



An assessment of the effectiveness of the tropical forest monitoring systems of the Brazilian Amazon and Myanmar

Daniel Santos and Aung Myint Myat

Outline

- Introduction and Background
- Monitoring systems in the Brazilian Amazon
- Forest monitoring system in Myanmar
- Effectiveness assessment of the systems
- Challenges
- Conclusions

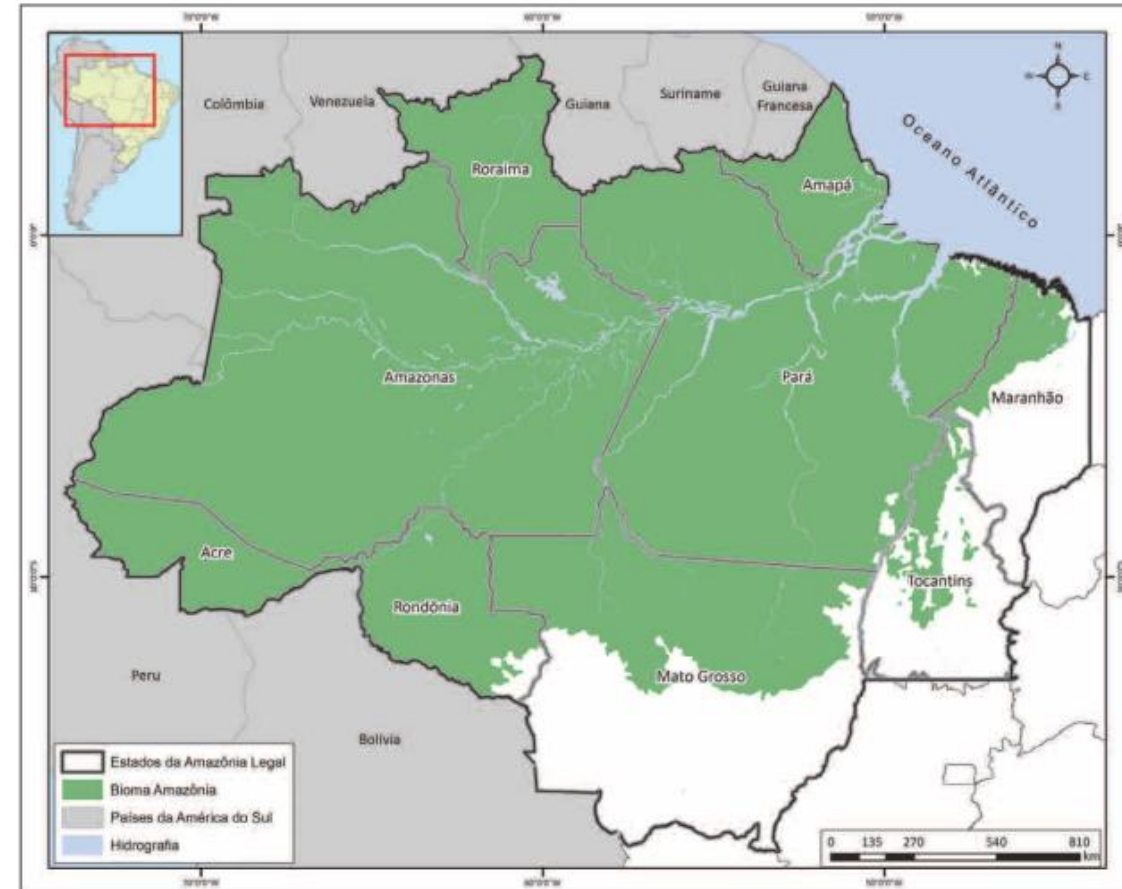
Introduction and Background

The Brazilian Amazon

- Total land area = 5.217.423 km²
- Population = 24.4 million (2010)
- Forest Cover = 62.4%
- Non-forest vegetation = 20.3%

Deforestation rates

- 1990-2000 (1,651,391 ha/yr) 0.32 %
- 2000-2010 (1,653,100 ha/yr) 0.32 %
- 2010-2015 (547,300 ha/yr) 0.10 %



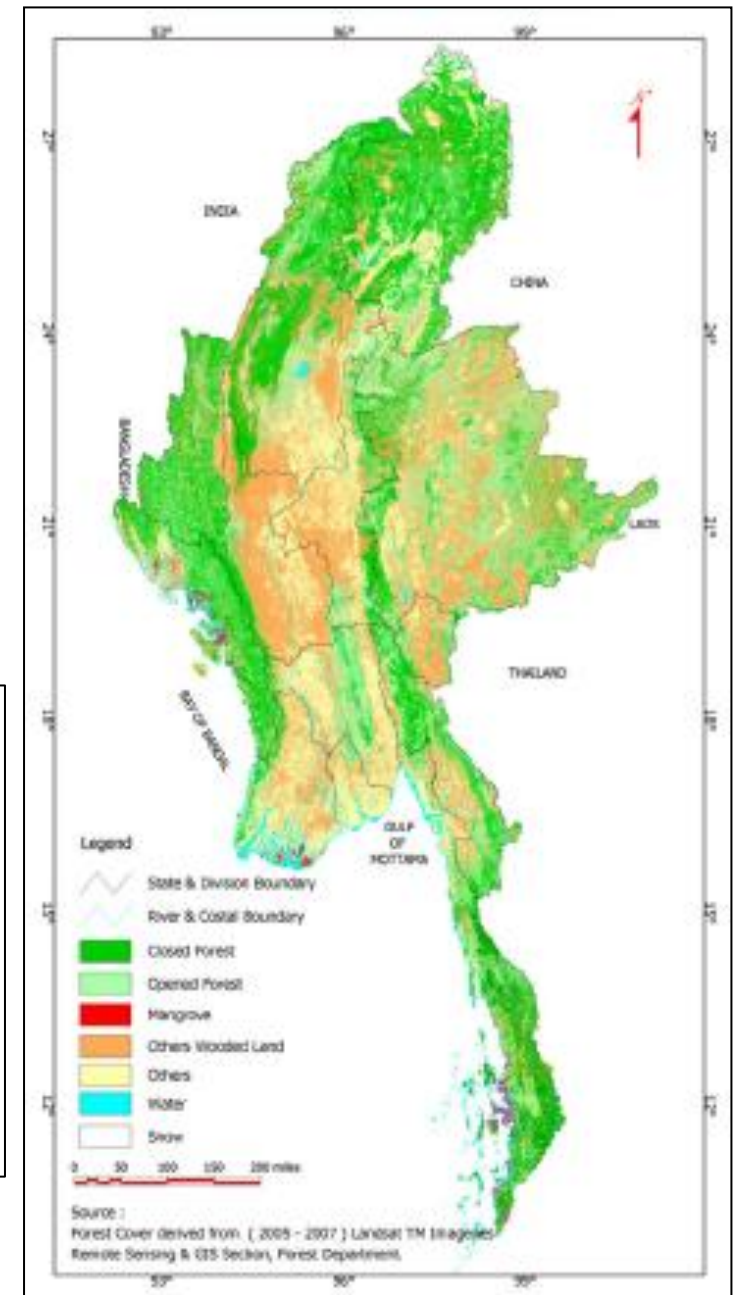
Source: IBGE 2013

Myanmar

- Total land area = 676,577 km²
- Population = 58.6 million (2010)
- Forest Cover = 45.04% (FRA; 2015)

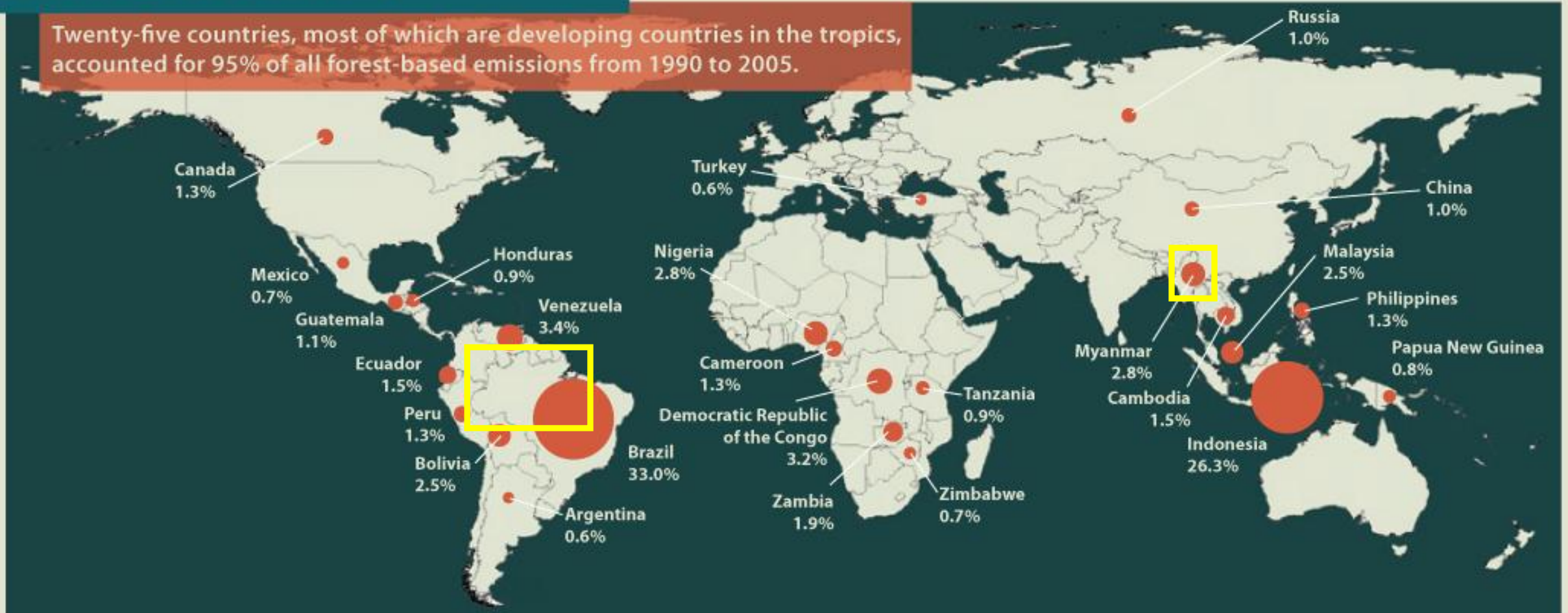
Deforestation rates

- 1990-2000 (435,000 ha/yr) 1.17 % 4th
- 2000-2010 (310,000 ha/yr) 0.93 % 8th
- 2010-2015 (546,000 ha/yr) 1.7 % 3rd



FORESTS AND GHG EMISSIONS

Twenty-five countries, most of which are developing countries in the tropics, accounted for 95% of all forest-based emissions from 1990 to 2005.



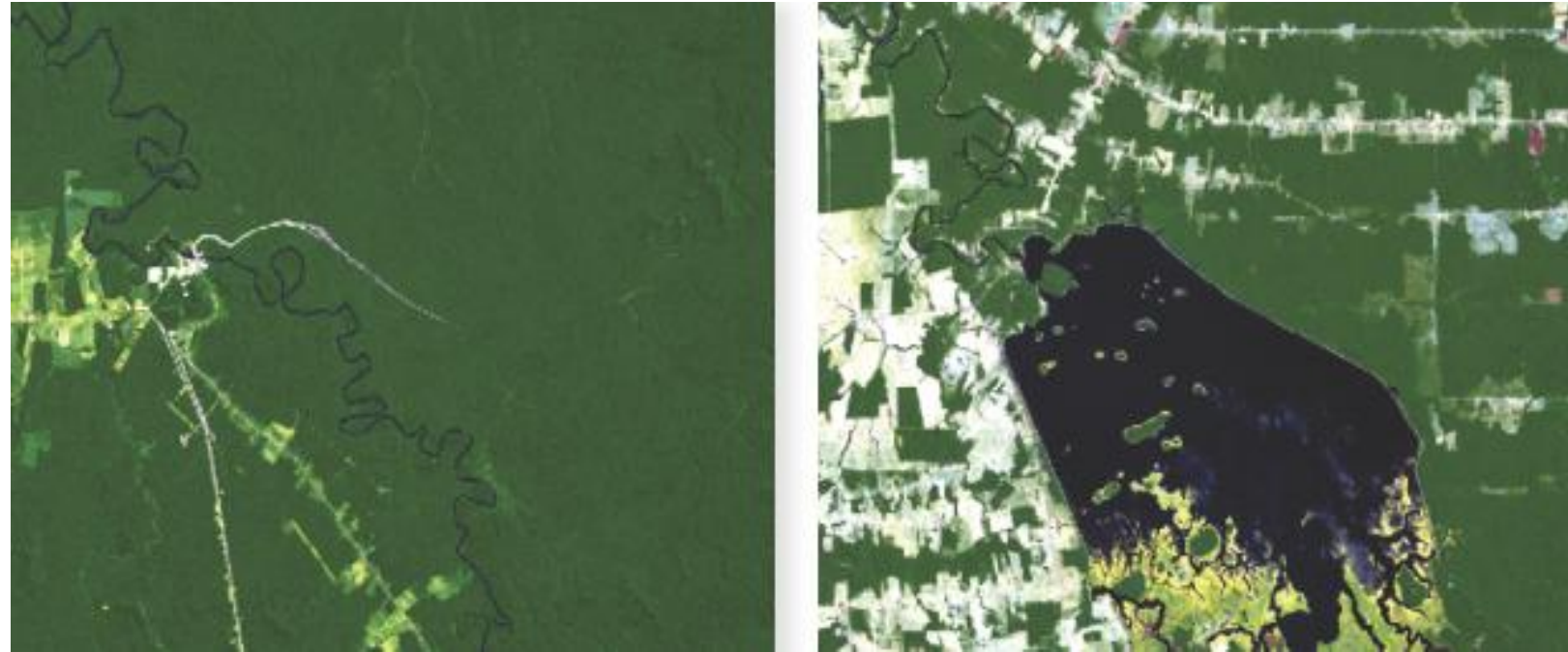
Source: <http://socialcapitalreview.org/>

Monitoring systems in the Brazilian Amazon

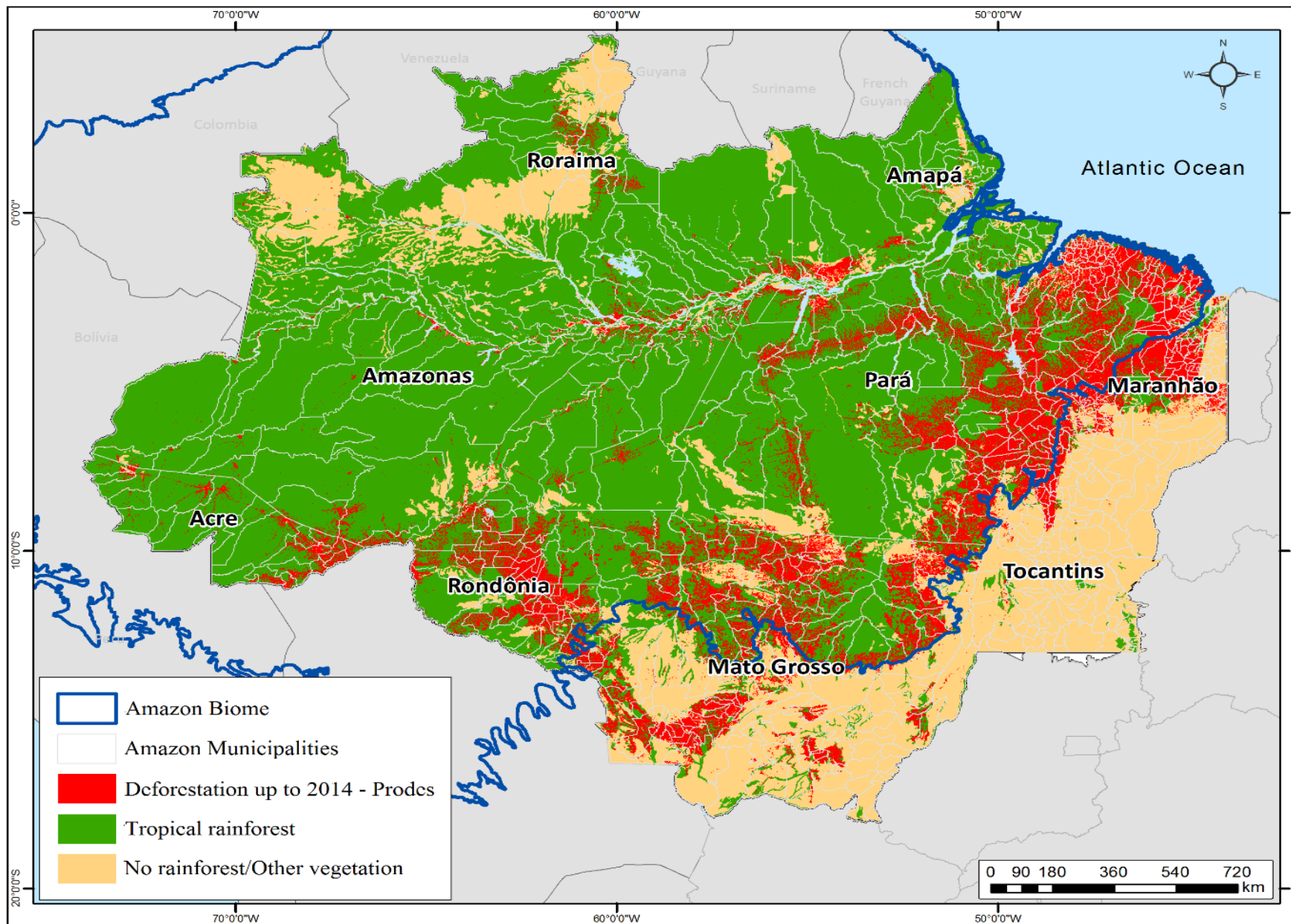
1 – *The Prodes Project*

- *INPE's initiative*
- *Landsat imageries*
- *Annually since 1988*
- *Digital classification since 2002*
- Mapping area of 6.25 ha

Landsat applicability example in Rondônia State 1984 – 2011 (Source: USGS, 2012)



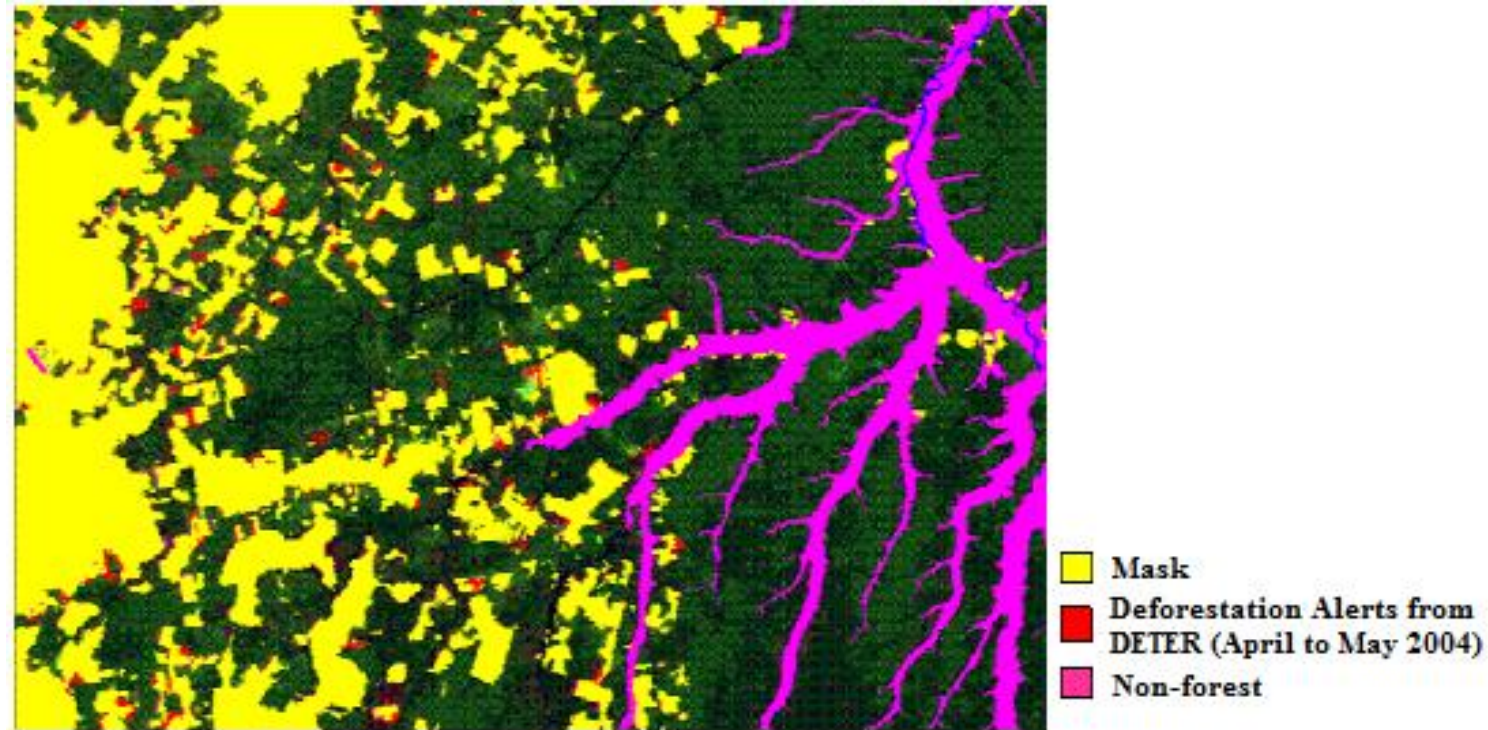
Deforestation in the Brazilian Amazon up to 2014 detected by the Prodes



Source: INPE 2014

2 – The DETER Project

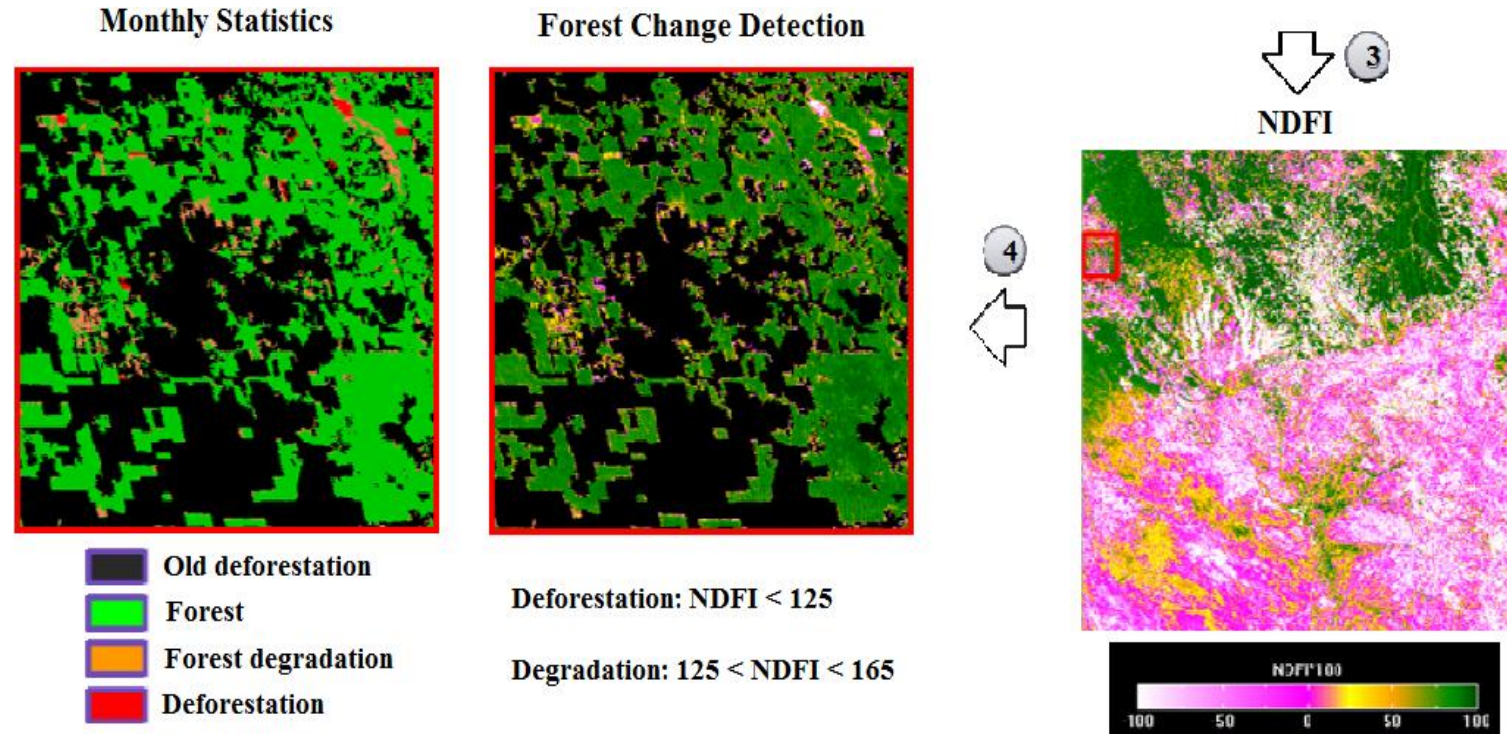
- *INPE's initiative*
- *MODIS sensor in TERRA satellite imageries*
- *Monthly since 2004*
- *Mapping area of 25 ha*



Deforestation identified by DETER (Source: INPE, 2008).

3 – The SAD initiative

- *Imazon's initiative (local NGO)*
- *MODIS sensor in TERRA satellite imageries*
- *Monthly since 2008*
- Mapping area of 25 ha
- Different method than DETER (NDFI)



SAD of Imazon, based on NDFI calculated from MODIS 250 meter spatial resolution images. (Source: Souza Jr., Hayashi, et al., 2009).

Monitoring Systems	Advantages	Disadvantages
Prodes	<ul style="list-style-type: none"> • Better accuracy (6.25 ha) • Tracks the overall deforestation • Landsat • Pioneer 	<ul style="list-style-type: none"> • Annual frequency • Susceptible to biased interpretations
DETER and SAD	<ul style="list-style-type: none"> • Alert systems • High frequency • Key to decrease deforestation 	<ul style="list-style-type: none"> • Low accuracy • Low spatial resolution • Do not track every deforestation • Cloud issues

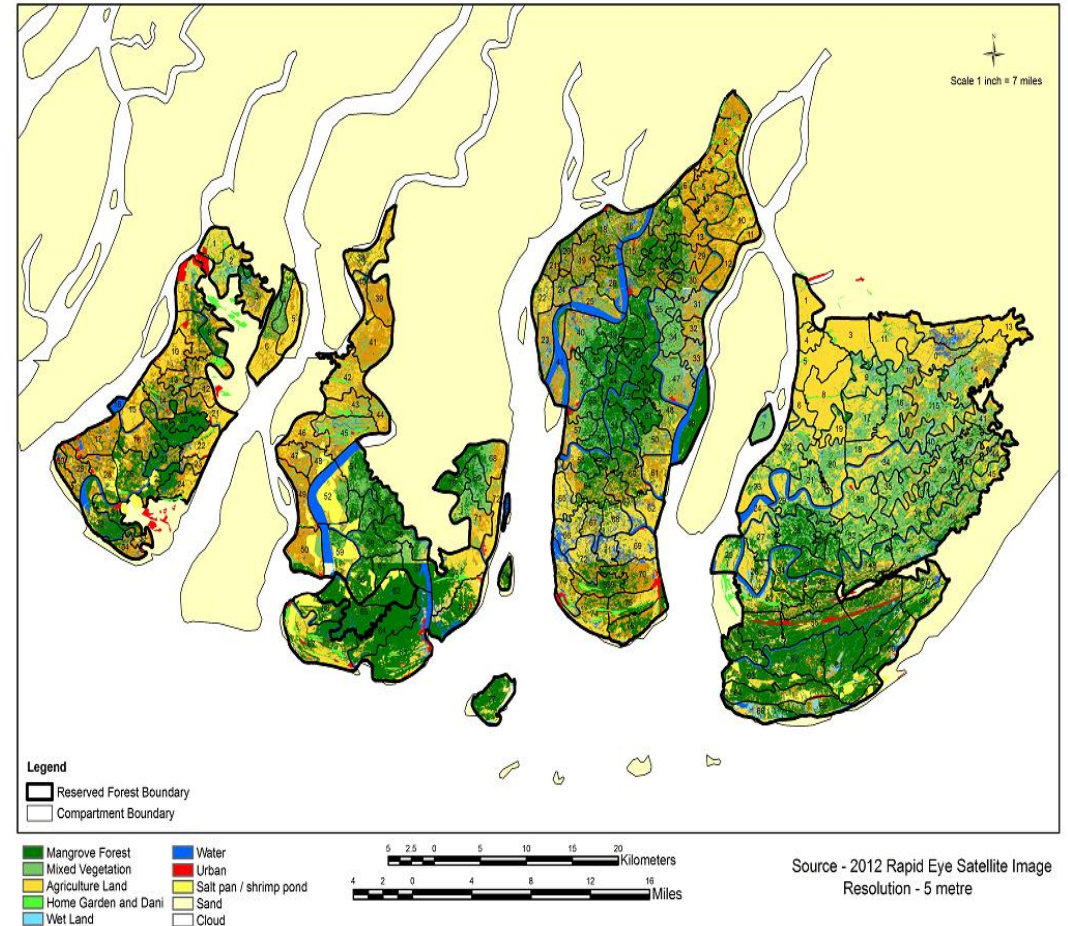
Forest monitoring system in Myanmar

1957	First Myanmar forest cover assessment with Aerial photograph 1:24,000 scale, 57% forest cover
1975	Landsat MSS image, 1:1,000,000 scale, FAO, UNEP and Forest Department
1990	Landsat TM imagery 1989-1990, 1:500,000 scale, 43.2 %
2000	FRA 2000, Landsat TM images, Japan Forest Technical Association (JAFTA) and Forest Department, Watershed Management for Three Critical Areas Project
2005	FRA 2005
2010	FRA 2010 Landsat TM (30 m x 30 m resolution)
2015	FRA 2015 IRS Liss 3 (23.5 m x 23.5 m resolution)

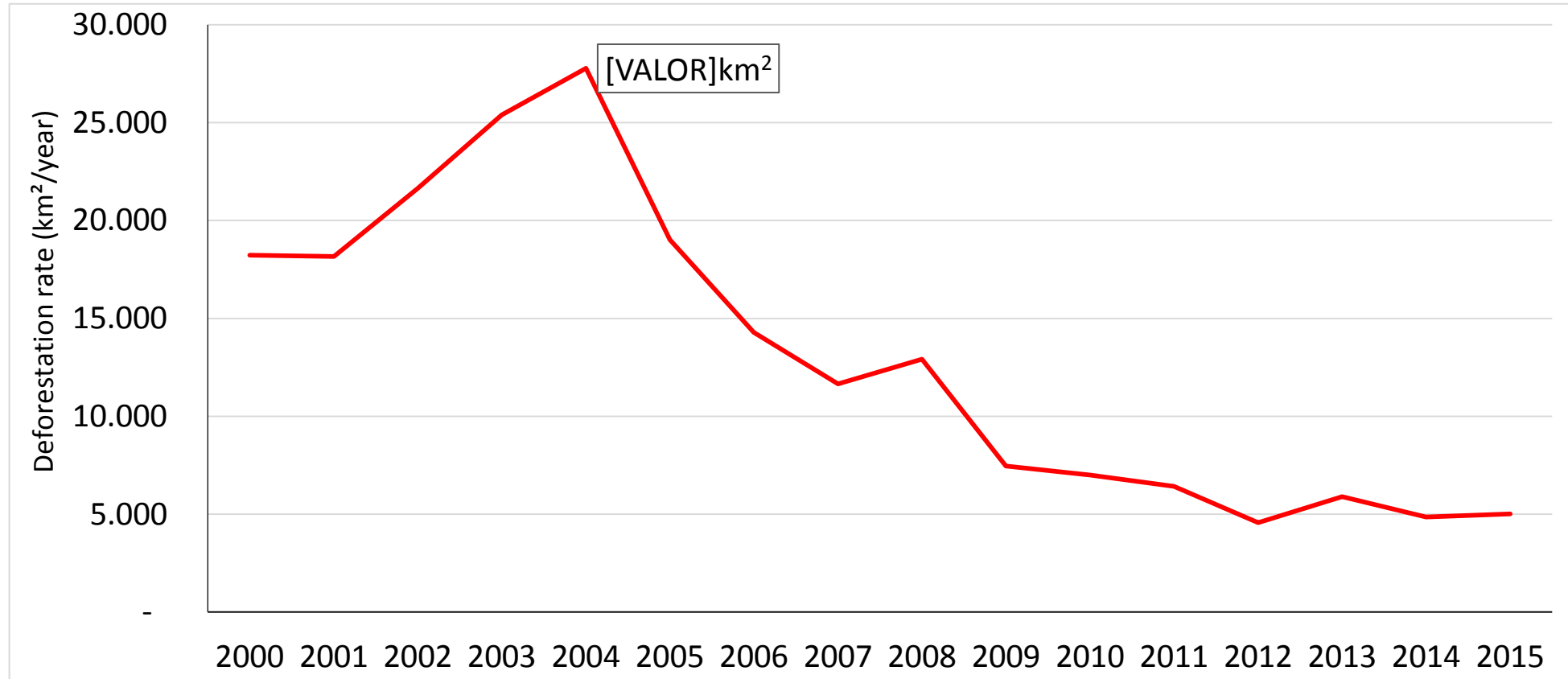
Effectiveness of Forest MS in Myanmar

- Used high resolution satellite imageries (Quickbird, IKONOS, ALOS, Rapideye) for some important forest area
- Projected forest carbon storage map in 2005 with REDD+ programme
- Initiate sub national /local level forest assessment
- Land use plan for the whole country

Land Use and Land Cover Map 2012 (Rapideye image)



Effectiveness of Forest MS in Brazilian Amazon



Source: INPE (2015)

Leadership to monitor the Amazon rainforest

Environmental public policies

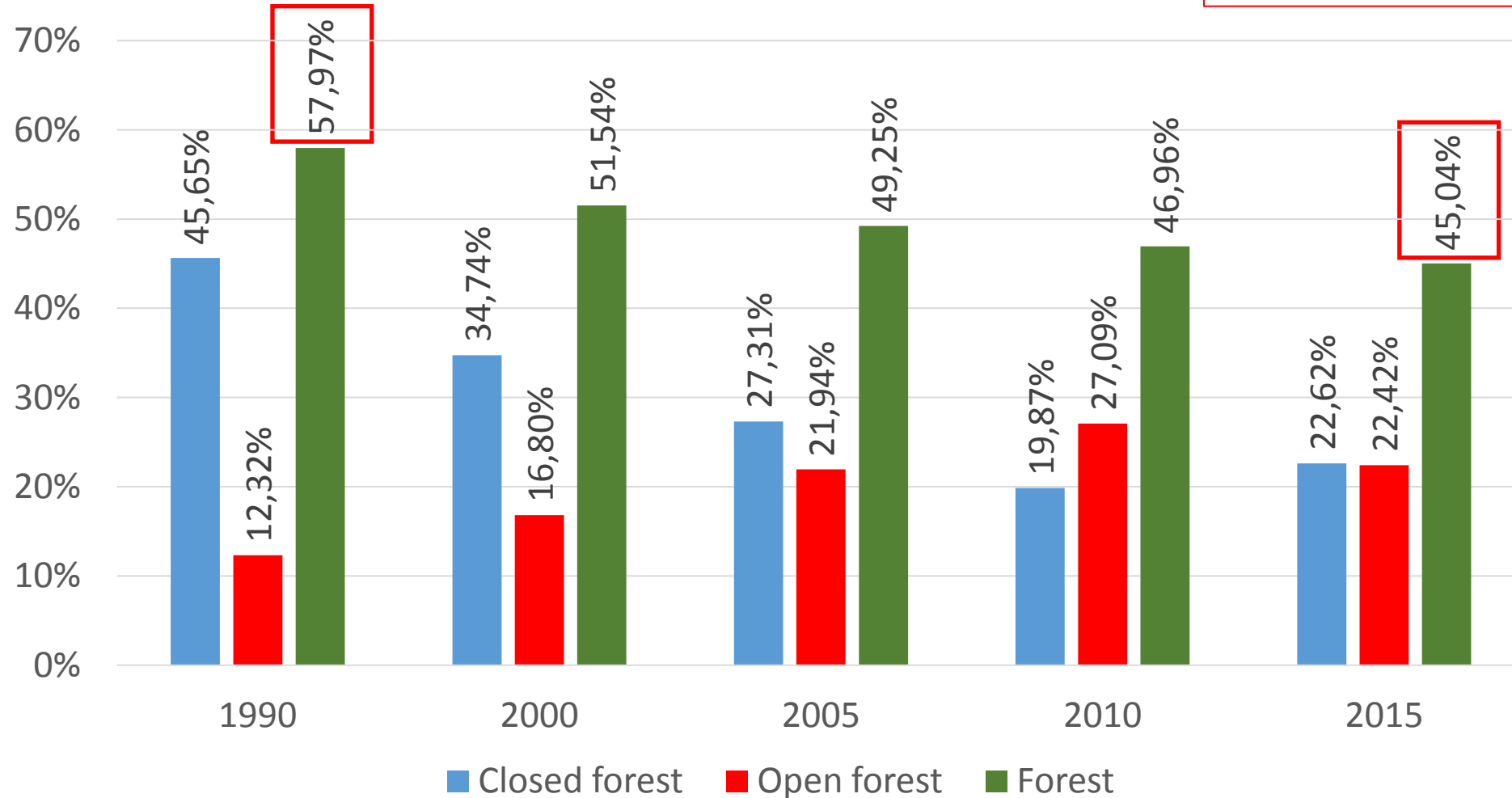
Transparency

Challenges for Development of MS in the Brazilian Amazon

- “Zero” net deforestation challenge;
- Information provided is not sufficient anymore;
- Evolve MS to deal with the actual deforestation trend;
- People who destroy the forests “adapted” to the systems;
- Deal with governance issues (e.g DETER’s lack of transparency).

Forest Cover Changes in Myanmar

Forest loss = 87,481 km²



Challenges for Development of MS in Myanmar

- Data Sources (i.e. Satellite Images for monthly etc.)
- Weakness in application of Advanced Technology (no forest fire detection & alarm etc.)
- Limited Funding and Structure (Human resources, equipment etc.)
- Weakness in Institutional systems (RS and GIS only in FD HQ, no facilities in District Forest Office)

Lessons that Myanmar can learn from Brazil initiatives

- To track the deforestation monthly via MODIS sensor (DETER, SAD etc.);
- To improve leadership of government, local NGO, like Amazon;
- Resources available for this initiative.
- Achieve more transparency;

Conclusions

- Brazil reduced deforestation with the successive development of monitoring system
- Prodes → DETER and SAD
- try to evolve techniques of monitoring system zero deforestation

- Myanmar still have increased deforestation rates
- Limitations to provide effective information from forest monitoring
- Needs to improve the investments from government & other organizations

References

1. Food and Agriculture Organization of the United Nations (2010); Global Forest Resources Assessment
2. Food and Agriculture Organization of the United Nations (2015); Global Forest Resources Assessment
3. <http://socialcapitalreview.org>
4. IBGE. 2013. Divisão politico-administrativa do Brasil e Biomas brasileiros. Brasilia: DF, IBGE. Available at: <www.ibge.gov.br>.
5. INPE, (2008); Avaliação do INPE sobre o relatório “inspeção de pontos e áreas do DETER” da Secretaria de Estado do Meio Ambiente do Estado do Mato Grosso. Brazilian Ministry of Science and Technology.
6. INPE. (2014); Annual rates of deforestation in the Brazilian Amazon from 1988 to 2014 Available at: <http://www.obt.inpe.br/prodes/prodes_1988_2014.htm>.
7. INPE. 2015. Annual rates of deforestation in the Brazilian Amazon from 1988 to 2014 Available at: <http://www.obt.inpe.br/prodes/prodes_1988_2014.htm>.
8. Myanmar Forest Department (2015); National Forest Monitoring System in Myanmar: History, Current Status and Challenges
9. Souza Jr., C.M., Pereira, K., Lins, V., Haiashy, S., Souza, D., 2009. Web-oriented GIS system for monitoring, conservation and law enforcement of the Brazilian Amazon. Earth science informatics 2, 205–215.
10. USGS. United States Geological Survey. 2012. Landsat - a global land-imaging mission. USGS and U.S. Department of Interior. Fact Sheet 2012–3072.
11. www.fao.org/forestry (2007); Brief on national forest inventory Myanmar



Thank you!

