BEYOND DEFORESTATION

Promoting climate stabilization through land carbon monitoring and management at local to global scales

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OUR MISSION: To advance scientific discovery and seek science-based solutions for the world’s environmental and economic challenges through research and education.

WHO WE ARE

#1 Climate Change Think Tank in the World

Awarded by the International Center for Climate Governance 2013, 2014, & 2015
WHAT WE DO

OUR FOCUS: We are an independent research institute where scientists investigate the causes and effects of climate change to identify and implement opportunities for conservation, restoration and economic development around the world.

We believe in the power of nature to slow climate change. We work on land-based carbon from the tropics to the Arctic.
The area deforested is known (activity data).
The average carbon density is known (emissions factors).

Gross carbon emissions

\[ C_{gr\_em} = \left( \sum_{i=1}^{m} A_{loss(i)} \cdot C_{loss(i)} \right) \]

Deforestation

\[ + \left( \sum_{i \cdot j=1}^{n \cdot m} A_{dgr(ij)} \cdot C_{dgr(ij)} \right) \]

Degradation

\[ \text{for forest types } i \ldots m \]

\[ \text{for degradation types } j \ldots n \]

\[ \text{for forest types } i \ldots m \]

\[ A_{loss} = \text{Area of deforestation (ha)} \]

\[ C_{loss} = \text{Carbon emission from deforestation (t/ha)} \]

\[ A_{dgr} = \text{Area affected by degradation (ha)} \]

\[ C_{dgr} = \text{Carbon emission from degradation (t/ha)} \]
2007 Aboveground Biomass Density (500 m)

500 m and 30 m resolution maps showing aboveground carbon density. The maps illustrate the distribution of aboveground biomass density across different regions, with color gradients indicating varying levels of biomass density.

Baccini et al., 2012
Hansen et al., 2013

2000-2014 Forest Cover Loss (30 m)

Baccini et al., 2012 Updated to 30 m, 2015

2000 Aboveground Biomass Density (30 m)
Annual Gross Emissions from Forest Cover Loss

Year: 2001

Tg carbon lost since year 2000: 1.77

Limitations

• Gross biomass loss from deforestation only
  - Deforestation: the damage is done
  - Degradation: hope remains

• Gains in biomass (growth/uptake) ignored
Mapping biomass change through time

- Time series approach based on “change point” analysis
- For each 500 m pixel we identify the trajectory of biomass change
Continuous spatially explicit carbon biomass change with measurable uncertainty

Gain = 59.2
StdEr = 24.2
P-V = 0.041

Loss = -201.2
StdEr = 8.4
P-V = 0.003

StdEr = 46.1
P-V = 0.99

190 x 215 km
Consistent with losses from deforestation and sensitive to losses from forest degradation.
Applications
Indigenous Territories of the Amazon Basin:

Influencing Forest Policy with Evidence and Data
Managing forest degradation and climate risk

In the Pan-Amazon network of indigenous lands and protected areas
Climate stabilization through land carbon storage

Measuring the potential
How much carbon is being stored on land and where?
Where is carbon being lost?  Where is carbon being gained?
Where can carbon storage be increased (restored) and by how much?

Competition from other land uses is high!
National-level Examples: Mexico

Field and Airborne Data Acquisitions

- CONAFORE INFyS Plots
- CONAFORE Management Plots
- CartoData Lidar Acquisitions
- NASA G-LiHT Lidar Acquisitions
- Mexico State Boundaries

1,685 km² Cartodata
2,422 km² G-LiHT
4,107 km²

1000s of Field Plots
Challenges

• Proposing alternatives to existing operating procedures and protocols (e.g., IPCC Guidelines)

• Incorporating new/better data sources into existing operational systems (e.g., national forest monitoring systems)

• Institutional technical capacity limitations

• Fostering awareness of alternatives
Opportunities

• REDD+ Readiness
  ✓ Support operational national/subnational forest carbon monitoring
  ✓ National/subnational pilots

• Nationally Determined Contributions (NDCs)
  ✓ Inform development of NDCs
  ✓ Provide independent verification

• Indigenous Land and Protected Area Management
  ✓ Document their role in climate change mitigation while developing decision making tools and proposing management strategies
Muchas Gracias!