

**GOFC-GOLD**

Global Observation of Forest Cover and Land Dynamics



**Land Cover**  
Project Office



Global Forest Observations Initiative

---

# GOFC-GOLD Land Cover Project Office Activities

Brice Mora

Joint GFOI/GOFC-GOLD Expert Workshop on Approaches to Monitoring Forest Degradation for REDD+

Wageningen, October 1-3, 2014



---

# Contributions of the GOFC-GOLD Land Cover Office

---

- GFOI meetings
  - Capacity development activities (Task list)

---

# Contributions of the GOFC-GOLD Land Cover Office

---

## **GOFC-GOLD Sourcebook and GFOI Methods and Guidance Document**

- Sourcebook an annually updated review of science
- MGD step-by-step advice on readily implementable approaches
- They are *complementary!* – use them together to provide estimates of REDD+ activities consistent with IPCC Guidance as required by the UNFCCC COP.

---

# Contributions of the GOFC-GOLD Land Cover Office

---

- GFOI meetings
  - Capacity development activities (Task list)
  - Sensor interoperability

[http://www.gfoi.org/sites/default/files/GFOI\\_RDExpertWS1\\_Report\\_final.pdf](http://www.gfoi.org/sites/default/files/GFOI_RDExpertWS1_Report_final.pdf)

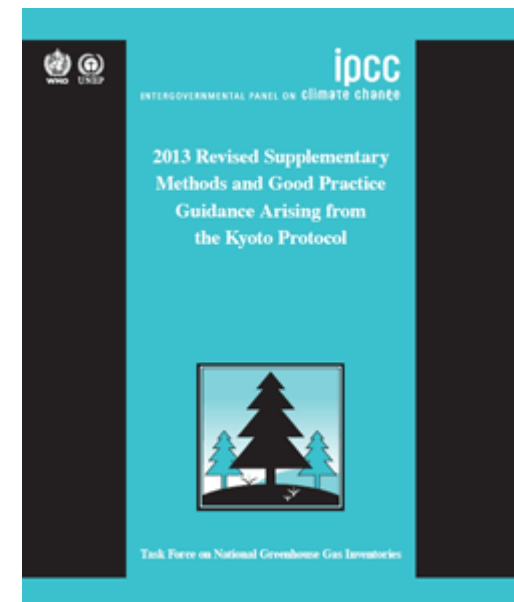
---

# Contributions of the GOFC-GOLD Land Cover Office

---

- Review of the 2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol

<http://www.ipcc-nggip.iges.or.jp/public/kpsg/>



---

# GOFC-GOLD / GEO BON Sourcebook

---

- Sourcebook for Biodiversity Monitoring in Tropical Forests with Remote Sensing

Same approach as for the REDD Sourcebook

Developed around the concept of EBVs

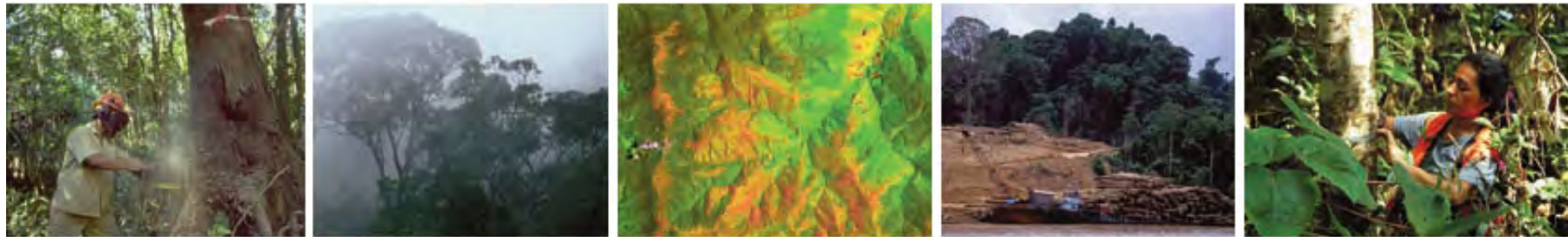
Outline designed

Call for contribution made

First section drafts expected in December 2015

First release scheduled for 2016

# GOFC-GOLD REDD Sourcebook



A sourcebook of methods and procedures for monitoring and reporting anthropogenic greenhouse gas emissions and removals caused by deforestation, gains and losses of carbon stocks in forests remaining forests, and forestation

# GOFC-GOLD Training Material: Coordination Team and Developers

- World Bank FCPF
- GOFC-GOLD LC PO & Wageningen U.: Martin Herold, Brice Mora, Erika Romijn





---

# GOFC-GOLD training Material: Objectives and approach

---

Respond to the need for technical assistance and guidance for countries to develop REDD+ MRV systems

- Provide a set of modular training materials to be used by developing countries and capacity development efforts in combination with complementary guidance documents (i.e. IPCC GPG, GOFC-GOLD, GFOI, FAO/UN-REDD);
- Develop materials that include lecture materials, concrete country examples and short tutorials and exercises;
- Create materials by building upon the GOFC-GOLD expert network, using country experts to provide examples and support independent review process
- Make the training material available online on the GOFC-GOLD project office (next to Sourcebook) and the WorldBank FCPF websites. Other media of dissemination to be considered as well
- Additional educational and pedagogical tools (e.g. distance and interactive learning) and more specific methods (i.e. use of specific software systems) can be implemented at a later stage.

# Set up of Modules & Target users

## Background lectures

Module 1.2 Framework for building national forest monitoring systems for REDD+

Module developers:  
Erika Romijn  
Martin Herold  
Brice Mora



After the course the participants should be able to:

- Understand the needs and priorities of a national REDD+ policy and implementation strategy
- Assess and characterize forest monitoring and reporting capacities of developing countries in different national circumstances
- Develop a roadmap for building sustained in-country capacities for REDD+ MRV

GOF-C-GOLD training materials for REDD+ monitoring and reporting  
Module 1.2 Framework for building national forest monitoring systems for REDD+




### Background lectures

Introducing and presenting the background; relevance of topic & overview of possible methodological options and approaches

*Intended for: REDD+ national and international policy makers; Project managers and Technical staff*

## Country examples

Biomass density map (in T dry matter) for 2007 for Mexico, derived from INEGI vegetation map (2007) and INFyS 2004-2008 plot data.



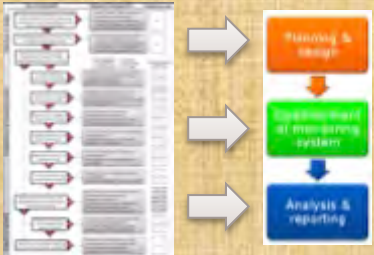
### Practical examples

of successful implementation activities in developing countries; experiences presenting different national circumstances

*Intended for: MRV project managers & Designers and Technical staff*

## Practical exercises

Process for establishing a NFMS

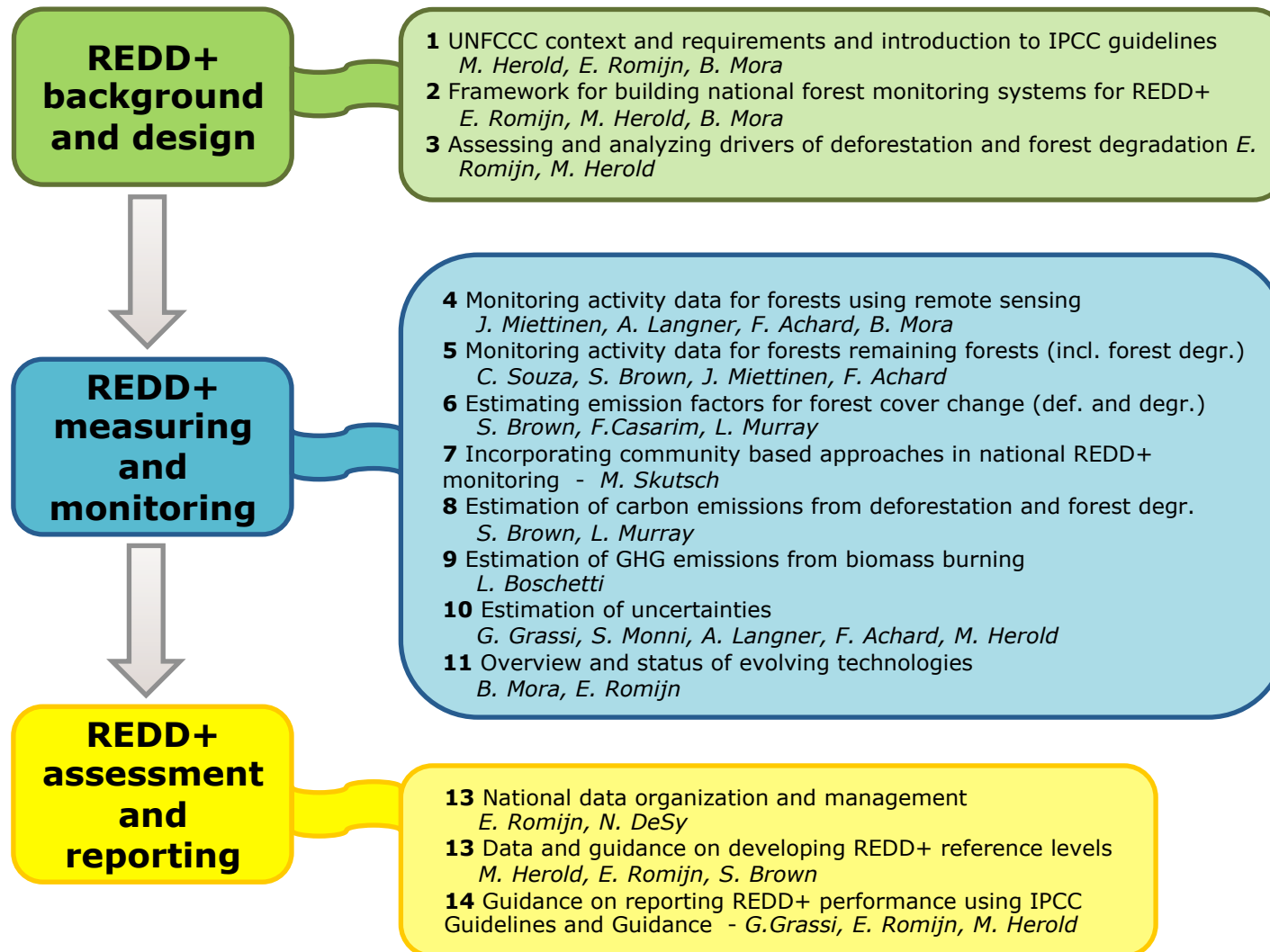


### Practical exercises and short tutorials

to provide simple hands-on exercises for implementation, data processing and analysis

*Intended for: Technical staff*

# Training material for REDD+ Monitoring and Reporting: Overview of Modules



---

# GOFC-GOLD Sourcebook training materials for REDD+ monitoring and reporting

---

The cover of the sourcebook features a large, stylized title 'SOURCEBOOK' in a serif font, centered on a background of a topographic map with green and yellow hues. Below the title is a horizontal strip of five small images: a person in a field, a misty forest, a topographic map, a dirt road through a forest, and a person in a field. At the bottom of the cover is a white text box containing the book's description.

## SOURCEBOOK

**A sourcebook of methods and procedures for monitoring and reporting anthropogenic greenhouse gas emissions and removals associated with deforestation, gains and losses of carbon stocks in forests remaining forests, and forestation**

---

## 2. REDD+ measuring and monitoring

Module 2.1 Monitoring activity data for forests using remote sensing

**Module 2.2 Monitoring activity data for forests remaining forests (incl. forest degradation)**

Module 2.3 Estimating emission factors for forest cover change (deforestation and forest degradation)

Module 2.4 Incorporating community based monitoring (CBM) in national (or jurisdictional) REDD+ monitoring

Module 2.5 Estimation of carbon emissions from deforestation and forest degradation

Module 2.6 Estimation of GHG emissions from biomass burning

Module 2.7 Estimation of uncertainties

Module 2.8 Overview and status of evolving technologies

---

*GOFC-GOLD training materials for REDD+ monitoring and reporting*



---

# Module 2.2 Monitoring activity data for forests remaining forests (incl. forest degradation)

---

## *Module developers:*

Carlos Souza

Sandra Brown

Jukka Mietinen

Frédéric Achard

Martin Herold

## *After the course the participants should be able to:*

- Describe different types of forest degradation and the approaches to monitor degradation
- Map and analyze various forest degradation processes using ground surveys and remote sensing



---

# Background material

- GOF-C-GOLD Sourcebook section 2.2  
<http://www.gofcgold.wur.nl/redd/index.php>
- Souza Jr., C., Monitoring of Forest Degradation. 2012  
[Global Forest Monitoring from Earth Observation](#), CRC Press. p. 185-208.
- Morton, D., et al., Historic emissions from deforestation and forest degradation in Mato Grosso, Brazil: 1) source data uncertainties. Carbon Balance and Management, 2011. **6**(1): p. 18.
- Simula, M. 2009. Towards defining forest degradation: comparative analysis of existing definitions. Forest Resources Assessment. Pp 57. Working Paper 154. FAO, Rome.  
<ftp://ftp.fao.org/docrep/fao/012/k6217e/k6217e00.pdf>
- Herold et al., 2011. Options for monitoring and estimating historical carbon emissions from forest degradation in the context of REDD+, Carbon Balance and Management 2011, 6:13 doi:10.1186/1750-0680-6-13. <http://www.cbmjournal.com/content/6/1/13>

---

# Outline of lecture

1. Definition of Forest Degradation and IPCC GPG context
2. Types of forest degradation
3. Approaches to assess forest degradation areas
  - i. Monitoring forest degradation from selective logging
  - ii. Remote sensing approaches
    - a) direct methods
    - b) indirect methods
4. Software requirements



---

# Outline of lecture

■ ■ ■

# Combining Fraction Information to Enhance Forest Degradation Detection

## NDFI – Normalized Differencing Fraction Index

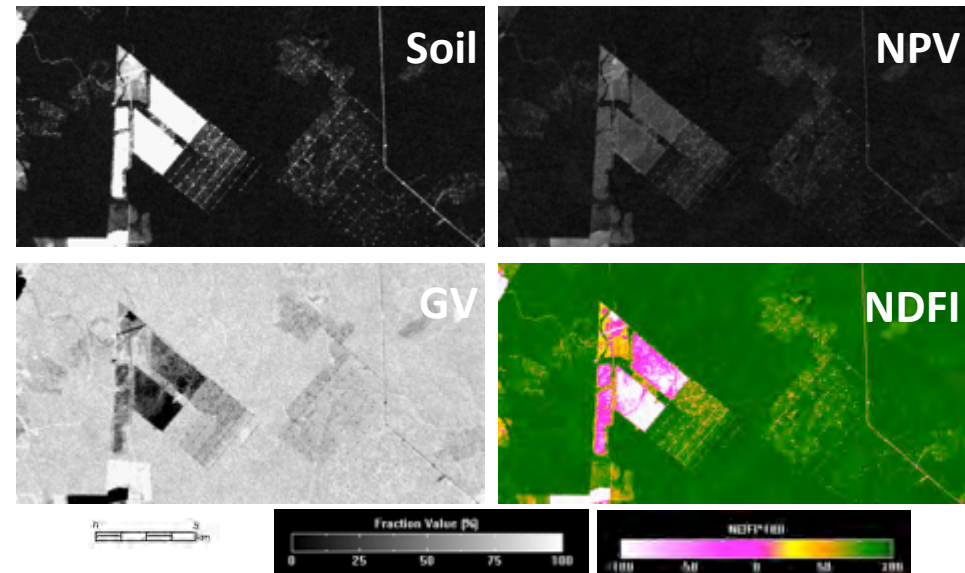
$$\text{NDFI} = \frac{\text{GV}_{\text{Shade}} - (\text{NPV} + \text{Soil})}{\text{GV}_{\text{Shade}} + \text{NPV} + \text{Soil}}$$

$$\text{GV}_{\text{Shade}} = \frac{\text{GV}}{100 - \text{Shade}}$$

$$-1 \leq \text{NDFI} \leq 1$$

*Souza Jr. (2005), RES*

Paragominas, Pará State - 223/62



---

# Country examples and exercises

## Country example

- Brazil

## Exercises

- Monitoring degradation processes, using ImgTools:
  - Logging and forest fires
  - Shifting cultivation
  - Fuelwood collection
- Intact/non-intact forest mapping using a proxy approach

---

# Recommended modules as follow up

- Module 2.3 for methods to assess emission factors in order to calculate changes in forest carbon stocks
- Modules 3. to learn more about REDD+ assessment and reporting

---

# Module 2.2 Monitoring activity data for forests remaining forests (incl. forest degradation)

---

## *Module developers:*

Carlos Souza

Sandra Brown

Jukka Mietinen

Frédéric Achard

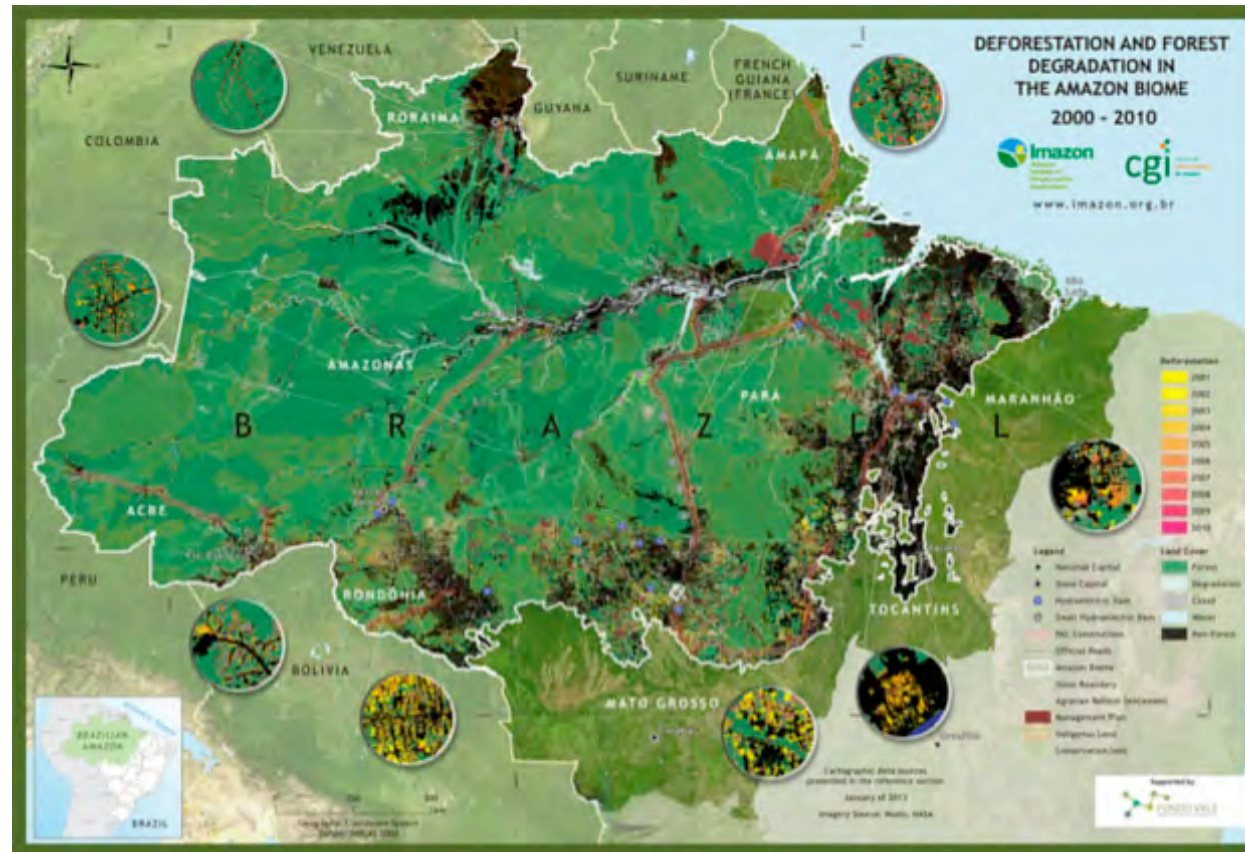


## **Country example:**

- Brazil

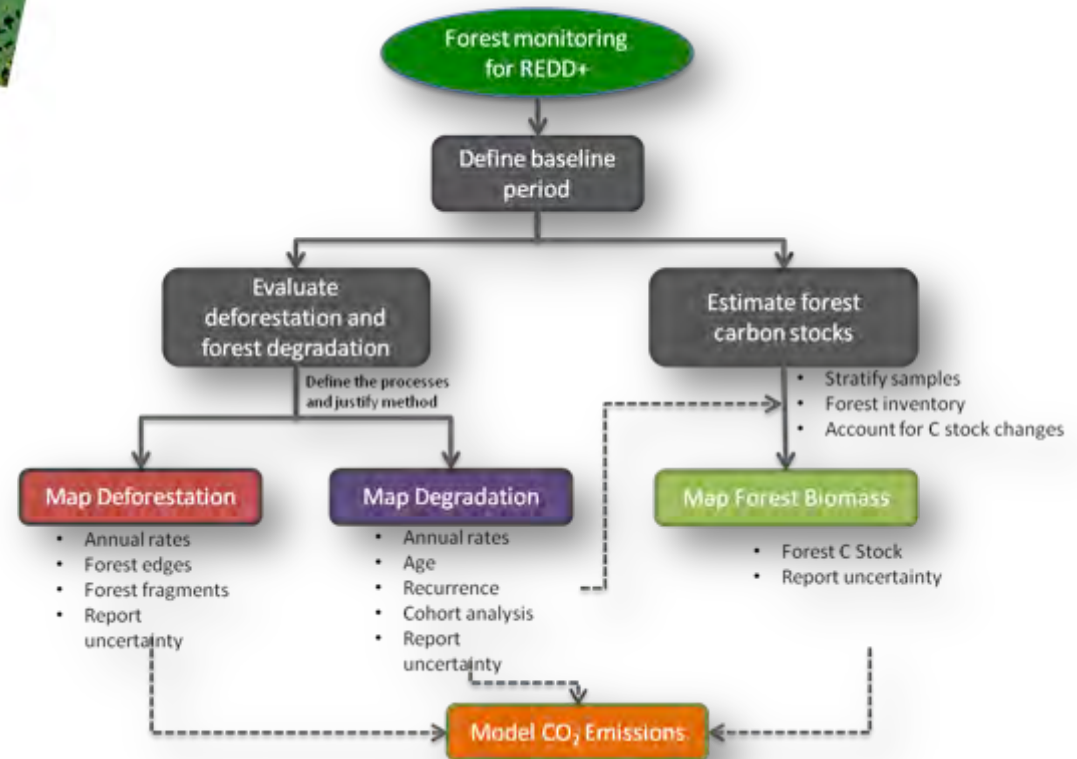
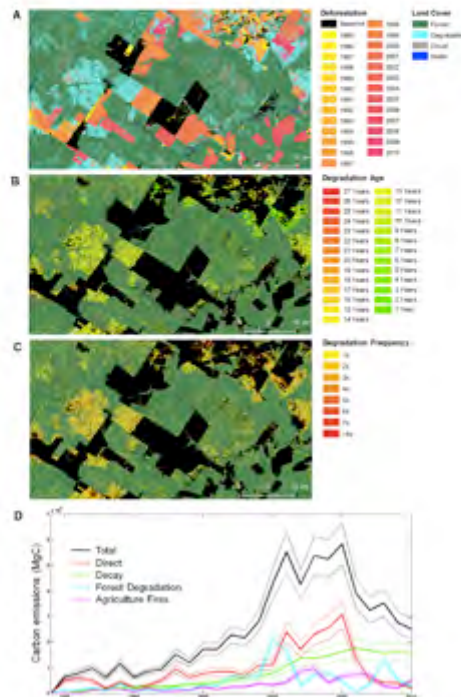
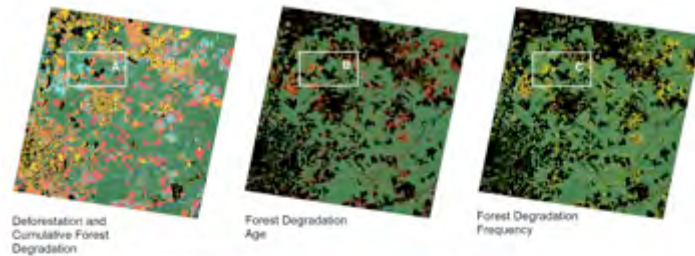


# The Brazil Case





# Estimating forest carbon emissions



# Authors

Modules	Authors
<b>M1.1</b> UNFCCC context and requirements and introduction to IPCC guidelines	<b>Herold</b> , Romijn, Mora
<b>M1.2</b> Framework for building national forest monitoring systems for REDD+	<b>Romijn</b> , Herold, Mora
<b>M1.3</b> Assessing and analysing drivers of deforestation and forest degradation	<b>Romijn</b> , Herold
M 2.1 Monitoring activity data for forests using remote sensing	<b>Miettinen</b> , Langner, Achard, Mora
M 2.2 Monitoring activity data for forests remaining forests (incl. forest degradation)	<b>Souza</b> , Brown, Miettinen, Achard
<b>M 2.3</b> Estimating emission factors for forest cover change (deforestation and degradation)	<b>Brown</b> , Murray, Casarim, Harris
<b>M 2.4</b> Incorporating community based approaches in national (or jurisdictional) REDD+ monitoring	<b>Skutsch</b>
<b>M 2.5</b> Estimation of carbon emissions from deforestation and forest degradation	<b>Brown</b> , Murray, Harris
<b>M 2.6</b> Estimation of GHG emissions from biomass burning	<b>Boschetti</b>
<b>M 2.7</b> Estimation of uncertainties	<b>Grassi</b> , Monni, Langner, Achard, Herold
<b>M 2.8</b> Overview and status of evolving technologies	<b>Mora</b> , Romijn
M 3.1 National data organization and management	<b>Romijn</b> , De Sy
M 3.2 Data and guidance on developing REDD+ reference levels	<b>Herold</b> , Romijn, Brown
<b>M 3.3</b> Guidance on reporting REDD+ performance using IPCC Guidelines and Guidance	<b>Grassi</b> , Romijn, Herold



---

# External Review: completed

---

## List of reviewers (14):

Rosa Maria Cuesta, Pham Manh Cuong, Niki de Sy, Sandro Federici, Inge Jonckheere, Ben de Jong, Gabrielle Kissinger, Ron McRoberts, Anthea Mitchell, Jim Penman, Maria Sanz Sanchez, Arief Wijaya, Sylvia Wilson, Naikoa Aguilar-Amuchastegui

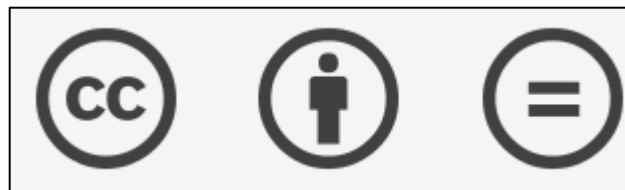
---

# Distribution License of Training Materials

---

- Allowing commercial use of the materials
- Restricting distribution of adaptations

= -> Creative Commons Attribution-NoDerivatives 4.0 International License



---

# Training Materials: Summarized in a Few Stats

---

14 modules

669 lecture slides

28 country examples

22 exercises

... and more (support documents, notes, references)

---

# Planned and Possible Next Steps

- Review by the World Bank (October)
- Dissemination: Online (November)

## *Decided/ to be discussed*

- Training activities with FCPF countries: Joint learning event (fall 2014)
- Video recording of the lectures
- Translation (French, Spanish)
- Synergies with GFOI, Silvacarbon, FAO, and others:

*Update Section 2.2. of the sourcebook (& Tr. Mat.?)*

**GOFC-GOLD**

Global Observation of Forest Cover and Land Dynamics



**Land Cover**  
Project Office



**European Space Agency**  
**Agence spatiale européenne**

**THANK YOU**

[brice.mora@wur.nl](mailto:brice.mora@wur.nl)

Follow us:

Twitter: [@gofcgold\\_lc](https://twitter.com/gofcgold_lc)

Facebook: [www.facebook.com/gofcgold.lc.po](https://www.facebook.com/gofcgold.lc.po)

Newsletter: [www.gofcgold.wur.nl](http://www.gofcgold.wur.nl)



**WAGENINGEN UR**

*For quality of life*