# IPS Commission IX
# Tropical Peatlands
# Finnish Peatland Society 25.11. 2010

Harri Vasander, with the help of:

Sue Page, Chris Banks, Jack Rieley, Jyrki Jauhiainen

www.carbopeat.org

# Global peatlands - uncertainty

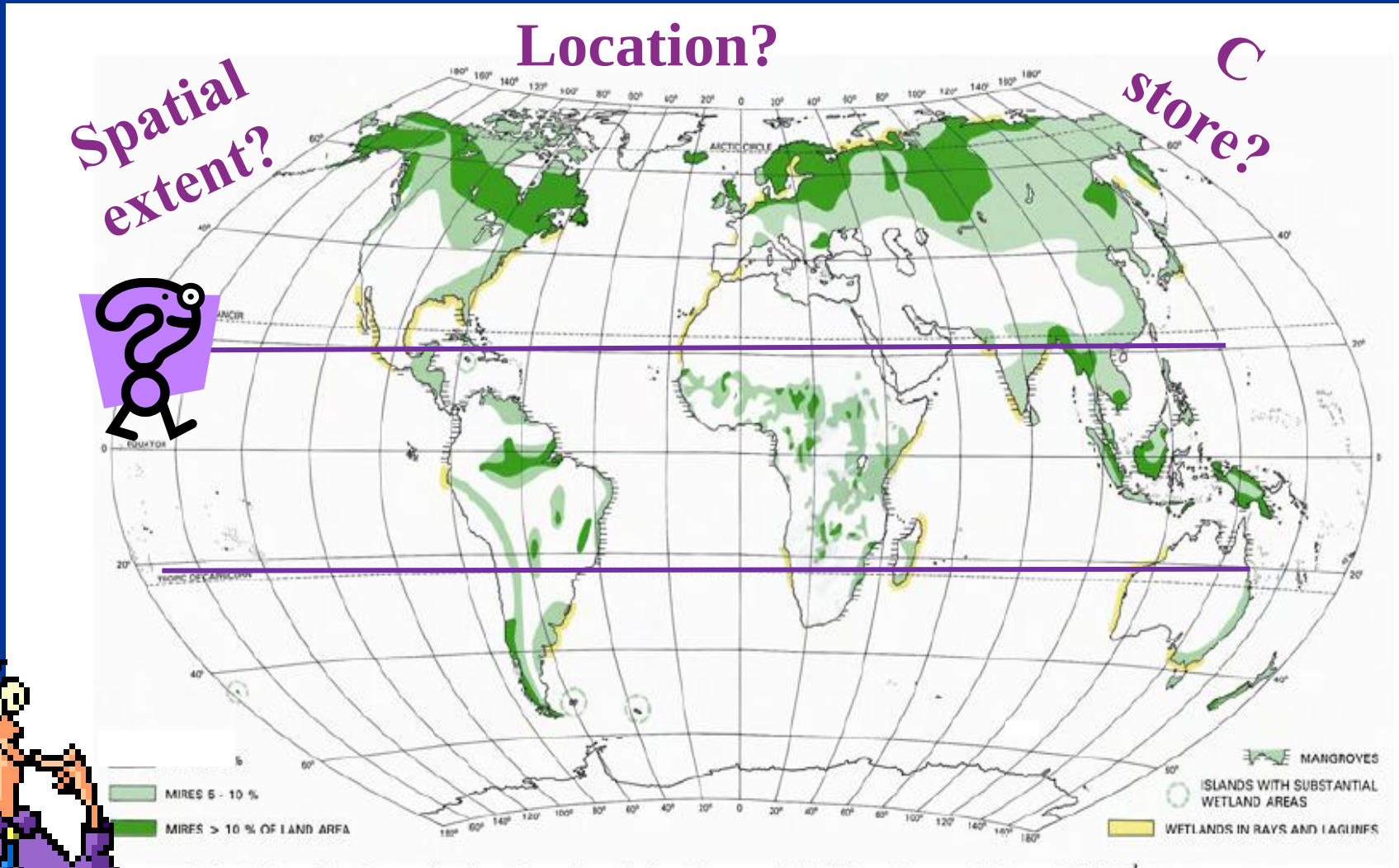



*Figure 1.1: Distribution of mires/peatlands in the world (After Lappalainen 1996 [1]).*

# Why is accurate inventory important?

- Contribute to improved global climate-carbon models
- Estimate likely scale of GHG emissions resulting from changes in land use & fire
- Predict likely consequences of climate variability & change
- Support C emissions reductions policies

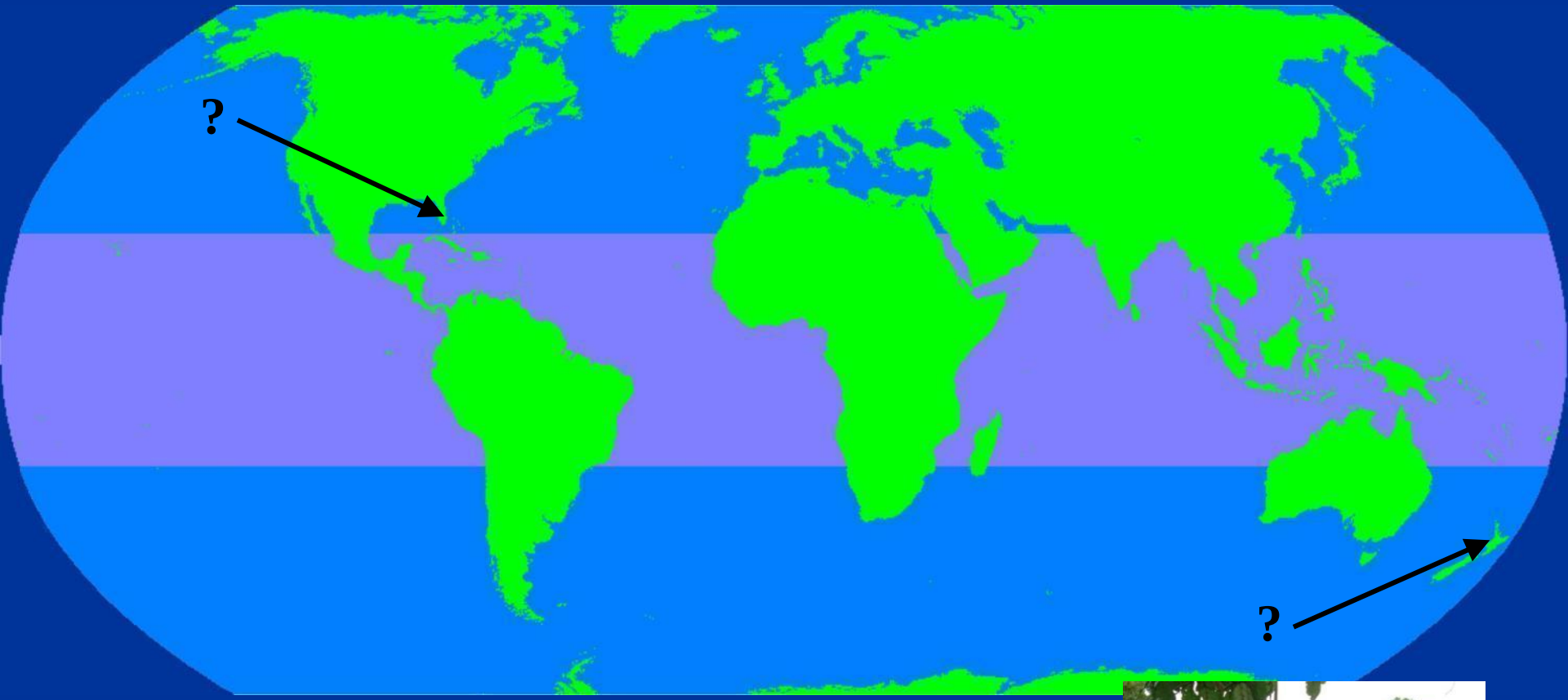
- .... dealing with uncertainty can mean something new and exciting to discover!

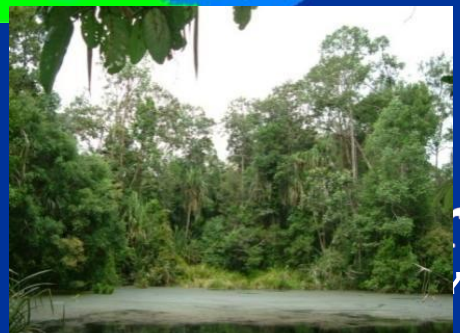
# It’s an easy calculation

Carbon pool = area x thickness x (volumetric) carbon density

(kg) ($m^2$) (m) ($kgm^{-3}$)

# Where is tropical peat?

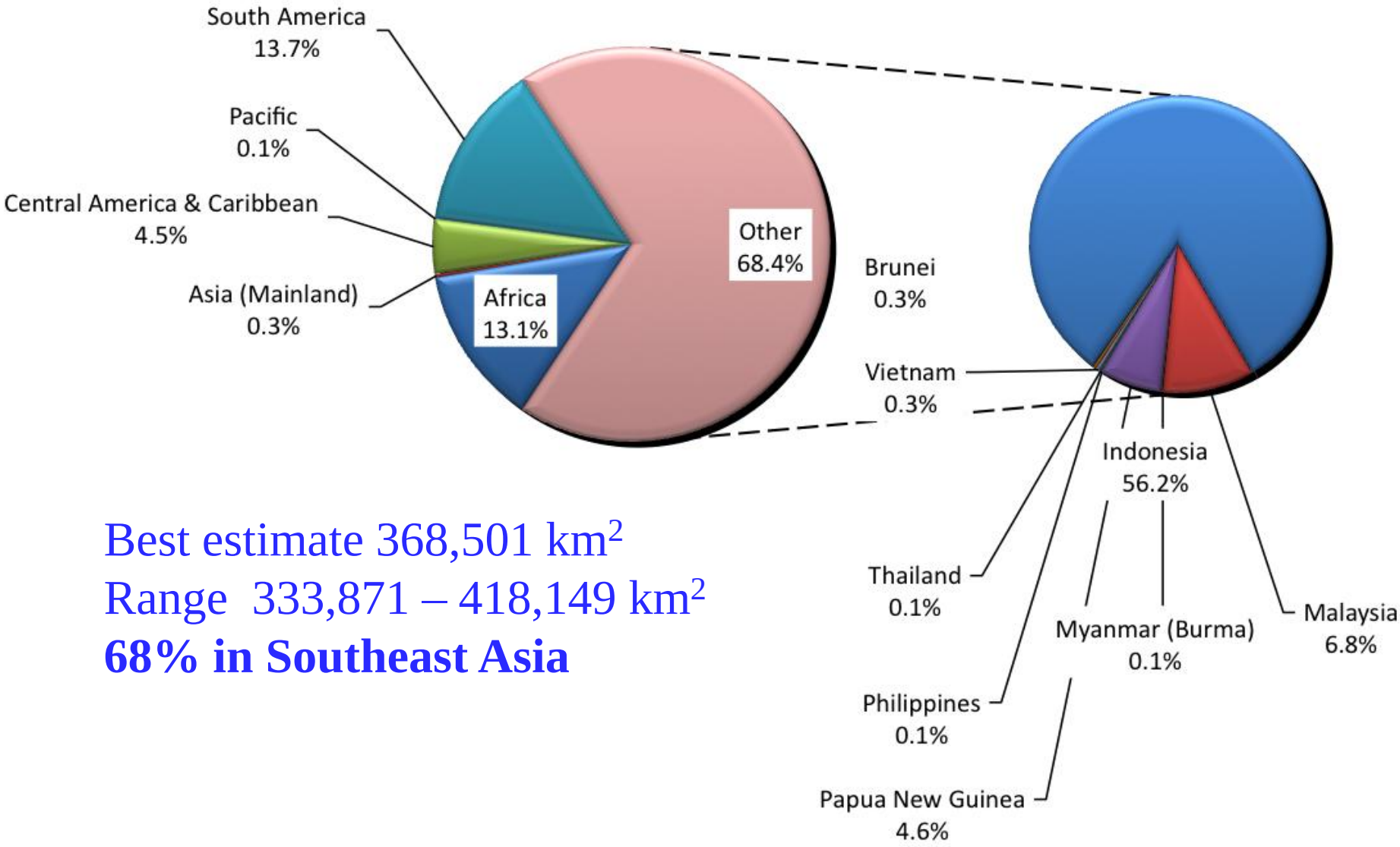


# What is tropical peat?

- What is peat?
- Conflicting definitions of organic soils and peats
- Our definition :
  - Peat is the surface layer of soil, consisting mostly of partially decomposed vegetation, with an organic content of at least 65% in a minimum thickness of 30 cm
- Many country inventories provide the area of Histosols, of which peat is one type – but not always separated
- Area of non-peat Histosols may exceed that of true peat

# Area of tropical peatland




Best estimate 368,501 km$^2$

Range 333,871 – 418,149 km$^2$

**68% in Southeast Asia**

# Thickness of tropical peat: "best" estimate?

Other country specific data: Bangladesh, Belize, Cuba, Guiana, Jamaica, Liberia, Rwanda, Senegal, Sri Lanka, Trinidad & Tobago, Venezuela

| Country | Best estimate of mean thickness (m) | Comment |
|---|---|---|
| Brunei | 3 | |
| Indonesia | 5 | |
| Malaysia | 7 | |
| Burma | 0.3 | Default value |
| Papua New Guinea | 0.3 | Default value |
| Philippines | 0.5 | |
| Thailand | 0.3 | Default value |
| Vietnam | 0.3 | Default value |

# Bulk density

- Few published data!
- Most detailed for Indonesian & Malaysian peats
- Predominance of values for surface or near-surface samples
- Issues of sampling, compaction, land use, drainage, etc
- We applied single composite value: 0.09 g $cm^{-3}$ based on published means for peat cores (Neuzil 1997; Page et al. 2004)

# Carbon content

- Less variable than bulk density
- Most detailed data for Indonesian & Malaysian peats
- Values range from 42% to 62%
- We applied value of 56%, based on range of data for SE Asia
- NB – peat matrix value excluding wood!

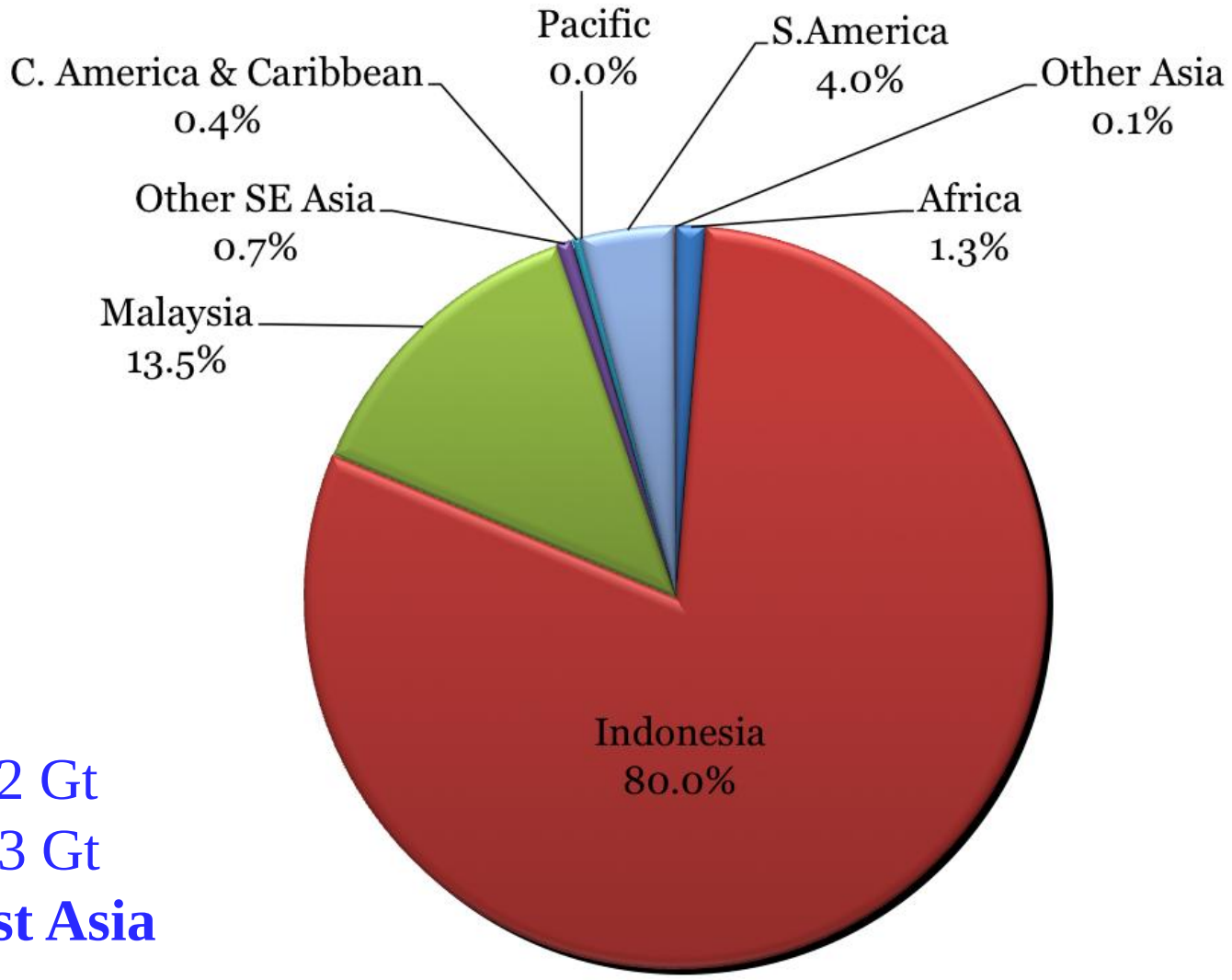
# It's an easy calculation

Carbon content = area x thickness x (volumetric) carbon density

(kg) ($m^2$) (m) ($kgm^{-3}$)

? ??? ???

# Peat carbon pool




Best estimate 65.2 Gt

Range 41.5 - 95.3 Gt

**94% in Southeast Asia**

# Known knowns

- Southeast Asian peatlands
  - ⇨ Largest contribution to tropical peat C pool
  - ⇨ Greatest certainty (least uncertainty?)

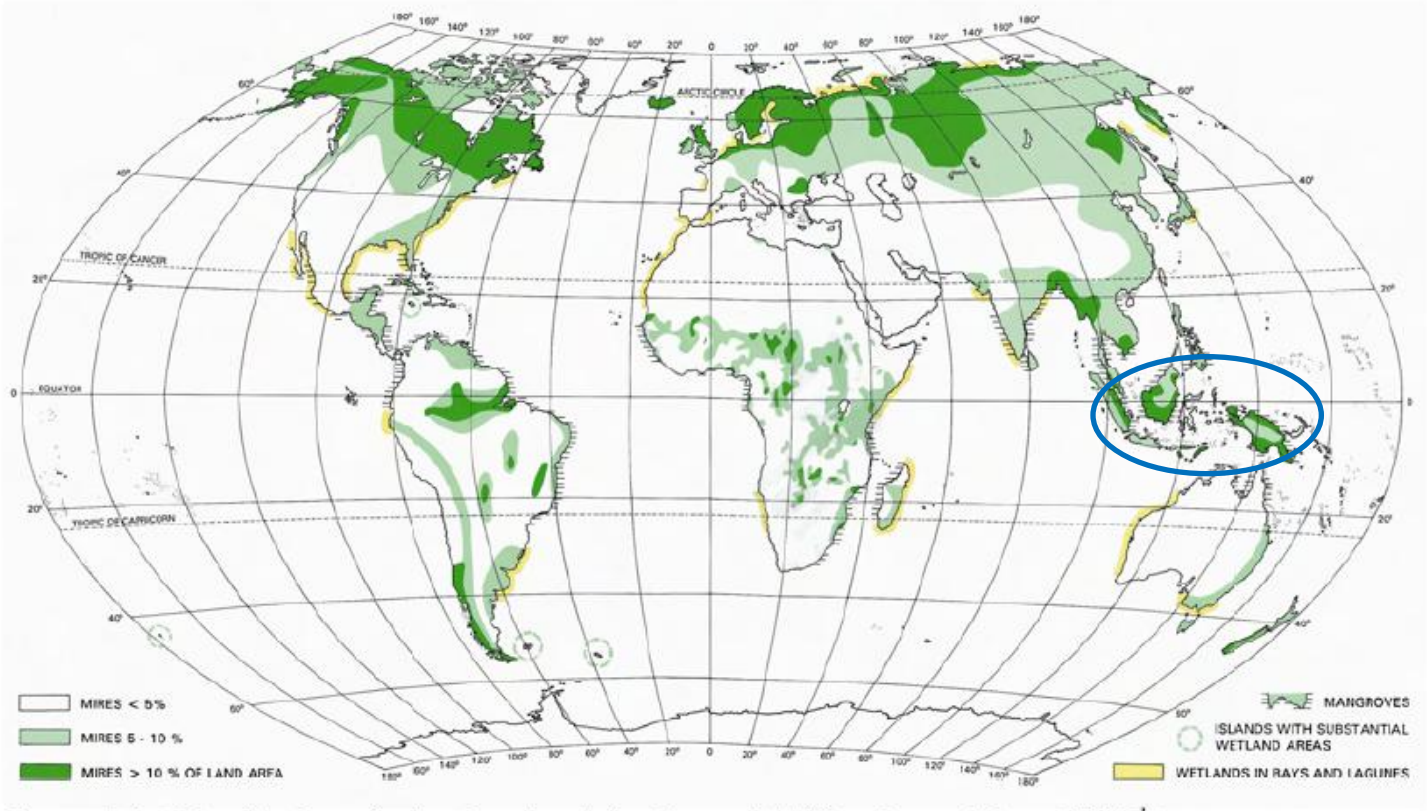



*Figure 1.1: Distribution of mires/peatlands in the world (After Lappalainen 1996 [1]).*

# Known unknowns

- Regions outside Southeast Asia:
  - Imprecise knowledge of peatland area
  - Very limited/no data on thickness, bulk density or C content
  - Limited field survey in remote locations – e.g. Amazonia (see Lähteenoja *et al*., 2009)

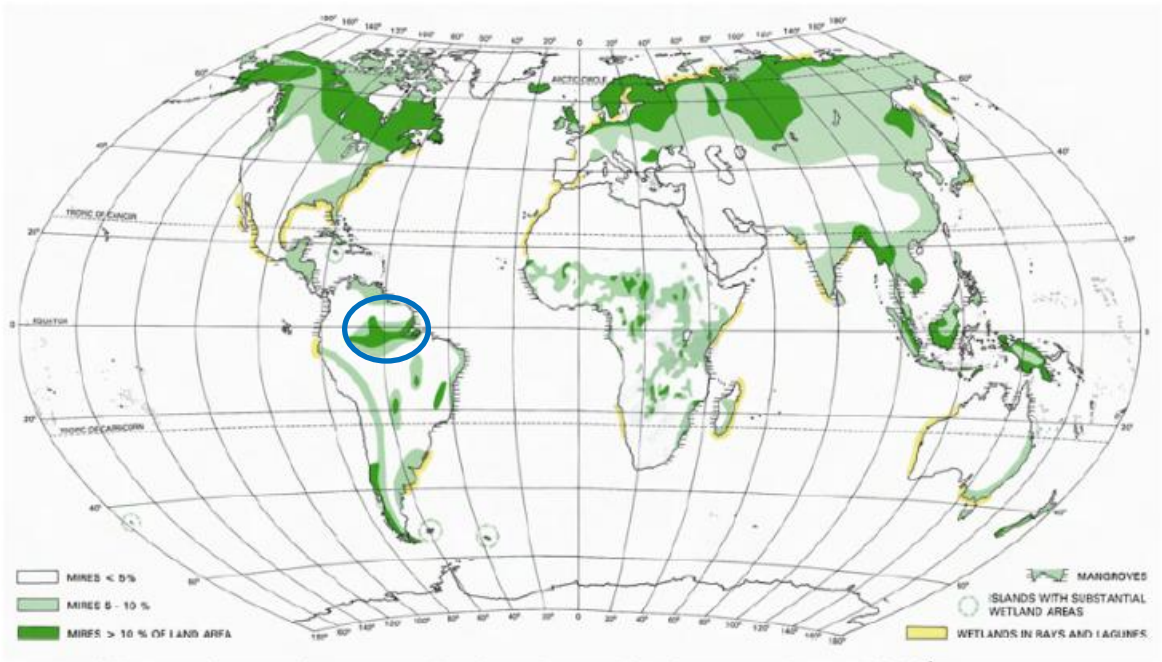



*Figure 1.1: Distribution of mires/peatlands in the world (After Lappalainen 1996 [1]).*

# Amazonian peatlands ~ 150,000 km$^2$?

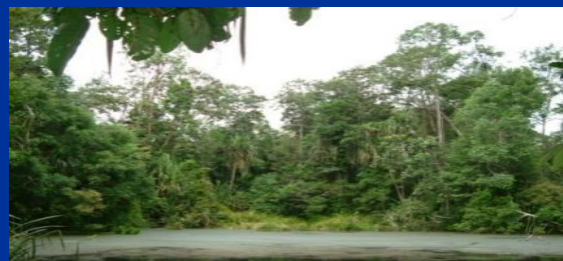
*Mauritia* (Palmaceae) swamp forest, Amazonia (image courtesy J-C. Berrio)

# High altitude tropical peatlands

Peat-forming ‘cushion’ community of *Distichia* (Juncaceae) at high altitude (3800-4200 m asl) in the Andes (image courtesy J-C. Berrio)

# Global and regional importance of tropical peatlands

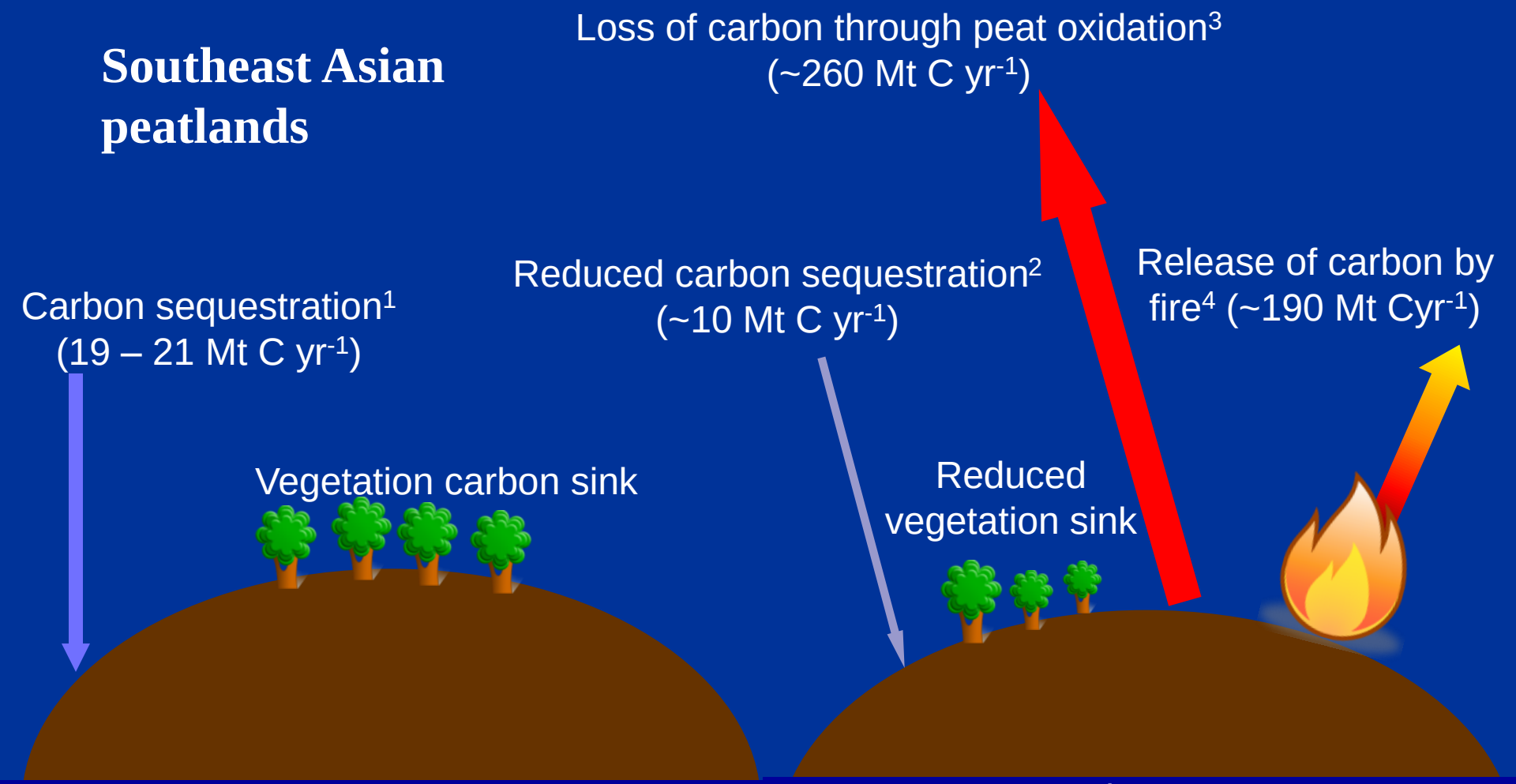
- 10 - 11% of global peatlands by area*
  - **SE Asian peats 6.5 - 7.0%**
- 14 - 20% of global peat carbon pool*
  - **SE Asian peats 13 - 19%**
- Revised estimates for total forest carbon pools**:
  - **Indonesia : 110 Gt (from 40 Gt) (biomass + soil C)**
  - **Malaysia : 15 Gt (from 10 Gt) (biomass + soil C)**
  - **In both countries, peat component ~ 47%**



(* Immirzi *et al.*1992; Bridgham *et al.* 2006)
(** Brown *et al.* 1993)

# But all this ignores (significant) land use changes, drainage and fire

# Southeast Asian peatlands




Pool: 61 Gt (& increasing?)

**Natural overall carbon sequestration**

Pool: < 61 Gt

**(& decreasing by 460 Mt C yr$^{-1}$)**

**Current situation overall carbon source**

Notes:

[1] based on area of 252,229 km$^2$ and carbon accumulation rate of 80 g C m$^2$ yr$^{-1}$ (Neuzil, 1997; Page et al., 2004)

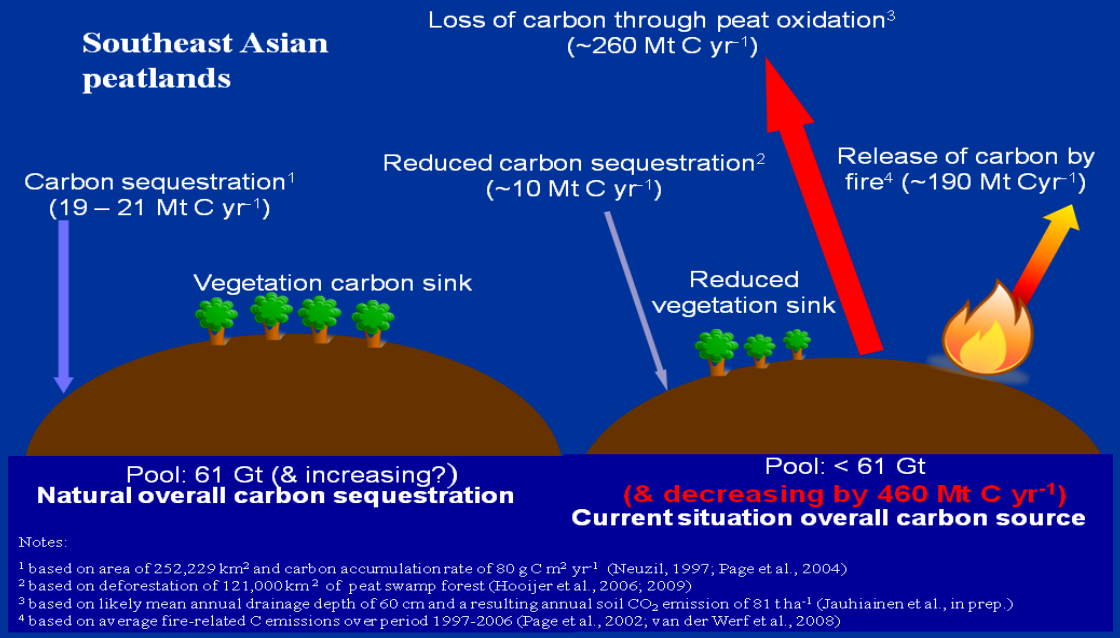
[2] based on deforestation of 121,000 km $^2$ of peat swamp forest (Hooijer et al., 2006; 2009)

[3] based on likely mean annual drainage depth of 60 cm and a resulting annual soil $CO_2$ emission of 81 t ha$^{-1}$ (Jauhiainen et al., in prep.)

[4] based on average fire-related C emissions over period 1997-2006 (Page et al., 2002; van der Werf et al., 2008)

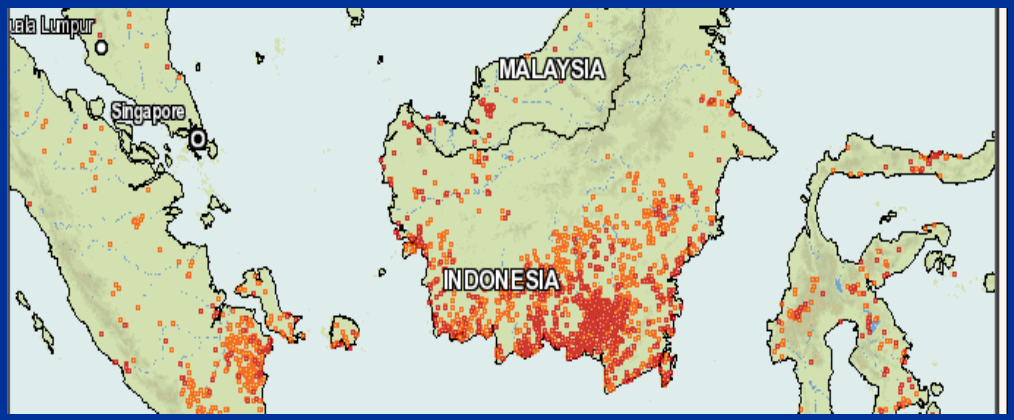
# Southeast Asian peatlands - from carbon sink to carbon source

- Estimated current annual loss ~460 Mt C
  - ⇨ Finland's total peat store is ~5000 Mt C !!
  - ⇨ 1700 Mt $CO_2e$ $yr^{-1}$ ≡ 5.6% global fossil fuel emissions !!
  - ⇨ Indonesian peat losses alone ~245 – 270 Mt C $yr^{-1}$



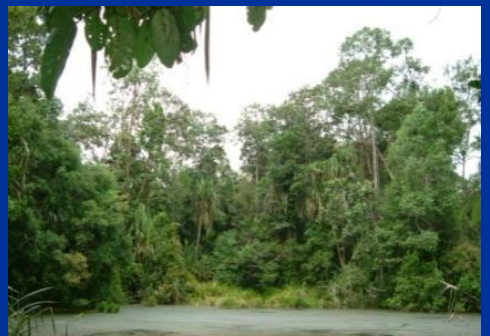
# Restoration, rehabilitation, mitigation ?

- World Institutions & Indonesian Govt. now starting to recognise the scale of the problem
- Small-scale hydrological restoration & reforestation projects underway
- Pilot projects to implement improved water management in plantations
- Larger-scale REDD demonstration, CDM & VCS projects in planning – will require huge investment in fire control




(http://firefly.geog.umd.edu/firemap)

Fire hotspots, 19-25 Sept 2009



# Summary

- Global area of tropical peatlands ~370,000 $km^2$; 68% in SE Asia
- Pre-disturbance carbon pool ~65 Gt; 94% in SE Asia
- Uncertainty – but importance of SE Asian region is clear
- Peat carbon comprises 47% of the total soil carbon pools in Indonesia & Malaysia
- Emphasises importance of including peat carbon in national and regional assessments of terrestrial carbon stocks
- Scale of GHG emissions from tropical peatlands now being recognised – emissions reduction is being addressed.....
- Too little, too late?


19/09/2009 12:46

The IPS Commission on Tropical Peatlands was established at the International Peat Congress in Tullamore in June 2008.
At the International Symposium on Tropical Peatland in Kuching, Malaysia in August 2008, a steering committee was formed and a suggestion made to appoint Dr. Jack Rieley as Chair of the Commission. The final approval of the Commission was given at the 46th Executive Board meeting in Jyväskylä in November 2009.

**Annual Report 2008**

A meeting, attended by 35 persons, to discuss the formation of this new IPS Commission was held in the Hilton Hotel, Kuching Sarawak, Malaysia on Friday 22 August 2008 following the International Symposium and Workshop on Tropical Peatland: Peatland development - Wise Use and Impact Management.

A Steering Committee was established to oversee the activities of Commission IX and to prepare a work plan and programme of activities and events for the period up to the next International Peat Congress in Sweden in 2012, consisting of:

Professor Jack Rieley (UK) Chairman
Professor Bostang Radjagukguk (Indonesia) Vice Chairman
Dr. Susan Page (UK) Secretary
Professor Murtedza Mohamed (Malaysia, Chairman of the Malaysian Peat Society)
Hon Dato James Dawos Mamit (Malaysia)
Dr. Bambang Setiadi (Indonesia, Chairman of the Indonesian Peat Association)
Professor Harri Vasander (Finland)

The following priority areas were identified: biodiversity, fire, poverty, water management, industry - Wise Use, restoration, spatial planning, and climate change. Climate change was recognized to be the most important area.

Activities of members of this Commission were well represented at the 13th International Peat Congress in Tullamore at which there were 24 oral and 7 poster presentations – 31 in total! A large number of participants were present representing Indonesia, Malaysia and Vietnam.

We now have two IPS National Committees in Southeast Asia, one in Indonesia and the other, recently formed in Malaysia.
The Malaysian Peat Society has been approved as the Malaysian National Committee of IPS in early 2009. The Society has currently 49 individual members and one institutional member.

Kiitos

Thank you