



Rethinking about Forest Degradation: Key issues for defining and quantifying

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Outline of the Presentation

- ❑ **Tropical Forest Landscapes**
- ❑ **Degraded forests – ecological context**
- ❑ **Definition of forest degradation**
- ❑ **Research papers on assessment of emissions from forest degradation**
 - ❖ GHG emissions from forest degradation: an underestimated source
 - ❖ Tropical forests are a net carbon source based on aboveground measurements of gain and loss
- ❑ **Key issues for defining and quantifying forest degradation**

Tropical Forest landscape: A variety of forest-land use options

250 mm ha

800 – 1,000 mm ha

110 mm ha

700-800 mm ha



Non-accessible
old-growth forest,
Effectively Protected
Areas

Openly accessible Forest Area:
Opened-up forests,
Degraded old-growth forests,
Secondary forests,
Degraded forest land

Timber production
forests,
with or without
concessions

“Forest areas” in a
multiple landscape,
tree plantations,
agrofor, small
wood lots

Global Forest Area: 4033 million ha
One third of the world's land area is forest

Source: Blaser and Sabogal (2002): ITTO Guidelines for Forest Restoration and Secondary Forest Management

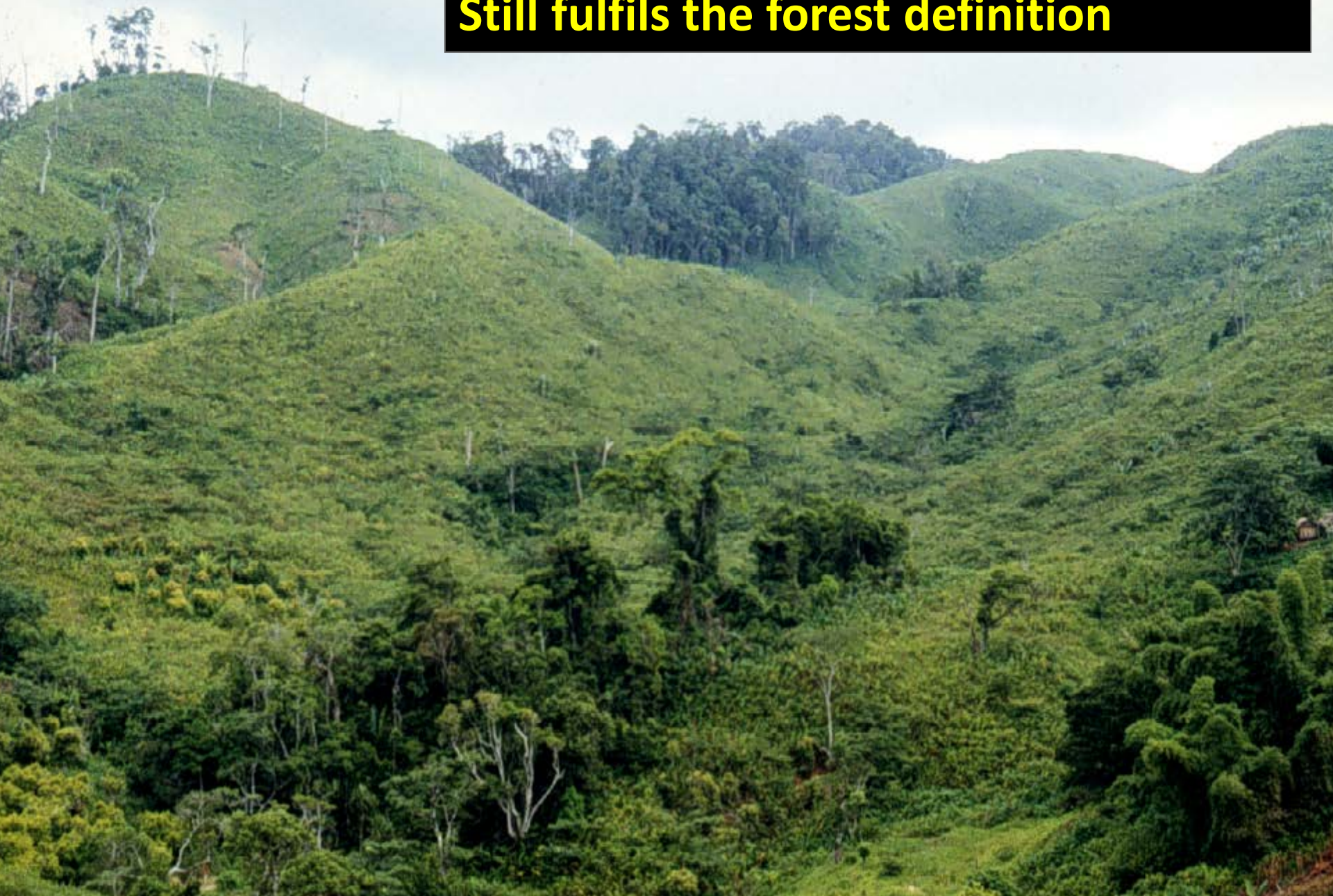
“unsustainable logging”





**Fuelwood,
Charcoal making**

**Gradually highly degraded forest
Still fulfils the forest definition**



Extent of degraded forest

Only rough estimates exist, no thresholds

ITTO (2002): about 850 million ha

Source: Blaser and Sabogal (2002): ITTO Guidelines for Forest Restoration and Secondary Forest Management Authors' estimates. Based on FAO (1982, 1990, 1995, 2001); Sips (1997); Wadsworth (1997); WRI-World Bank (2000). In tropical America, about 38 million ha are classified as secondary forests (second-growth forests). For the other regions it is not possible to distinguish between degraded primary forests and secondary forests

Laestadius and Potapov (2009): More than 1 billion ha

WRI (2014): 104 million ha (more than 8 percent) of the world's Intact forest landscapes (IFLs) have been degraded since 2000

<http://www.wri.org/blog/2014/09/8-percent-worlds-remaining-pristine-forests-degraded-2000>

WRI (2014): More than two billion hectares worldwide offer opportunities for restoration

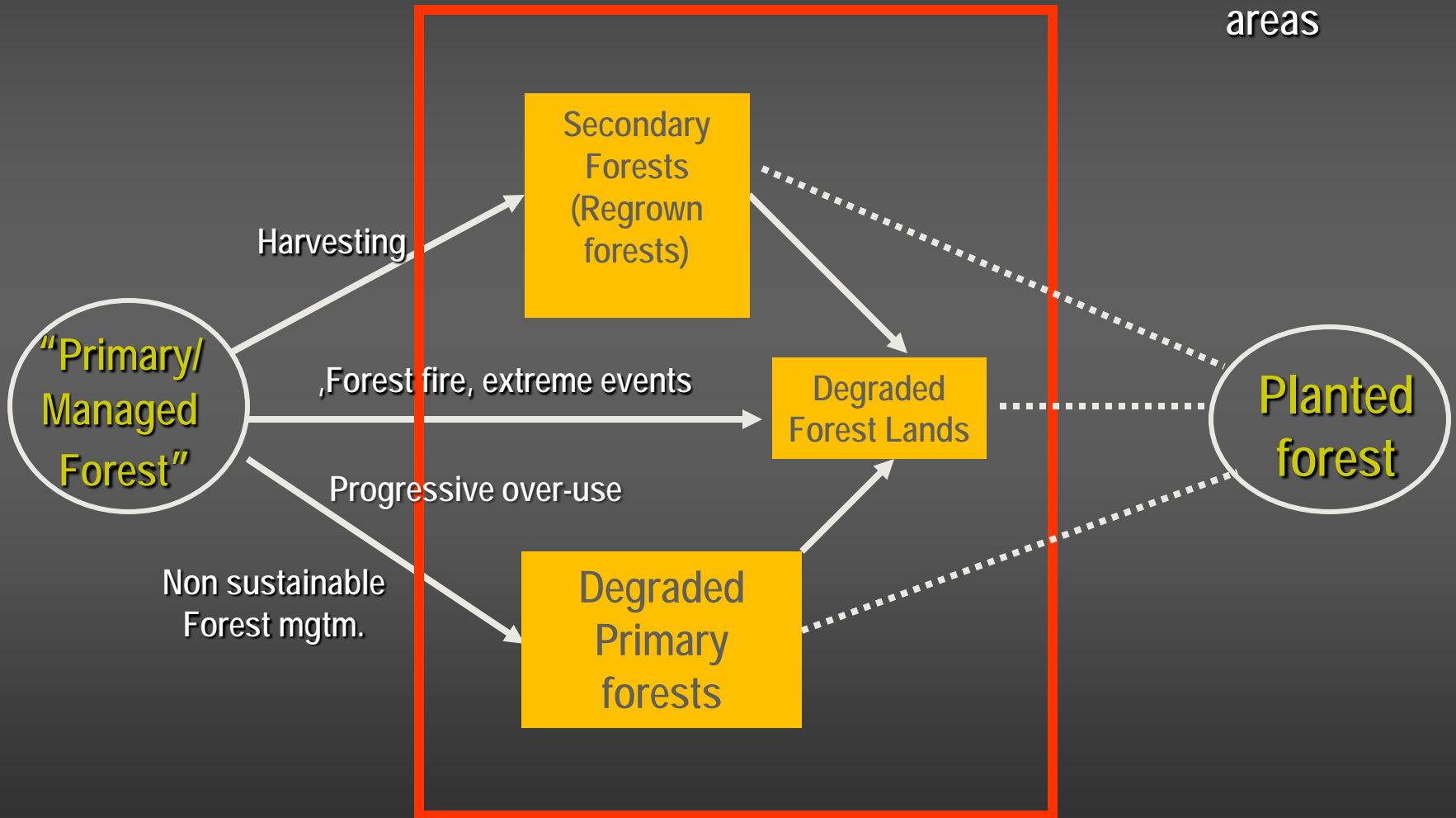
an area larger than South America. Most of these lands are in tropical and temperate areas
<http://www.wri.org/resources/maps/atlas-forest-and-landscape-restoration-opportunities>.

Degraded forests – ecological context

Natural forests

The forgotten middle ground in the past: Degraded forest ecosystems:

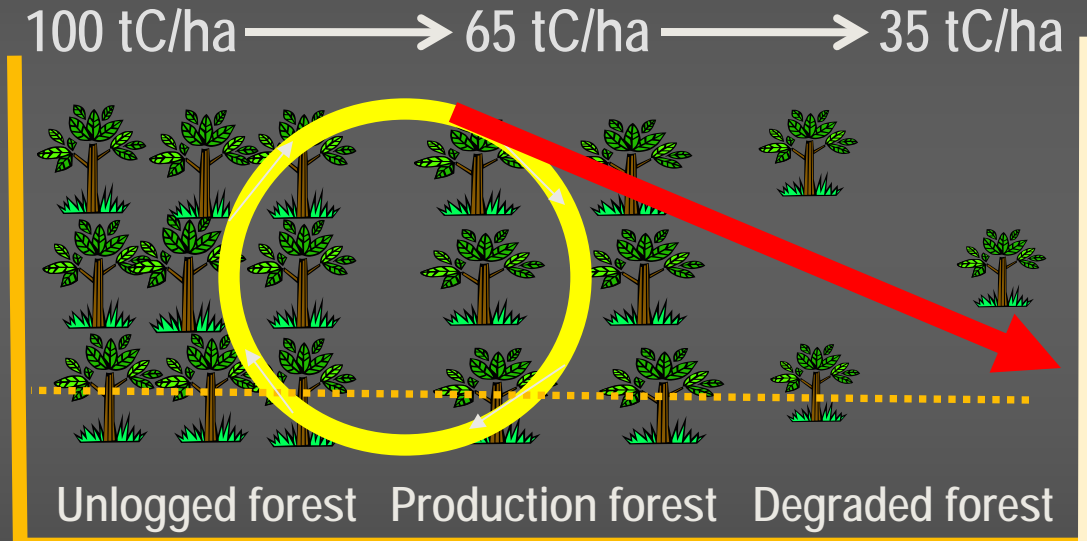
“Forested area Outside natural forest areas



Degrading forest

| | | | |
|----------------------|-----|---|---|
| Carbon | +++ | → | + |
| Protective functions | +++ | → | + |
| Biodiversity | +++ | → | + |

Deforestation
(land-use change)



Forest Degradation

Forest Restoration Process

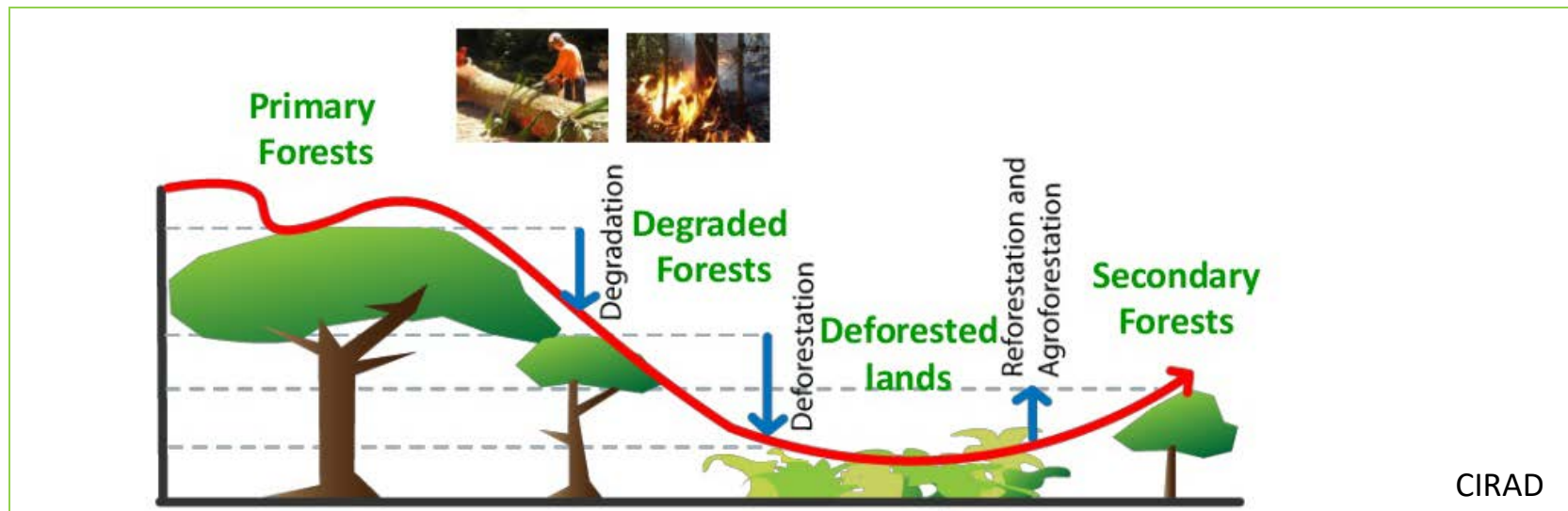
Sustainable Forest Management
(Conservation and sustainable use of existing forest)

Many definitions of Forest Degradation

| Agency | Definition | Source |
|--|--|-----------------------|
| FAO | Reduction in the capacity of forest to provide goods and services | FAO 2002 & FAO 2008 |
| ITTO | Long-term reduction of the overall potential supply of benefits from the forest, including wood, biodiversity and other products or services. Also, a direct human-induced loss of forest values (particularly carbon), likely to be characterized by a reduction of tree crown cover. Routine management from which crown cover will recover within the normal cycle of forest management operations is not included | ITTO 2002 & ITTO 2005 |
| SBSTA/UNFCCC workshop on defining and measuring degradation for REDD | Proposal that degradation should be defined in terms of comparison with intact forest of the same vegetation type: “Forest degradation is the reduction of the carbon stock in a natural forest , compared with its natural carbon carrying capacity, due to the impact of all human land-use activities”. | Cadman (2008/2009) |
| IPCC | A direct human-induced long-term loss (persisting for X years or more) of at least Y% of forest carbon stocks (and forest values) since time T and not qualifying as deforestation or an elected activity under Article 3.4 of the Kyoto Protocol | IPCC 2003 |

General Definition of Forest Degradation

Reduction of the capacity of a forest to provide goods and services by human disturbances



→ However, still considered as a forest in the « legal » sense

→ Action that reverse degradation = restoration

Greenhouse gas emissions from tropical forest degradation: an underestimated source

Source: Pearson *et al. Carbon Balance Manage (2017) 12:3*

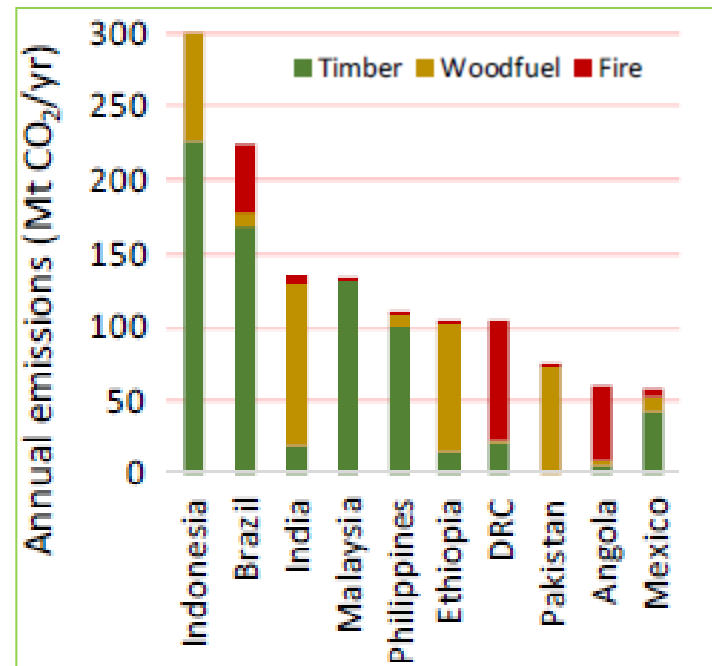
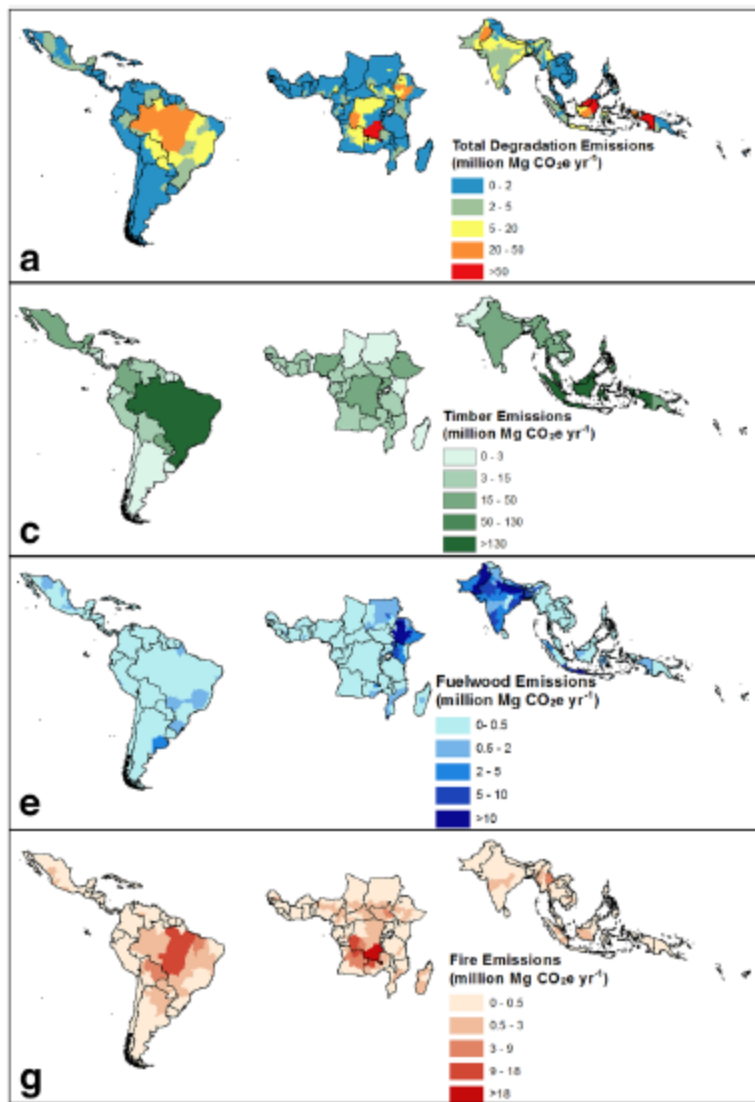
- Estimation of forest degradation emissions b/n 2005-2010 in 74 developing countries covering 2.2 billion ha of forests.
- Total emissions from deforestation and forest degradation

| Activity | Annual emission (Gt CO ₂ e year ⁻¹) | % |
|--------------------|--|-----------|
| Deforestation | 6.22 | 75 |
| Degradation | 2.06 | 25 |
| ✓ Timber | 1.09 | (53) |
| ✓ Woodfuel | 0.62 | (30) |
| ✓ Fire | 0.35 | (17) |

- ❖ Forest degradation accounted for 25% In 28 of the 74 countries, emissions from forest degradation exceeded those from deforestation
- ❖ Selective **timber** harvest in native forests include **extracted log emissions**, logging damage and logging infrastructure factors

Spatial distribution of forest degradation emissions

Source: Pearson *et al. Carbon Balance Manage* (2017) 12:3

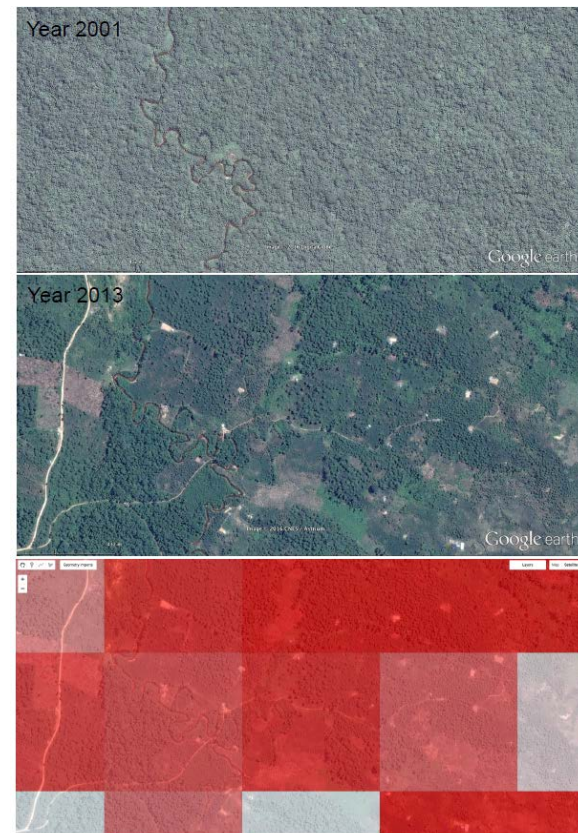


| Tropic | Timber (%) | Woodfuel (%) | Fire (%) |
|---------|------------|--------------|----------|
| America | 69 | 10 | 21 |
| Africa | 31 | 36 | 33 |
| Asia | 61 | 35 | 5 |

Tropical forests are a net carbon source based on aboveground measurements of gain and loss

Source: A. Baccini et al., Science 10.1126/science.aam5962 (2017)

- 12 years (2003–2014) of MODIS pantropical satellite data to quantify net annual changes in the aboveground carbon density of tropical woody live vegetation
- World's tropical forests are a net release of carbon of $425.2 \pm 92.0 \text{ Tg C yr}^{-1}$ (losses of $861.7 \pm 80.2 \text{ Tg C yr}^{-1}$ and gains of $436.5 \pm 31.0 \text{ Tg C yr}^{-1}$ from forest growth)
- Losses result from (i) deforestation and (ii) reductions in carbon density within standing forests (degradation) - accounting for **68.9%** of overall losses

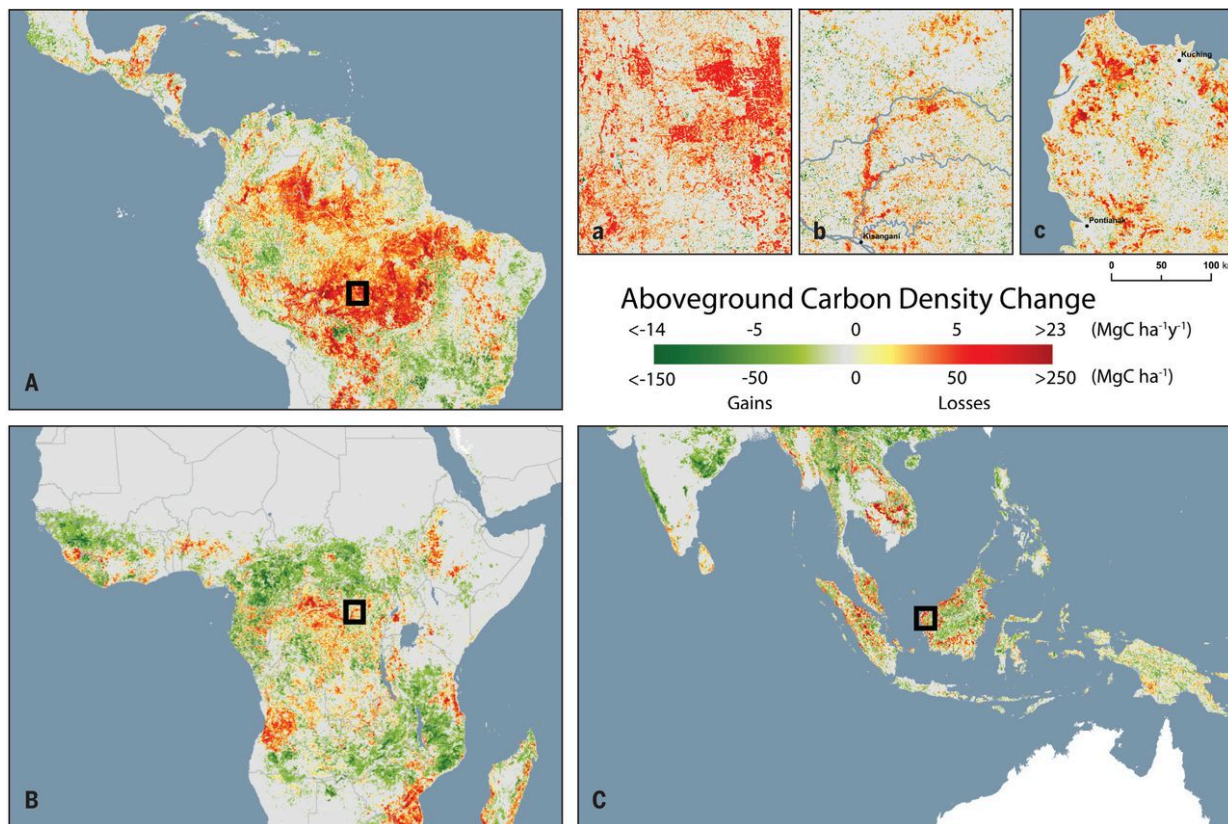


Example of degradation/disturbance detected. Losses in carbon density in the bottom panel as shades of red scaled from light to dark (i.e., low to high carbon loss)

Aboveground measurements of gain and loss

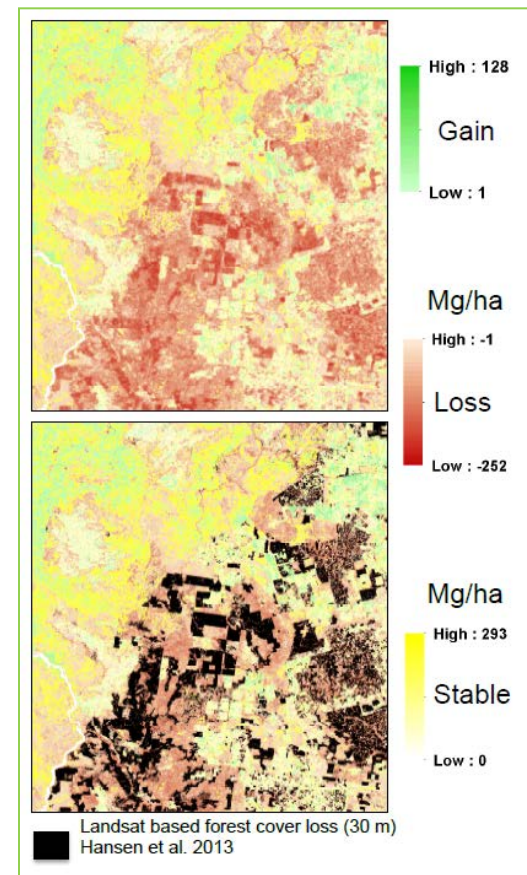
Source: A. Baccini et al., Science 10.1126/science.aam5962 (2017)

Geography of carbon density change



Degradation and disturbance accounts for 70%, 81%, 46% of carbon losses respectively across tropical America, Africa, and Asia.

Trajectories of carbon density



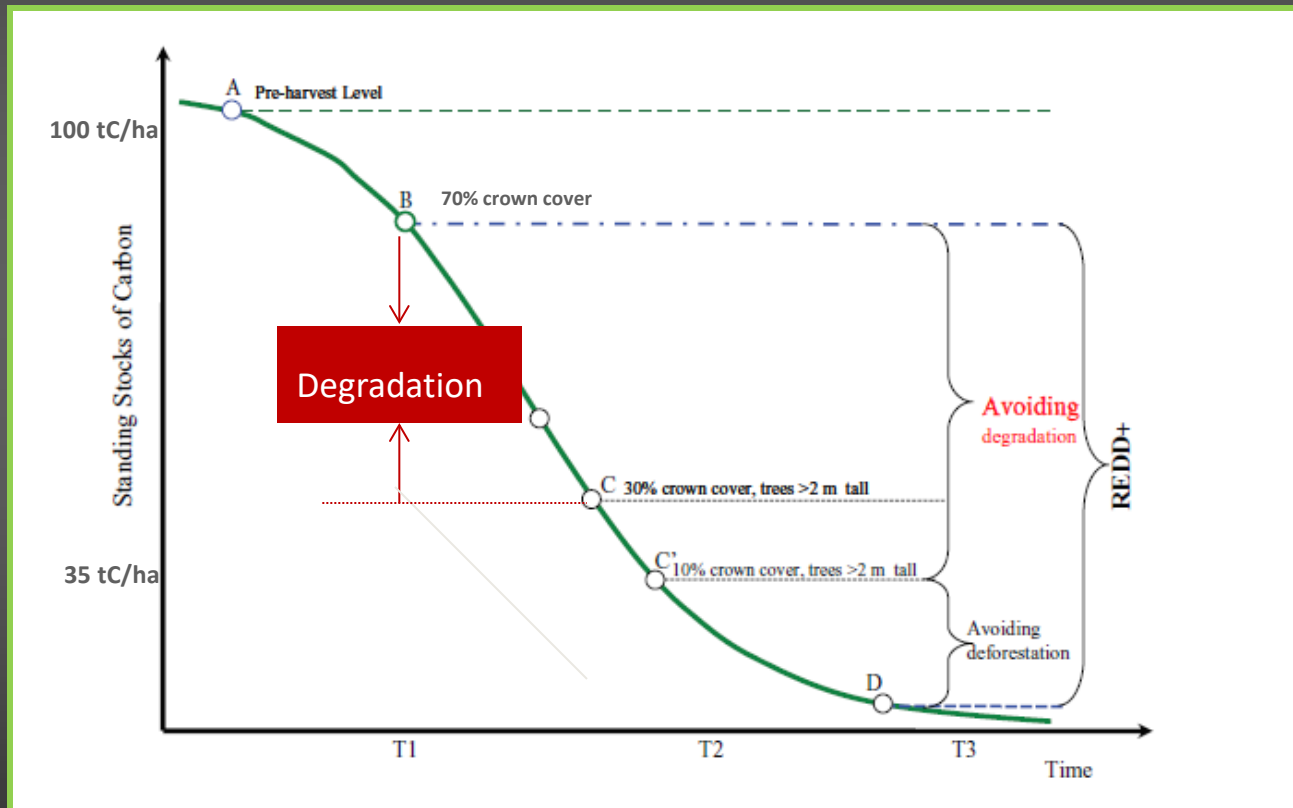
Forest cover loss data superimposed in black

Forest Degradation – Key issues

- ⇒ Degradation is location-specific (spatial and temporal)
- ⇒ Degradation is difficult to define.
- ⇒ Any assessment of degradation is dependent on the scale to which the definition applies
- ⇒ Need for defining forest degradation in a consistent and operational manner to permit cross site comparability
- ⇒ Strategies to increase the mitigation potential of addressing degradation

Conclusion:

Operational framework for defining and quantifying forest degradation is a key element of REDD+



Modified from Sasaki and Putz



Thank You!

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<http://www.itto.int>