

Measurement, Monitoring and Verification

**EPRI Greenhouse Gas Emissions Offset Policy Dialogue
Workshop 5 - REDD**

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Conclusions

- **Measuring change in forest area is now tractable at national scale**
 - We know how to do this
 - Must be based on satellite data
 - Requires building in-country technical capacity
 - Degradation more difficult to quantify
- **Biomass and emission factors less certain**
 - Possible at project level with ground and air-borne data
 - Foreseeable for future at national level
- **Markets based on measurable and verifiable quantities can reasonably use default biomass and emission factors**
- **Simplicity is key for REDD reporting and verification**

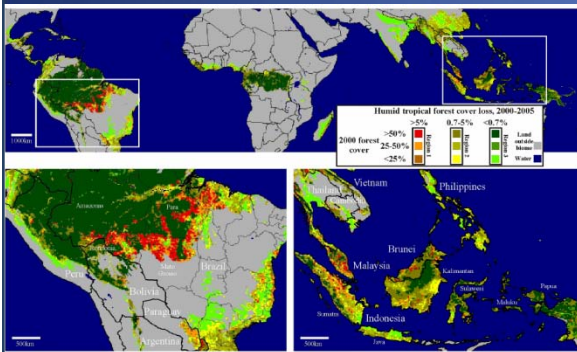
Deforestation carbon emissions/yr =

Area cleared/yr x Biomass removed/unit area

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Area cleared/yr x Biomass removed/unit area

PAN-TROPICAL



NATIONAL

sistema DETER
 detecção de desmatamento em Tempo Real

Projeto DETER
 Período de Observação: [Dropdown]
 Data Última Observação: [Dropdown]
 Estado: [Dropdown]
 País Operador/Estado: [Dropdown]
 Estado: [Dropdown]
 Filtro de Área: [Dropdown]
 Mostrar quantidade: [Dropdown]

PROJECT

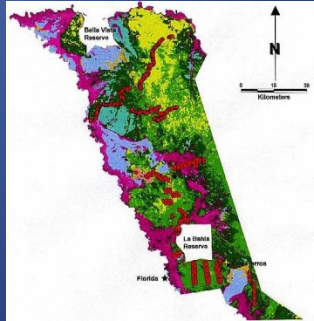


Methods are in-hand to measure changes in forest area at pan-tropical, national, and project levels

Avance de la deforestación mecanizada en Bolivia

State of Forest Report 1999
 Forest Survey of India
 (Ministry of Environment and Forests)
 Dehra Dun

INPE INSTITUTO NACIONAL DE PESQUISAS ESPACIAIS



Deforestation carbon emissions/yr =
Area cleared/yr x **Biomass removed/unit area**



initial emissions



decomposition



abandonment/regrowth

Need to know:

- original biomass
- emission factors for each component
- time scale of interest

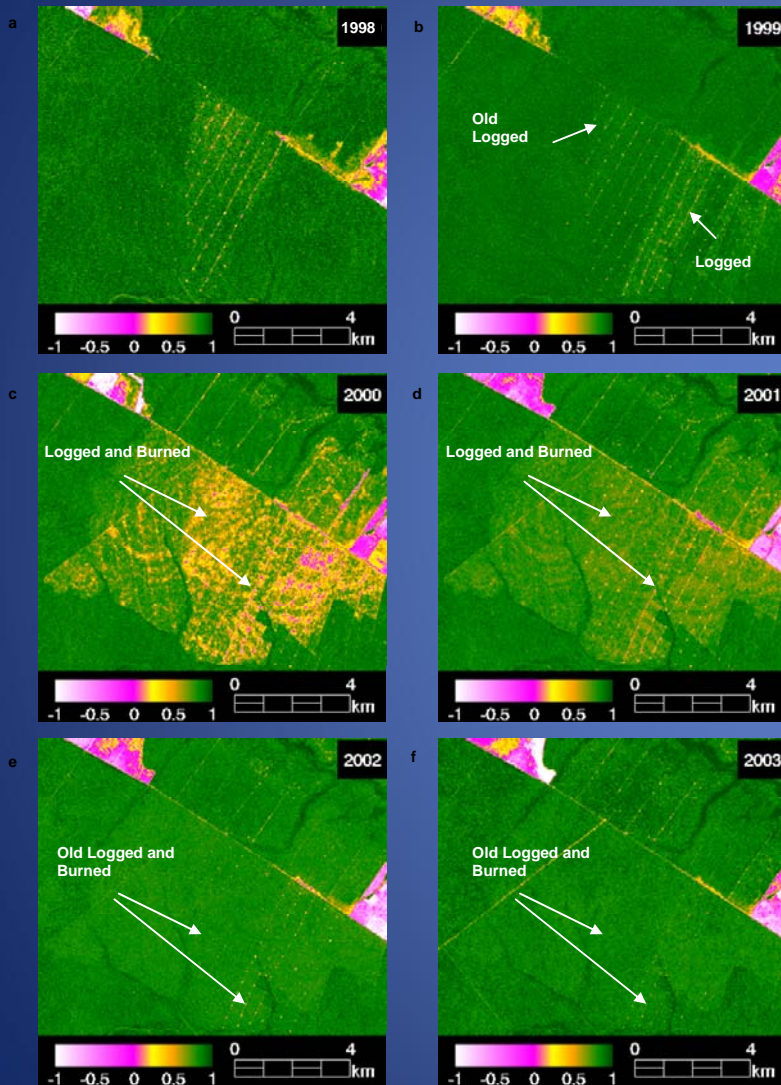
Possible at project level but more difficult at national level

	PROJECT LEVEL	NATIONAL LEVEL
Forest area change	✓ satellite and airborne	✓ satellite
Biomass	✓ airborne and ground data	extrapolation only
Emission factor (initial fire, decay, uptake)	modeled; field measurements	modeled

THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE HAS DEVELOPED TIER APPROACH TO ESTIMATE BIOMASS

IPCC Tier	Data needs/examples of appropriate biomass data
Tier 1 (little guidance needed)	Default mean annual increment (MAI for degradation) and/or forest biomass stock (for deforestation) for broad continental forest types—includes 6 classes for each continental area to encompass differences in elevation and general climatic zone; default values given for all vegetation-based pools
Tier 2	MAI and/or forest biomass values from existing forest inventories and/or ecological studies. Default values provided for all non-tree pools Newly-collected forest biomass data.
Tier 3	Repeated measurements of trees from permanent plots and/or calibrated process models. Can use default data for other pools stratified by in-country regions and forest type, or estimates from process models

Degradation is harder



Burned peat in central Kalimantan

Logging in southern Amazon from satellite

Developing and future capabilities

Hardware

- Orbiting Carbon Observatory to measure carbon directly in atmosphere
- Radar/LIDAR satellites to improve biomass mapping

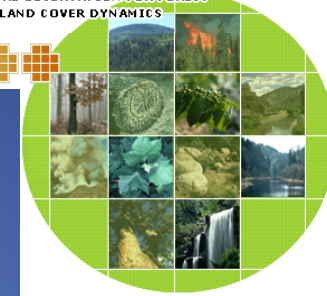
Soft capabilities

- In-country technical capacity
- Data access
- International attention on forest carbon

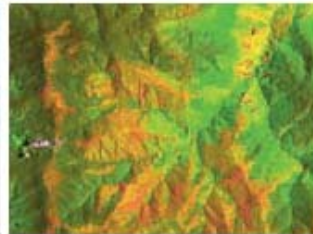


GOFC-GOLD

GLOBAL OBSERVATION FOR FOREST
AND LAND COVER DYNAMICS



SOURCEBOOK



Reducing Greenhouse Gas Emissions from Deforestation and
Degradation in Developing Countries: A Sourcebook of Methods
and Procedures for Monitoring, Measuring and Reporting

www.gofc-gold.uni-jena.de/redd

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