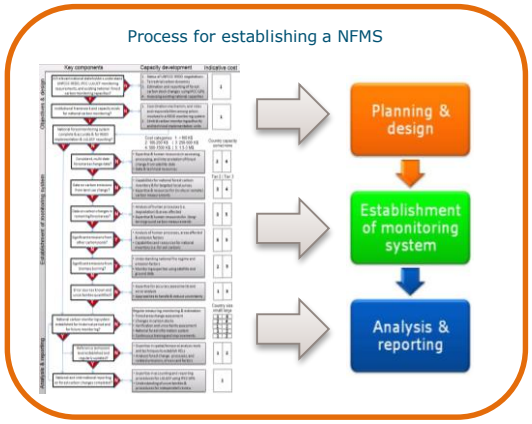
Background lectures (14)



Country examples (28)

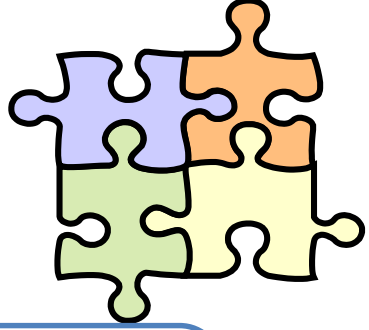


Practical exercises (22)



… and more: support documents, notes, references

How does it all fit together?



Explore

- Use decision support tool (including embedded data) to develop preliminary estimates and design

Decide

- Use decision support and country-specific data to facilitate a technical and policy decision process

Implement

- Use training material to build capacity and technical guidance to implement decisions; get data

Thank You!

www.forestcarbonpartnership.org

/technical-decision-support-and-training-material

/redd-training-material-forest-monitoring

/dst