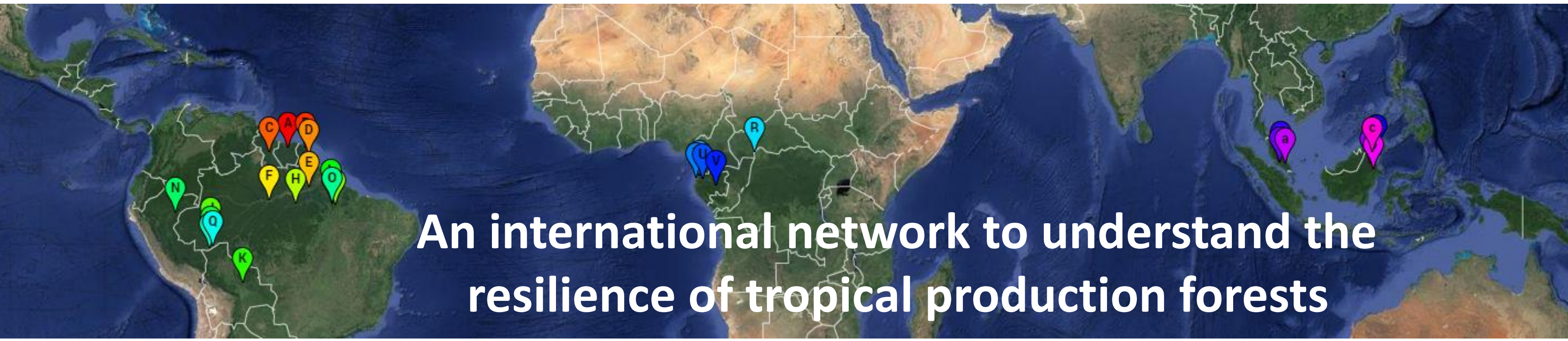
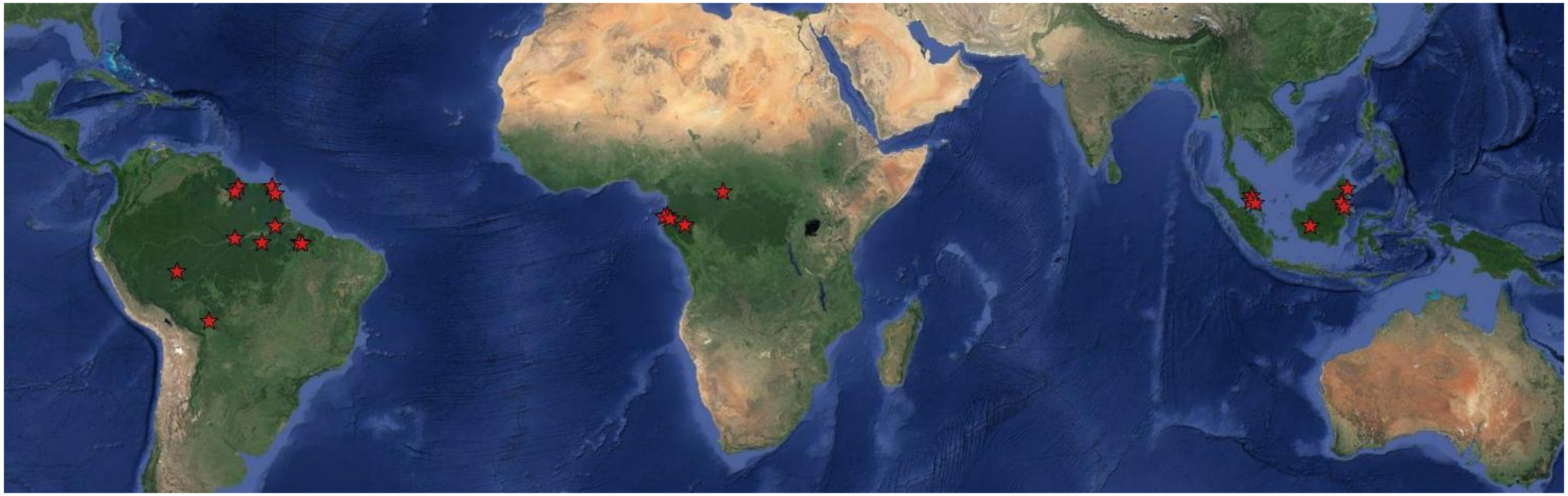
The Tropical managed Forests Observatory



Plinio Sist, IUFRO World Congress, 2019, Curitiba, Brazil

Main Purposes of this Presentation

- Why tropical managed forests matter?
- What are the main research questions of TmFO?
- TmFO in brief
- Some results
- Concluding remarks



Tropical Forests Networks

- Most networks focus on 'undisturbed' or secondary forests
- Primary forests = 24 %
- Degraded Forests = 76 %
- Production forests = 400 millions ha (Blaser et al. 2011)

- Limited knowledge on the ecology of logged tropical forests
- Uncertainty on their response to climate change
- Forests of the future

Urgent need to understand managed forests' resilience to disturbances (of increasing intensity/frequency)

Challenging Questions

- ✓ How do response of tropical forest to logging (biomass, biodiversity, dynamics) vary across regions and continents in the context of climate change?
- ✓ What are the trade-off between production of goods (Timbers, NTFPs) and Environmental Services such as Carbon storage and biodiversity in managed forests ?
- ✓ What is the future value of managed natural forests ?

TmFO in Brief

- Started in Mid 2012 (Cirad, Cgiar, PEFC, Embrapa)
- 3 continents, 11 countries, 18 Institutions, ~ 40 scientists
- 24 experimental sites, 537 Plots (1194 ha)
- average census interval of 17 years
- good reliable species identification (Genus level)
- consistent information on logging treatment
- **No raw data sharing only consolidated regional data**

IAVS

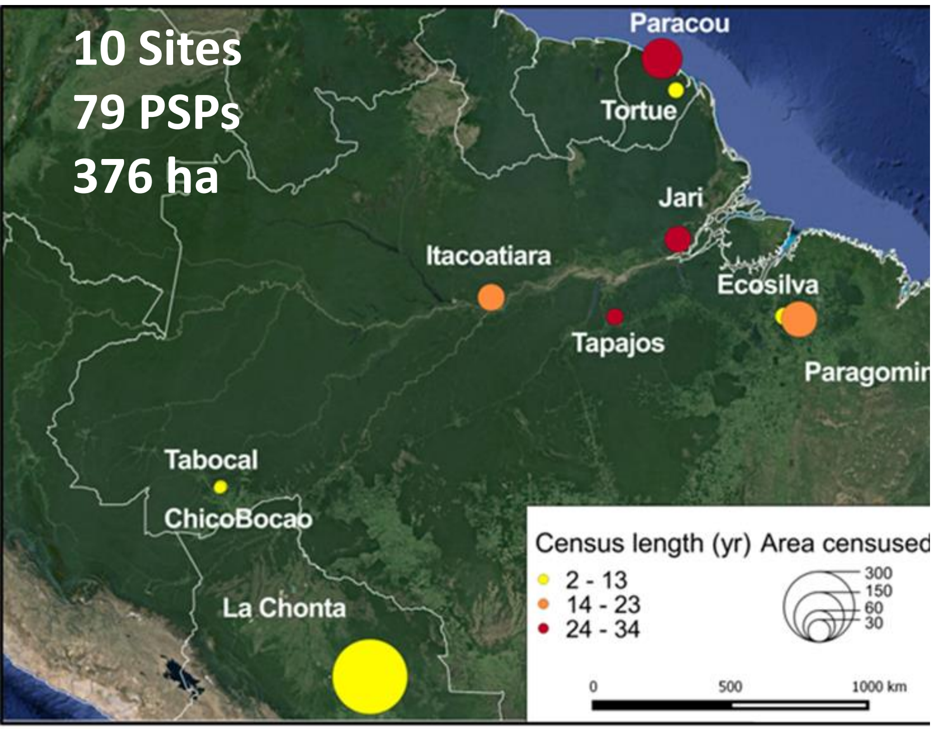
Applied Vegetation Science **18** (2015) 171–174

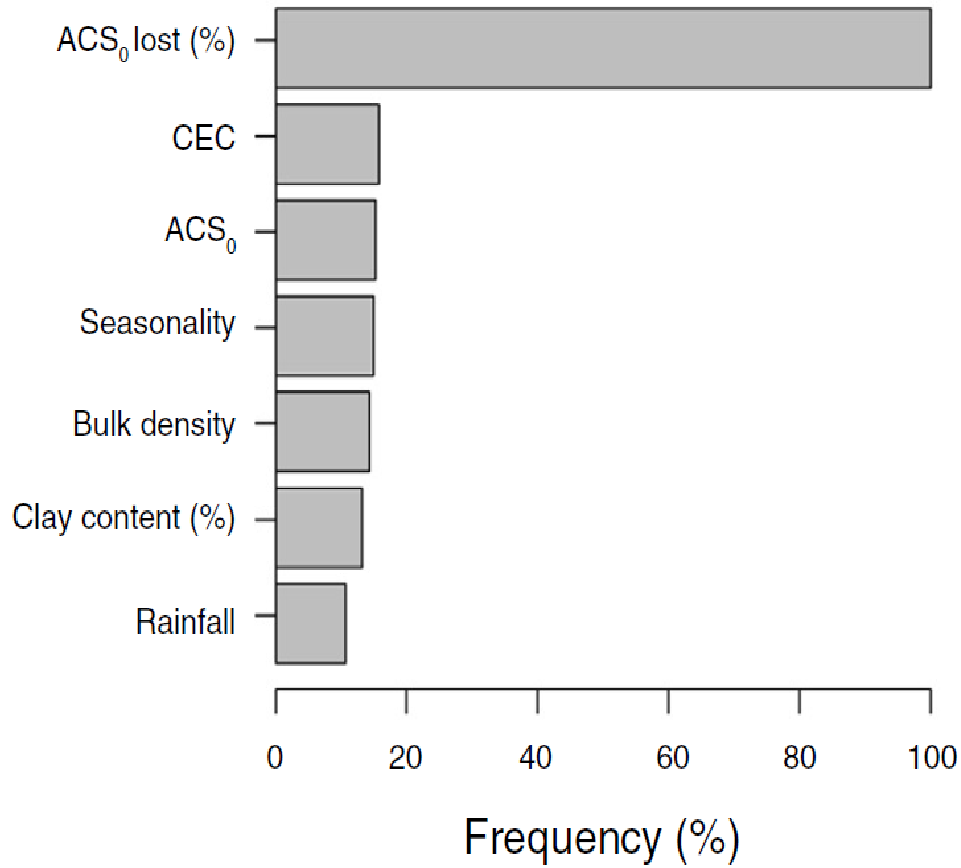
REPORT

The Tropical managed Forests Observatory: a research network addressing the future of tropical logged forests

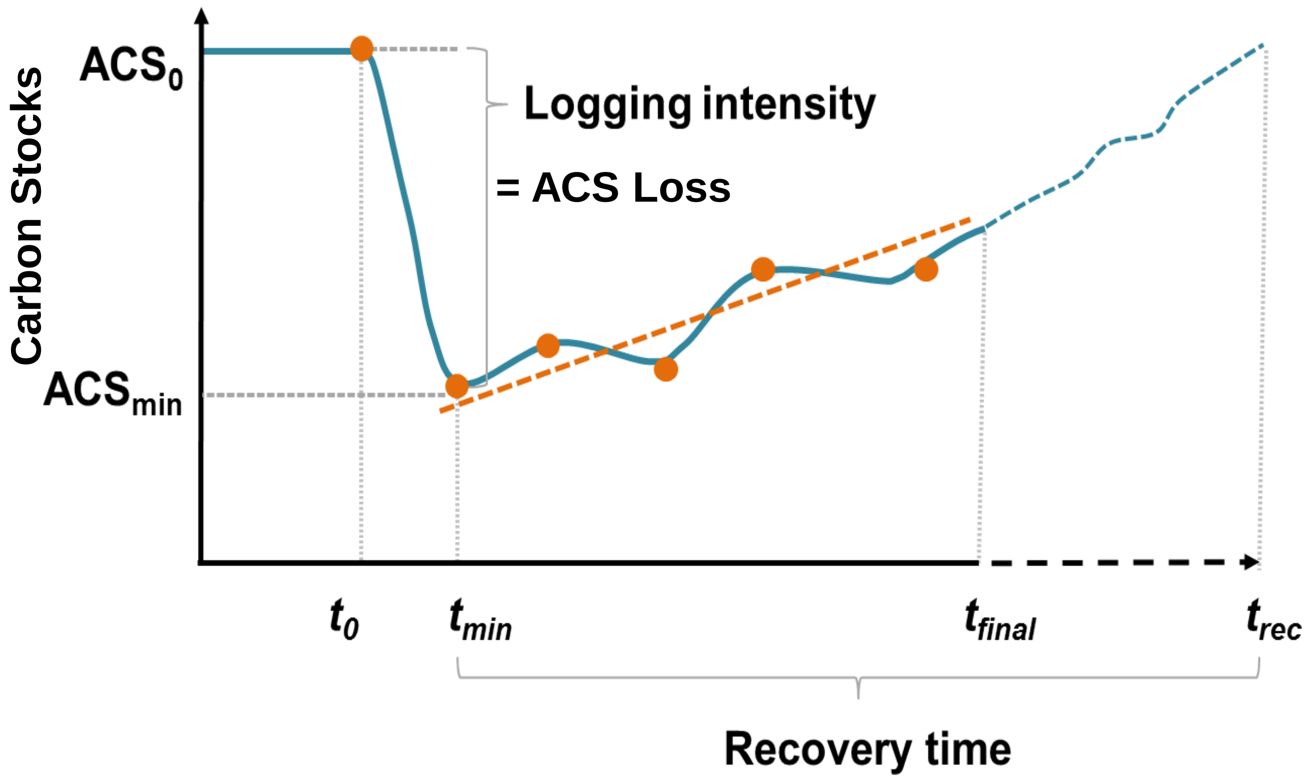
Plinio Sist, Ervan Rutishauser, Marielos Peña-Claros, Alexander Shenkin, Bruno Hérault, Lilian Blanc, Christopher Baraloto, Fidèle Baya, Fabrice Benedet, Katia Emidio da Silva, Laurent Descroix, Joice Nunes Ferreira, Sylvie Gourlet-Fleury, Marcelino Carneiro Guedes, Ismail Bin Harun, Riina Jalonen, Milton Kanashiro, Haruni Krisnawati, Mrigesh Kshatriya, Philippa Lincoln, Lucas Mazzei, Vincent Medjibé, Robert Nasi, Marcus Vinicius N. d'Oliveira, Luis C. de Oliveira, Nicolas Picard, Stephan Pietsch, Michelle Pinard, Hari Priyadi, Francis. E. Putz, Ken Rodney, Vivien Rossi, Anand Roopsind, Ademir Roberto Ruschel, Nur Hajar Zamah Shari, Cintia Rodrigues de Souza, Farida Herry Susanty, Eleneide Doff Sotta, Marisol Toledo, Edson Vidal, Thales A.P. West, Verginia Wortel & Toshihiro Yamada

Above Carbon Stock Recovery in the Amazon Basin





Biomass Recovery Time after Logging



ACS loss = logging intensity = ACS_0-ACS_{min}($Mg.ha^{-1}$)

Recovery rate = Mean (ACS $Mg.ha^{-1}.yr^{-1}$)

Recovery Time = ACS loss/ Mean Recovery rate (year)

Current Biology
Magazine

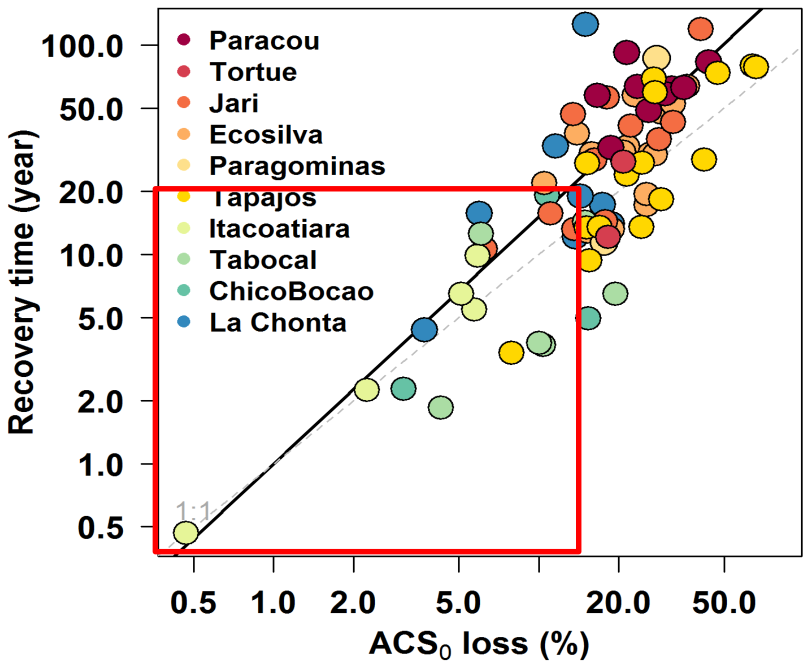
Correspondence

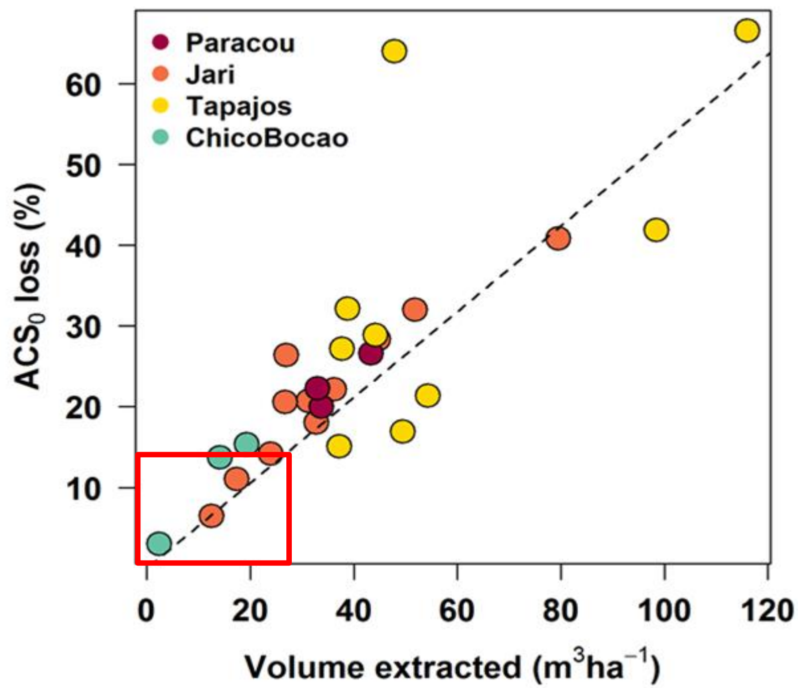
Rapid tree carbon stock recovery in managed Amazonian forests

Ervan Rutishauser[1,2,*], Bruno Hérault[3,a], Christopher Baraloto[4,5], Lilian Blanc[2], Laurent Descroix[6], Eleneide Doff Sotta[7], Joice Ferreira[8], Milton Kanashiro[8], Lucas Mazzei[8], Marcus V.N. d'Oliveira[9], Luis C. de Oliveira[9], Marielos Peña-Claros[10,11], Francis E. Putz[12], Ademir R. Ruschel[8], Ken Rodney[13], Anand Roopsind[12,13], Alexander Shenkin[14], Katia E. da Silva[15], Cintia R. de Souza[15], Marisol Toledo[11], Edson Vidal[16], Thales A.P. West[12], Verginia Wortel[17], and Plinio Sist[2,a]

While around 20% of the Amazonian forest has been cleared for pastures and agriculture, one fourth of the remaining forest is dedicated to wood production [1]. Most of these production

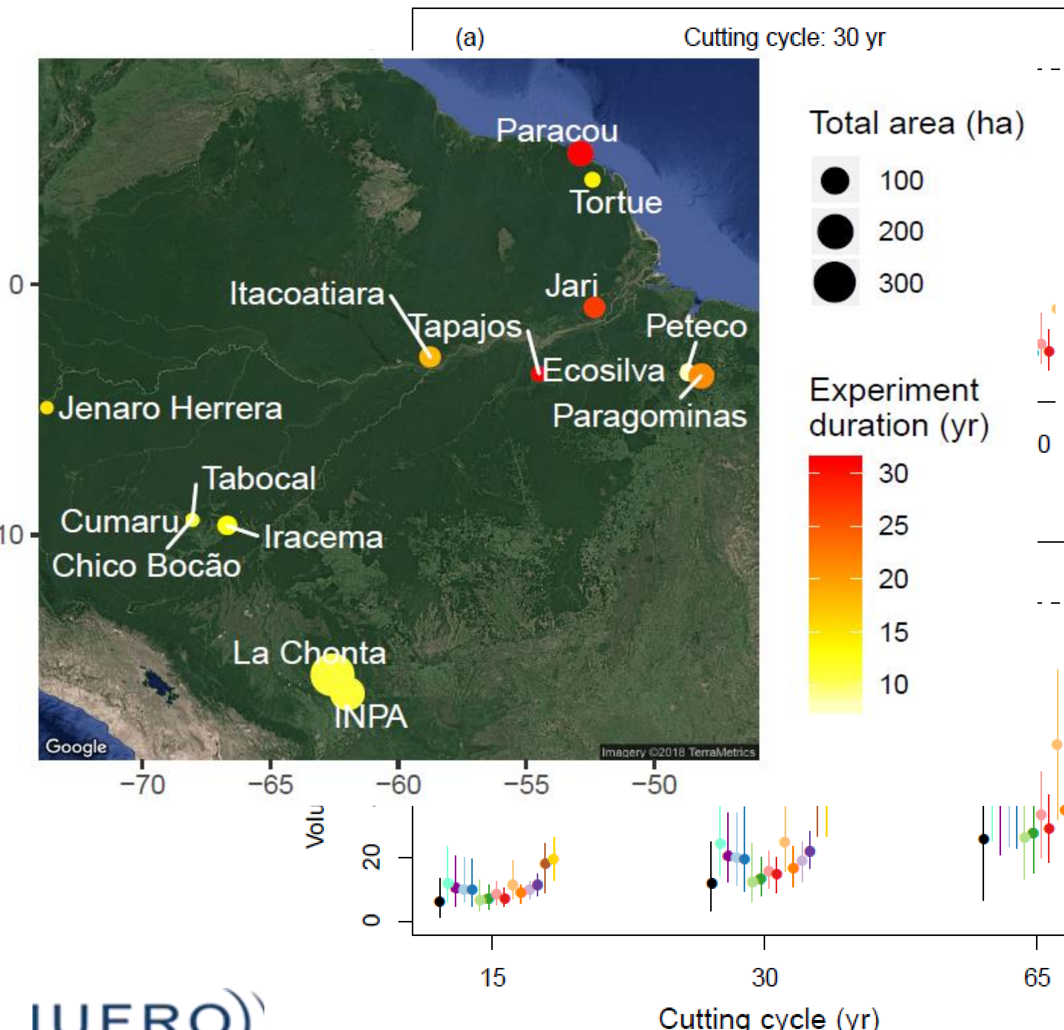
Above Carbon Stock Recovery in the Amazon Basin



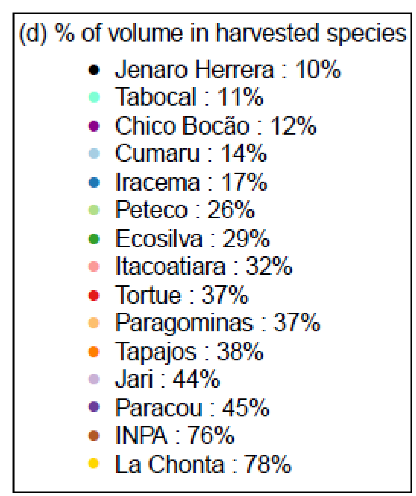


- ✓ Above Ground Carbon recovery time mainly depends on logging intensity
- ✓ Losses of 10, 25 or 50% of pre-logging ACS would require 12, 43 or 75 years to recover regardless of location in the Amazon region.
- ✓ Within the logging intensities occurring in the Amazon (10-30 m^3/ha), biomass will recover in 7 to 21 years

Volume recovery at regional level



- **15 long-term experimental sites (8-30 yrs)**
- **845 ha, 8% CNV logging, 33% RIL, 37% post logging liberation thinning, 22% Control**
- **Simulation of different logging regimes with a Bayesian hierarchical model of Volume Dynamics with Differential Equations)** **(Piponiot et al. 2018)**

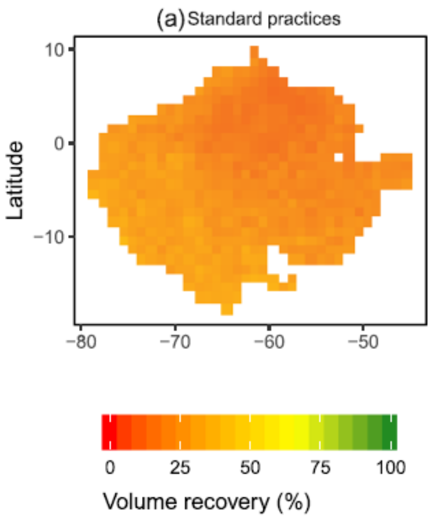


IUFRO

cirad

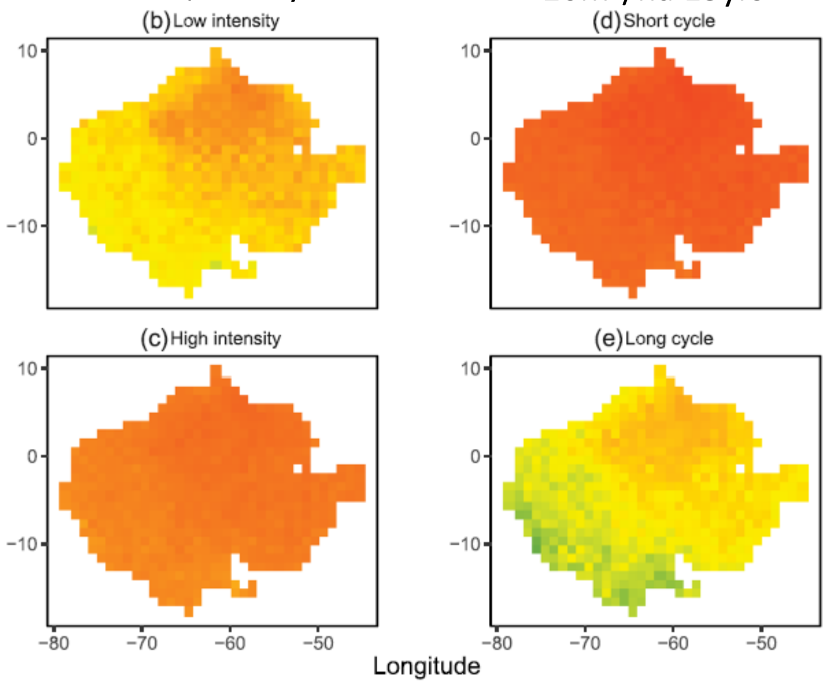
Volume recovery at regional level

20m^3/ha 30yrs



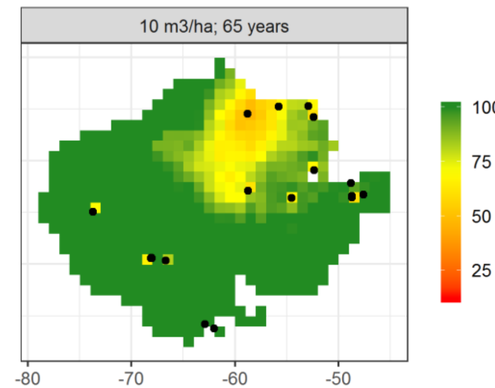
10m^3/ha 30yrs

20m^3/ha 15yrs



30m^3/ha 30yrs

20m^3/ha 65yrs



Piponiot et al. 2019

Concluding Remarks

- Carbon recovery is generally completed witin a 30yrs cycle after logging
- Capacity of long term sustainable production of timber of natural amazonian forests = 10m^3/ha every 65 years
- In the Amazon the demand of sawnwood is 30 Mm^3/year, the potential of natural forest only 17Mm^3/ha
- Aren’t tropical natural production forests more important for the provision of environmental services than for providing timbers?
- Transition phase must be anticipated

Acknowledgements

All the TmFO researchers : Marielos Peña-Claros, Alexander Shenkin, Bruno Hérault, Lilian Blanc, Christopher Baraloto, Fidèle Baya, Fabrice Benedet, Katia Emidio da Silva , Laurent Descroix, Joice Nunes Ferreira, Sylvie Gourlet-Fleury, Marcelino Carneiro Guedes, Ismail Bin Harun, Riina Jalonen, Milton Kanashiro, Haruni Krisnawati, Mrigesh Kshatriya, Philippa Lincoln, Lucas Mazzei, Vincent Medjibé, Robert Nasi, Marcus Vinicius N. d'Oliveira, Luis C. de Oliveira, Nicolas Picard, Stephan Pietsch, Michelle Pinard , Hari Priyadi, Francis. E. Putz , Ken Rodney, Vivien Rossi, Anand Roopsind, Ademir Roberto Ruschel, Nur Hajar Zamah Shari, Cintia Rodrigues de Souza, Farida Herry Susanty, Eleneide Doff Sotta, Marisol Toledo, Edson Vidal, Thales A.P. West, Verginia Wortel, Toshihiro Yamada

All the partners Institutions :


Thank you
www.tmfo.org