

# METHODOLOGY FOR CARBON MEASUREMENT IN BURNED PEAT

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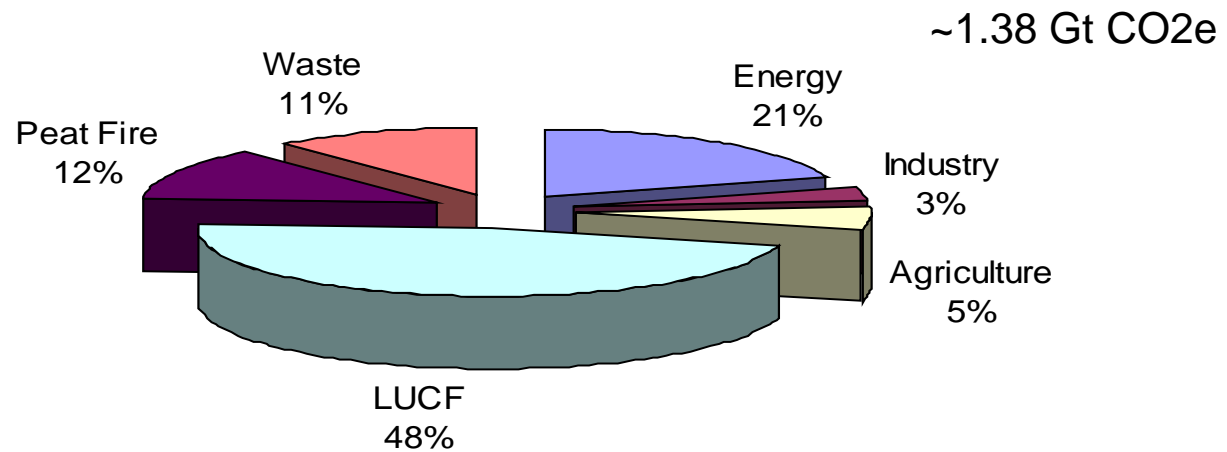
A paper presented in the Workshop on Options for Carbon Financing to Support Peatland Management, 4-6 October 2010, Pekanbaru, Riau Province, INDONESIA

# OUTLINE

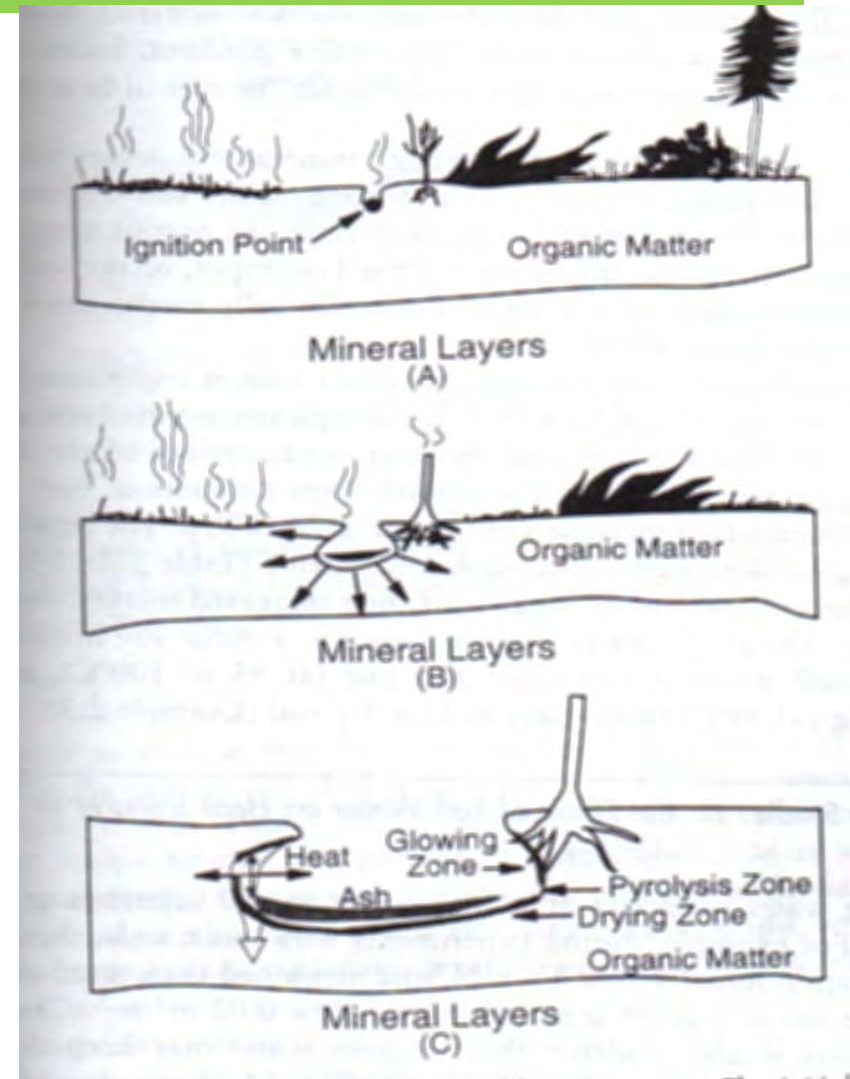
- INTRODUCTION
- PEAT FIRE
- METHODOLOGY OF CARBON MEASUREMENT IN BURNED PEAT
- ESTIMATION OF C EMISSION FROM FOREST AND LAND FIRES (A CASE STUDY)
- CLOSING REMARKS

# INTRODUCTION

	CO2 emission	CO2 removal	CH4	N2O	PFC	CO2e
Energy	247,522		1,437	10		280,938
Industry	40,342		104	0.43	0.02	42,815
Agriculture	2,178		2,419	72		75,420
LUCF	1,060,766	411,593	3	0.08		649,254
Peat Fire*	172,000					172,000
Waste	1,662		7,294	8		157,328
<b>TOTAL</b>	<b>1,524,472</b>	<b>411,593</b>	<b>236,388</b>	<b>28,341</b>		<b>1,377,754</b>



# PEAT FIRE

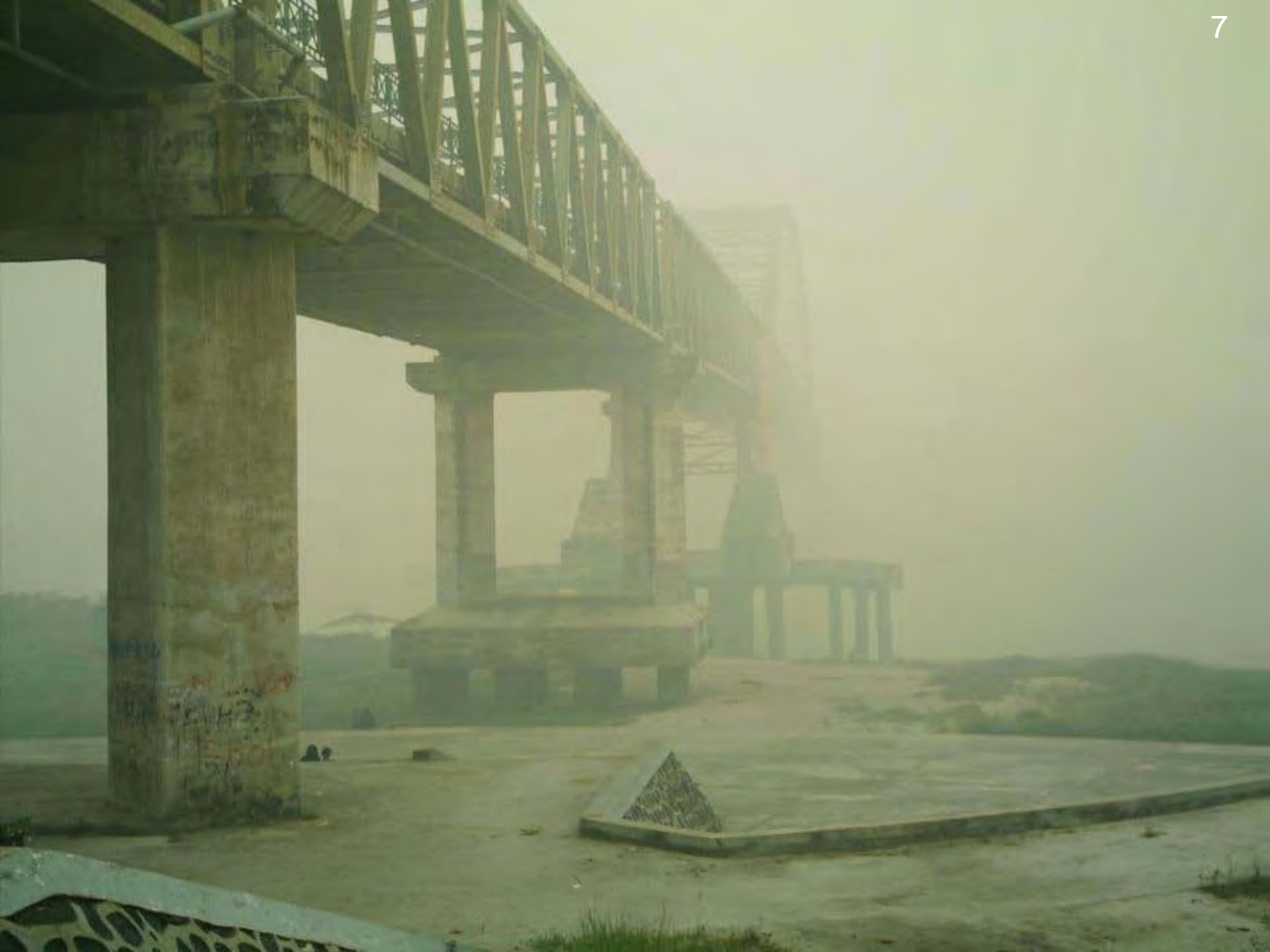




source : BPLHD kALTENG







# METHODOLOGY OF CARBON EMISSION MEASUREMENT FROM BURNING PEAT

- Emission of above ground biomass
- Emission of under ground biomass







# Above ground biomass emission

(Seiler and Crutzen, 1980)

- $M = A \cdot B \cdot a \cdot b$

Where :

M : Burned biomass total in an ecosystem (ton/year);

A : Yearly burned area (hectare/year);

B : Biomass density (ton/ha);

a : above ground biomass fraction; and

b: burned above ground biomass fraction



# Under ground biomass emission

- $M = A.B.E$

Where :

M : Burned biomass in an ecosystem (ton/year);

A : Yearly burned area (hectare/year);

B : Biomass density (ton/ha);

E : Burning Efficiency



# Biomass burning parameter

Ecosystem	Yearly burned area (x 10 <sup>6</sup> ha)	Biomass density (ton/ha)	Burned biomass fraction
Savanna	650	6	0.8 – 1.0
Tropical forest	12	50 - 330	0.20 – 0.25
Boreal forest	8		
Above ground vegetation		40 - 60	0.20 – 0.30
Organic soil		20 - 500	0.1 – 0.90

Source : summarized by Levine and Coffey (2000)



## TINGKAT KEPARAHAN KEBAKARAN (FIRE SEVERITY)

*Peat fire classification* (Artsybashev 1984)

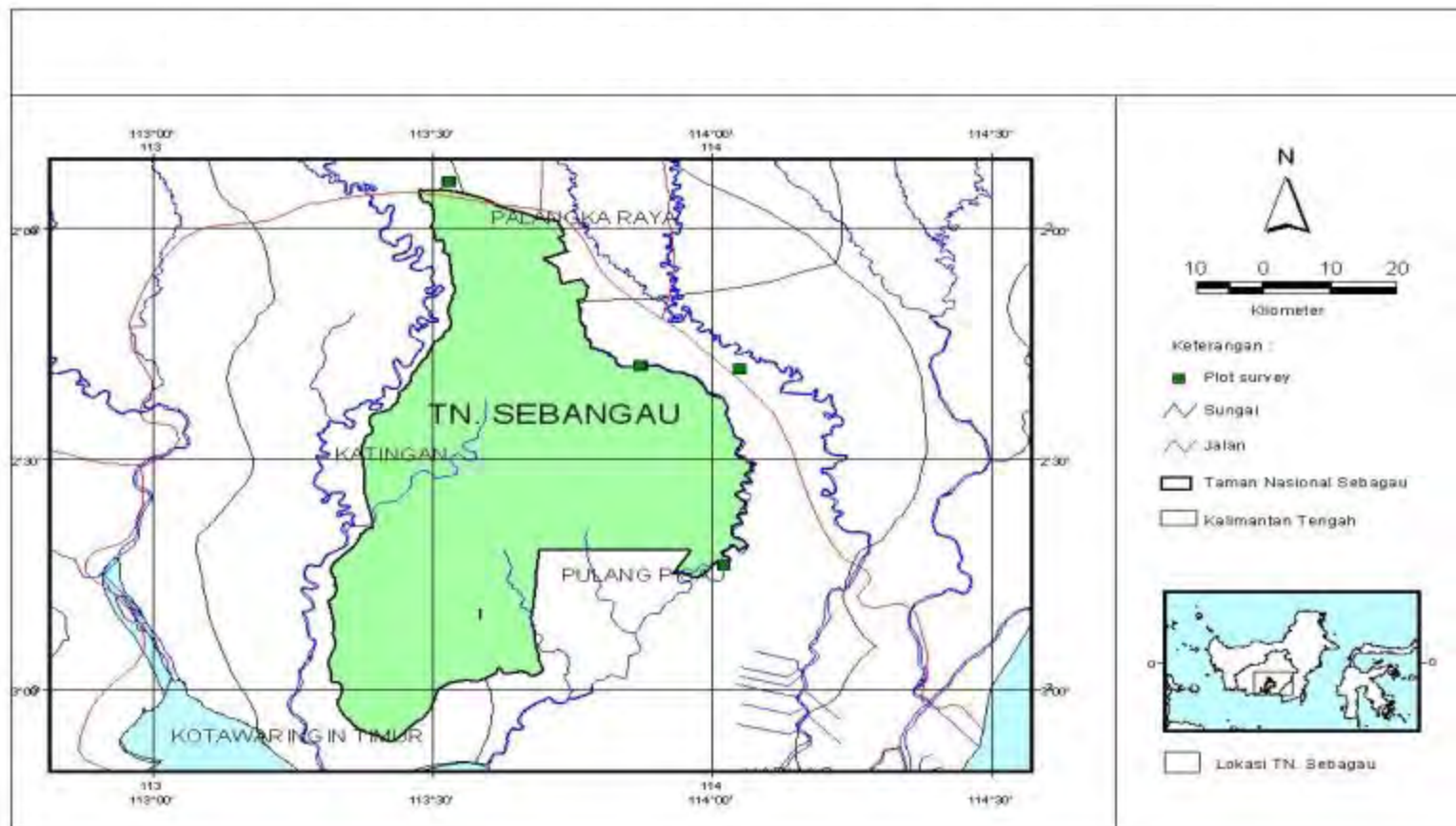
- 1) Low fire severity: burned peat depth up to 25 cm
- 2) Moderate fire severity: burned peat depth from 25 to 50 cm
- 3) High fire severity: burned peat depth more than 50 cm



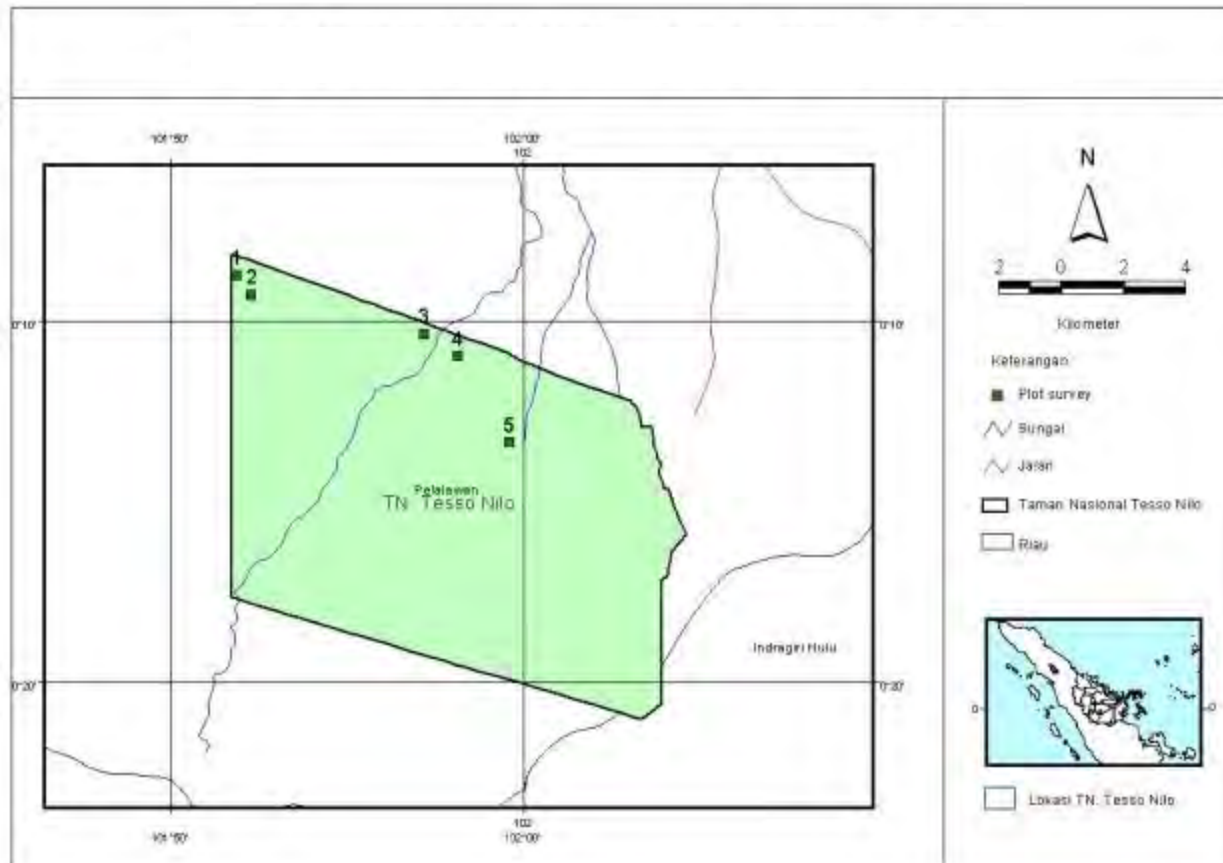
## Estimation of Carbon emission from forest and land fires (A case study of CCROM IPB-WWF, 2009)

- Location:
  - Peatland area : Sebangau National Park (Central Kalimantan)
  - Non peatland area : Tesso Nilo National Park (Riau)

# Sebangau National Park, Central Kalimantan



# Tesso Nilo National Park, Riau Province





## Fire condition in Sebangau



- Moderate fire severity
- Ground fire and surface fire types



Low fire severity

## Fire condition in Tesso Nilo



- Low fire severity
- Surface fire type



Moderate fire severity

# Methodology

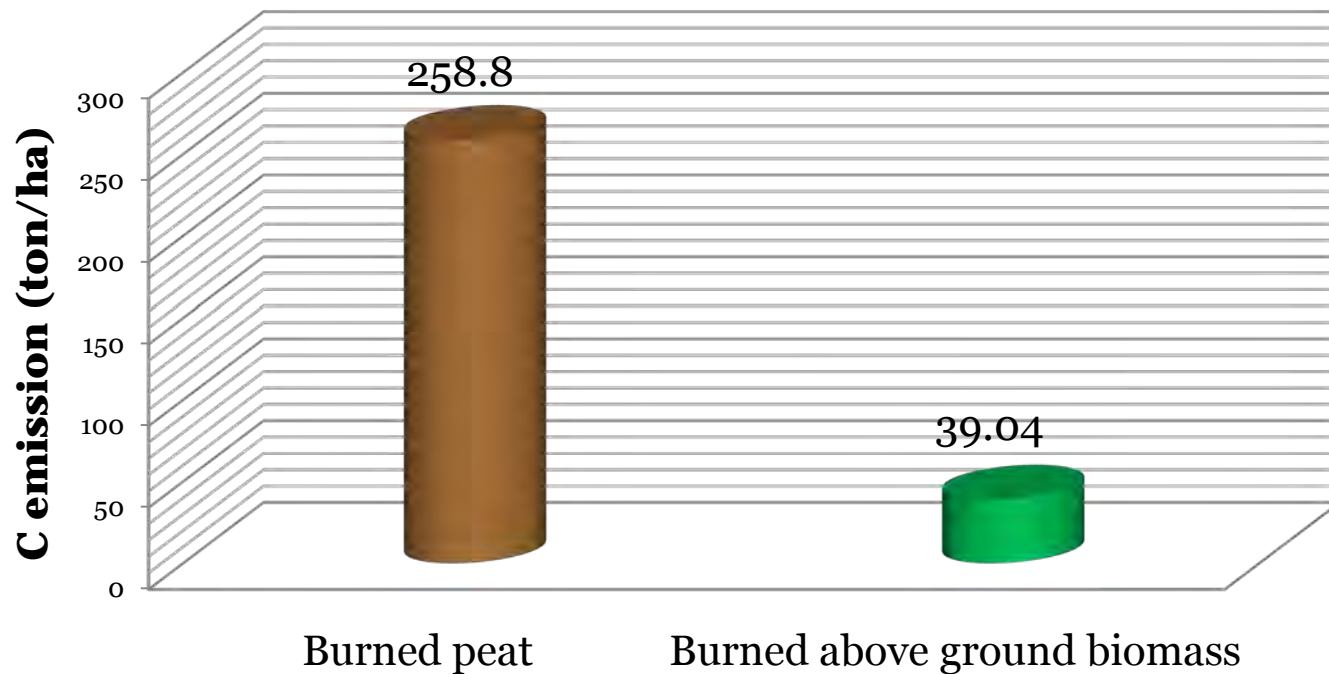
- Sample plots (systematic purposive random sampling)
  - Sebangau : 72 plots of 0.1 ha size in burned and unburned areas
  - Tesso Nilo : 30 plots of 0.1 ha size in burned and unburned areas
- Parameter measured:
  - Fuel load (above and underground biomass)
  - Vegetation analyses
  - Water level
  - Moisture content
  - Fire severity





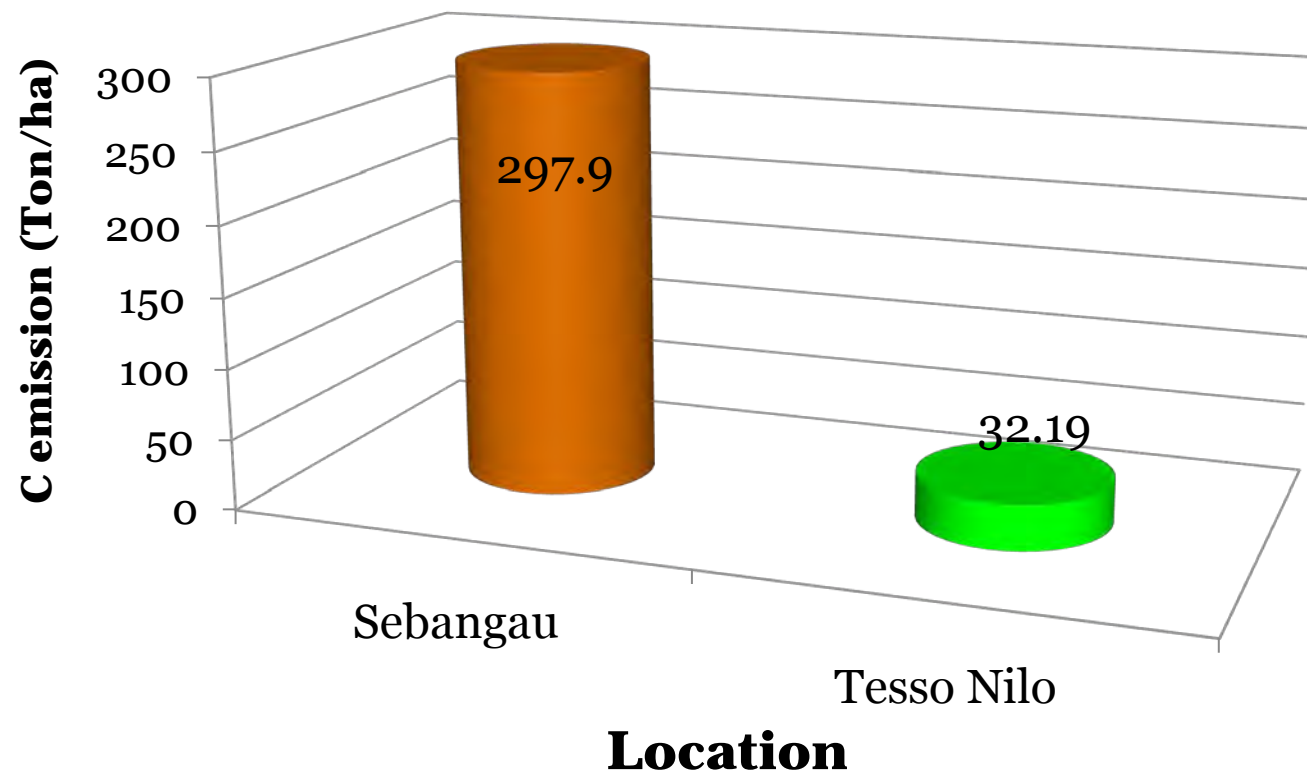


# Results



- Comparison C emission in burned peat and burned above ground biomass in Sebangau

# Results



Comparison of C emission in Sebangau and Tesso Nilo NPs

# CLOSING REMARKS

- Various methods of measurement and calculation of GHG have been developed, whether by field work and or biomass estimation calculation
- Factors need to be considered in carbon emission from burned peat, incl: *fire type, fire severity, biomass fraction and burning efficiency*
- C emission from peat is 6.6 times larger than that of above ground biomass
- C emission from peatland is 9.2 times greater than that of non peatland area







**Thank you**