



How land use change affects Carbon storage on tropical peat

Sebastian Persch^{1,2}*

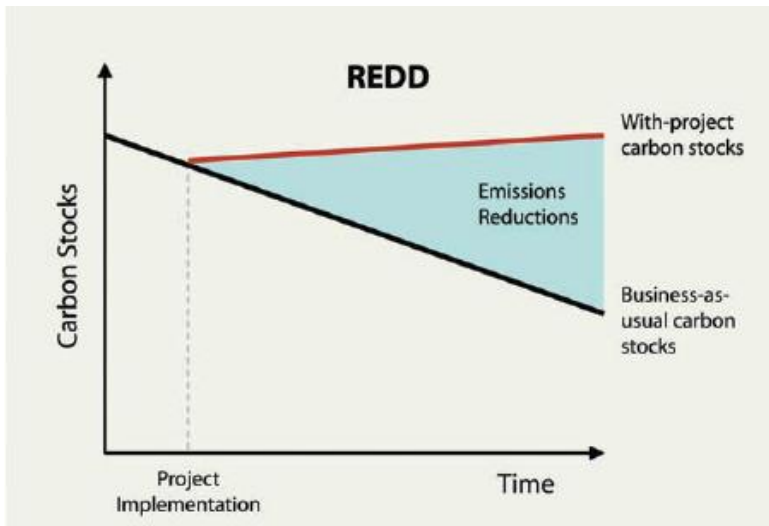
¹ Center for International Forestry Research (CIFOR)

² Department of Tropical Silviculture and Forest Ecology, University of Göttingen

*Corresponding Author: s.persch@cgiar.org

Carbon

- 11 % of total emissions results from land-use change
- **REDD +** a mechanism to reduce these emissions
- **BUT**, ecosystem specific measurement are needed for establish baselines and monitoring reduced emissions.



Tropical Peatlands

■ Ombrotrophic ecosystems

- Low nutrient availability
- Anaerobic conditions

➔ peat accumulation

■ Organic soil

- High Carbon (C) content
- High acidity
- Very low bulk density

■ Natural vegetation

Peat swamp forest



Tropical Peatlands

- Only 0.25 % of the total land area
- **BUT** important fraction of total terrestrial organic C storage (50 Gt C)
- Thus, tropical peatlands can be:
 - *source of GHG – emissions*, when converted to agriculture
 - *C – sink*, when left untouched



Land use change on Peatlands



Primary peat swamp forest



Secondary logged forest



Oil Palm Plantation

■ Forest area loss:

- Sumatra: 5.2% per year
- Jambi: 40% (last decade)
(Miettinen et al. 2011)

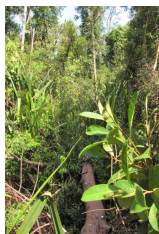
■ Main Threats:

- Drainage
- **Conversion to agriculture**
(Miettinen et al. 2011)

Research location



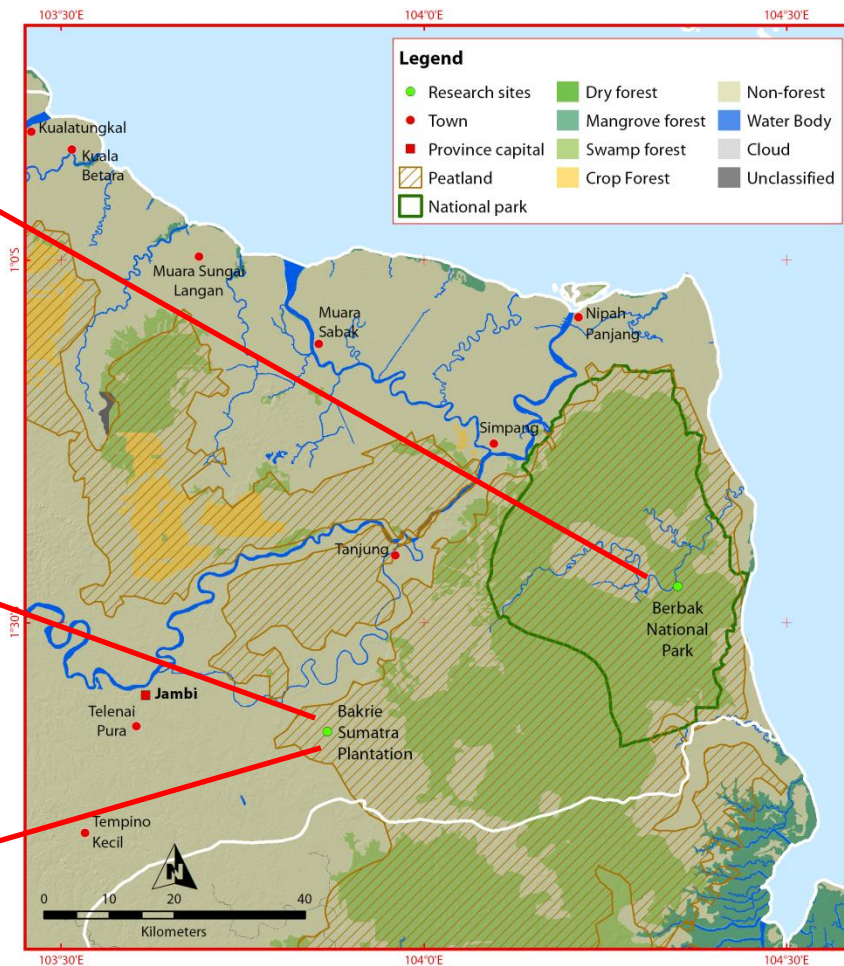
Primary peat swamp forest (PF)



Secondary logged forest (SF)



Oil Palm Plantation (OP)



Measurements

■ GHG emissions:

- CO₂
- CH₄
- N₂O

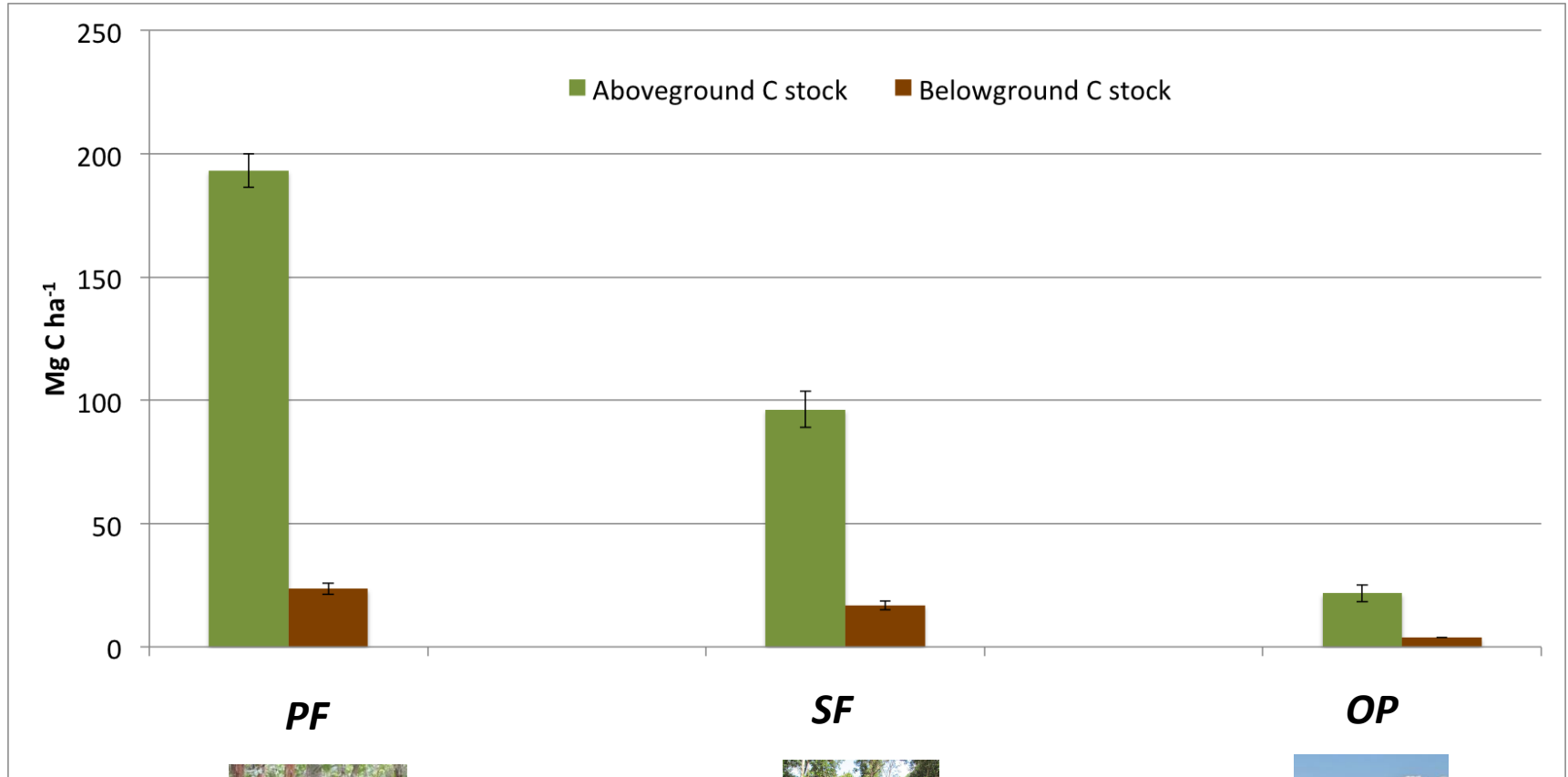


■ Biomass production:

- Aboveground (Trees)
- Belowground (Roots)



preliminary results



- 48%



- 88%



Land use treatment

THINKING beyond the canopy



preliminary results

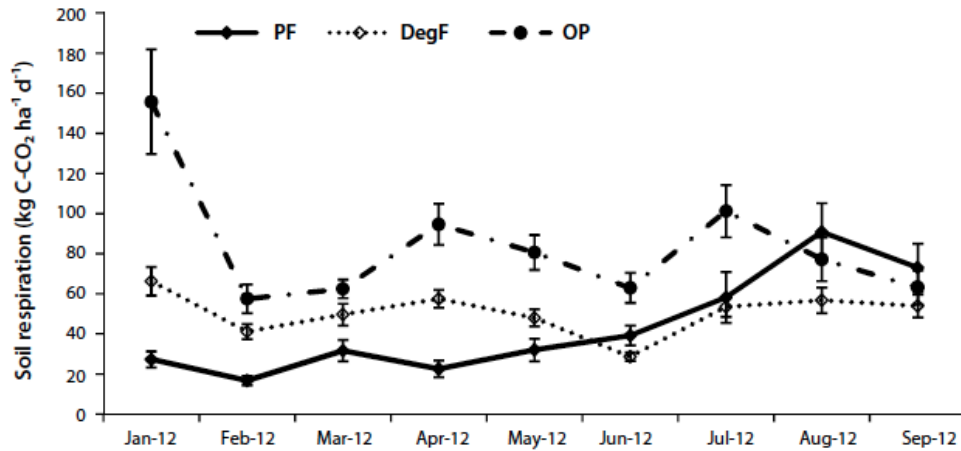
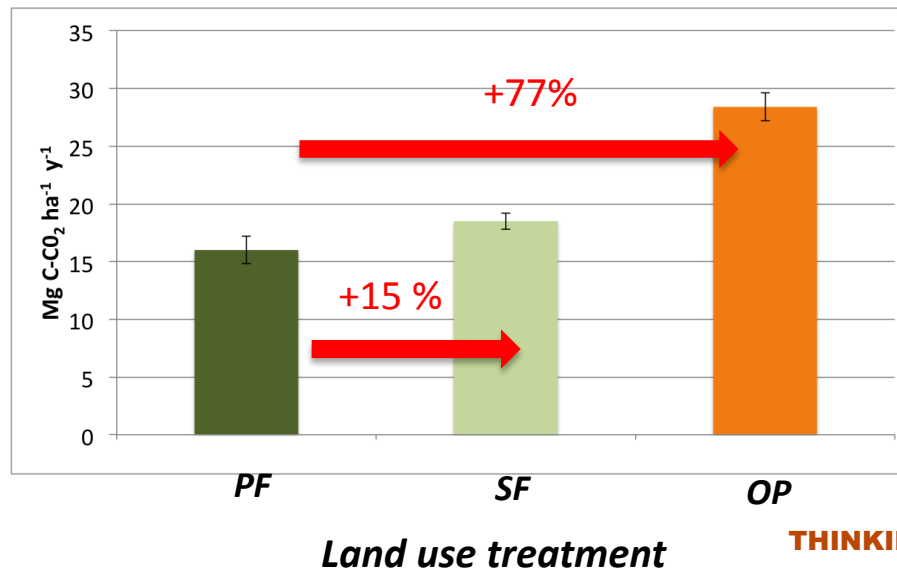


Figure 2. Average monthly soil CO₂ emission rates in the intact peat swamp forest (PF), the drained logged forest (DegF) and the 7-year-old oil palm plantation (OP). Error bars indicate the standard error associated with the average.

from Comeau *et al.*, 2013



Conclusion

- Conversion of primary forest to oil palm plantation on peat results in:
 - Huge losses of C stocks (194 Mg C ha^{-1})
 - Huge increase of CO_2 emissions ($12 \text{ Mg C-CO}_2 \text{ ha}^{-1} \text{ y}^{-1}$)
- Future results will include:
 - other GHG (methane and nitrous oxide)
 - loss of soil C
 - loss in Net Primary Production (above + belowground)



www.cifor.cgiar.org

s.persch@cgiar.org



CIFOR advances human well-being, environmental conservation, and equity by conducting research to inform policies and practices that affect forests in developing countries.

THINKING beyond the canopy

