Tropical peat swamp forests:

Current knowledge, gaps and science needs

Daniel Murdiyarso, *CIFOR*
Boone Kauffman, *Oregon State University*
Louis V Verchot, *CIFOR*
Joko Purbopuspito, *CIFOR*
Matthew Warren, *US Forest Service*
Kristell Hergoualc'h, *CIFOR*

Outline

- Setting the scene
- Global and regional estimates of C-stocks
- Land-use change and GHG emissions
- Information gaps and science needs
- Synergizing adaptation and mitigation in wetlands
- Concluding remarks

Policy Focus

Mini Focus: Sustainable Landscapes in a World of Change: Tropical Forests, Land use and Implementation of REDD+

Climate change mitigation strategies should include tropical wetlands

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Daniel Murdiyarso*[1,2], J Boone Kauffman[3] & Louis V Verchot[1]

Tropical wetland ecosystems, especially mangroves and peatlands, are carbon-rich ecosystems that should be considered to be part of climate change mitigation strategies. Globally, tropical mangroves store 20 PgC and tropical peatlands store 89 PgC. Most of these potentials reside in southeast Asia. Emission factors and activity data are among the most important components to carry out credible assessment. In this article, we explore and discuss emission factors and activity data in light of project development and national reporting using the upcoming IPCC methodologies for wetlands. Country-specific data are needed to reduce uncertainties and hence enhance the projects competitiveness. There are opportunities to improve local livelihoods through mitigation strategies in wetlands. Potential bundling with adaptation measures is also discussed.

SWAMP Sustainable Wetlands Adaptation and Mitigation Program

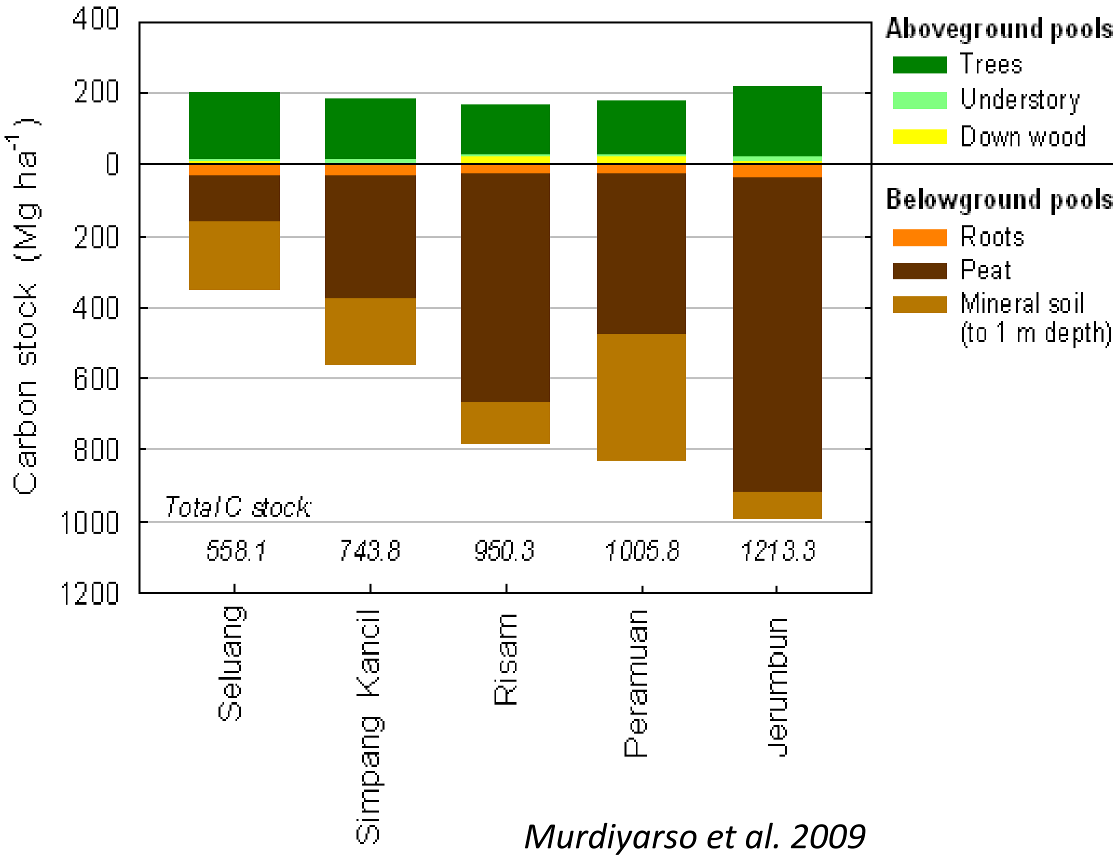
USAID

CIFOR

Why Tropical PSFs are important?

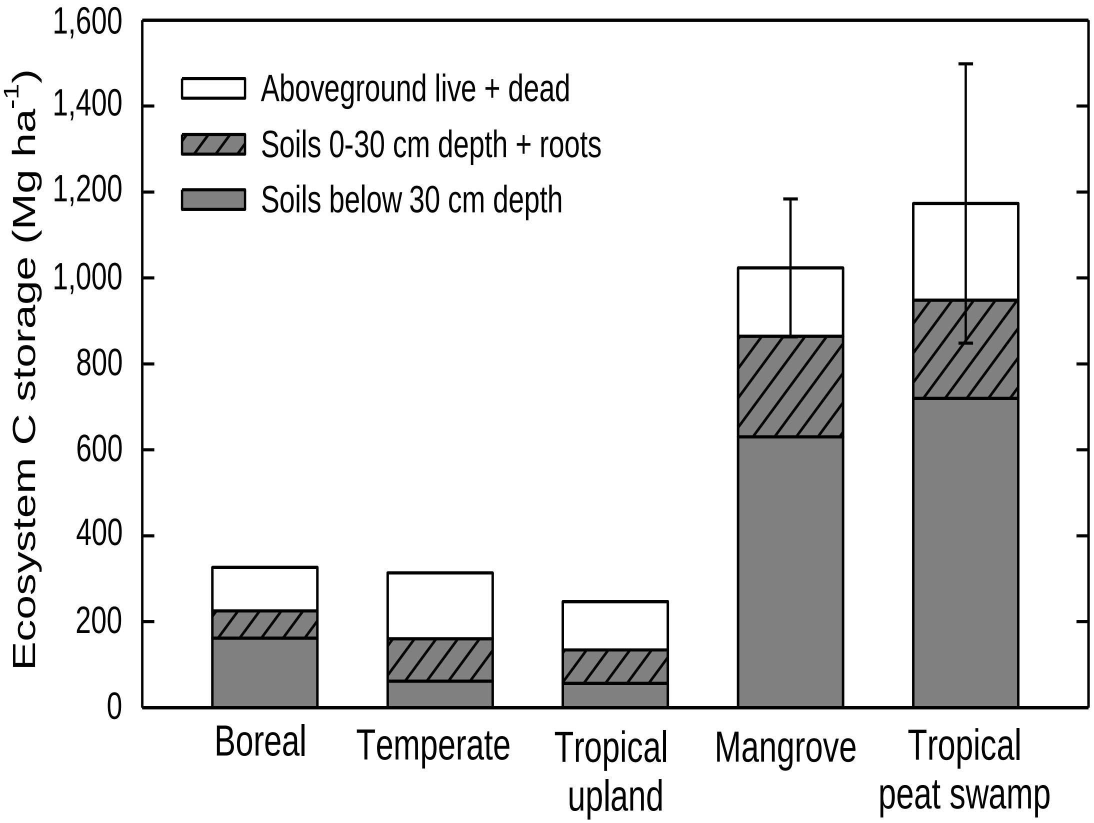
- Major terrestrial carbon store on earth and highly significant to mitigate climate change
- Extensively deforested, drained, and degraded
- Guidelines for GHG inventory is becoming available
  - Drained peatland
  - Rewetted organic soil
- EFs and AD are needed

Large belowground pools



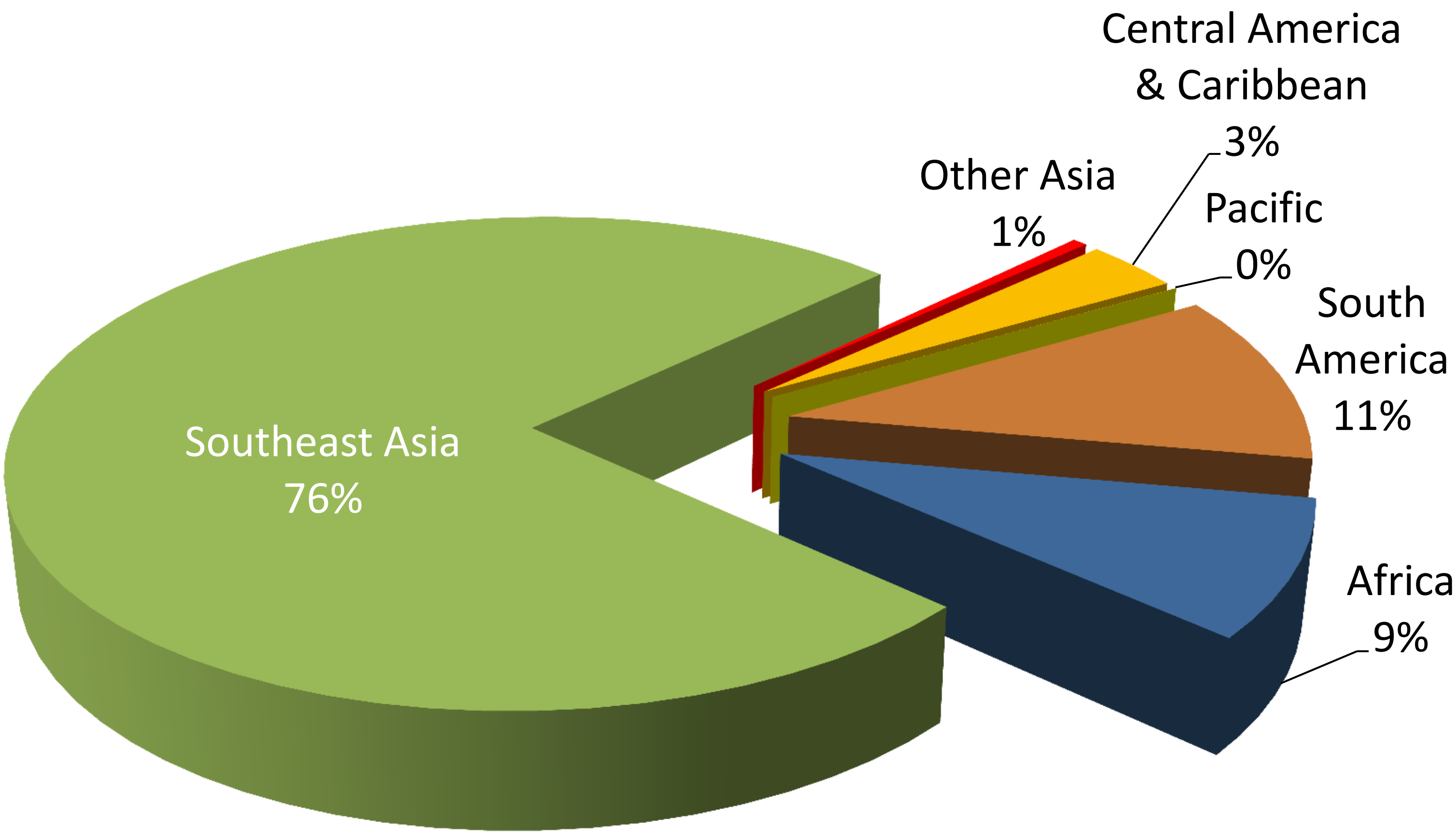
Murdiyarso et al. 2009

Large belowground pools



Donato et al. 2011 and this presentation

Global carbon store in tropical peatland



Total = 92 Pg C

Source: Page et al. 2010

C-stocks and estimated EF of PSF in selected countries

Country	Area (×1000 ha)	Mean peat thickness (m)	Total carbon stock (Pg)	Emission factor		Ref.
				Mg C ha^{-1}	Mg CO_2 ha^{-1} yr^{-1}	
Indonesia	20,695	5.5	55 ± 10	-2658		[9]
		3.7–5.4	57.4–58.3	-2795		[3]
					60†	[8]
					44–55‡	[4]
					85.52‡	[1]
					30.22§	[4]
					117.25¶	[2]
Malaysia	2589	7.0	7.9–9.2	-3300		[9]
					84†	[5]
					0.03–0.18§	[7]

† PSF converted into oil palm
‡ PSF converted into rice field
§ PSF remaining PSF (undrained)
¶ PSF converted into Acacia

Source: Murdiyarso et al. 2013

C-stocks and estimated EF of PSF in selected countries

Country	Area (×1000 ha)	Mean peat thickness (m)	Total carbon stock (Pg)	Emission factor		Ref.
				Mg C ha^{-1}	Mg CO_2 ha^{-1} yr^{-1}	
Peru	5000 2193	1.8 7.5	4.4 3.1	-882	0.24–4.0§	[9] [6]
Brazil	2500	2.0	1.5-3.0	-896		[9]
Zambia	1220	0.5	0.3-0.4	-262		[9]
PNG	1099	2.5	0.6-1.7	-1042		[9]
Venezuela	1000	4.0	2.0	-202		[9]
Sudan	907	1.0	0.1-08	-481		[9]
Congo	621	7.5	1.10-2.50	-2900		[9]

§ PSF remaining PSF (undrained)

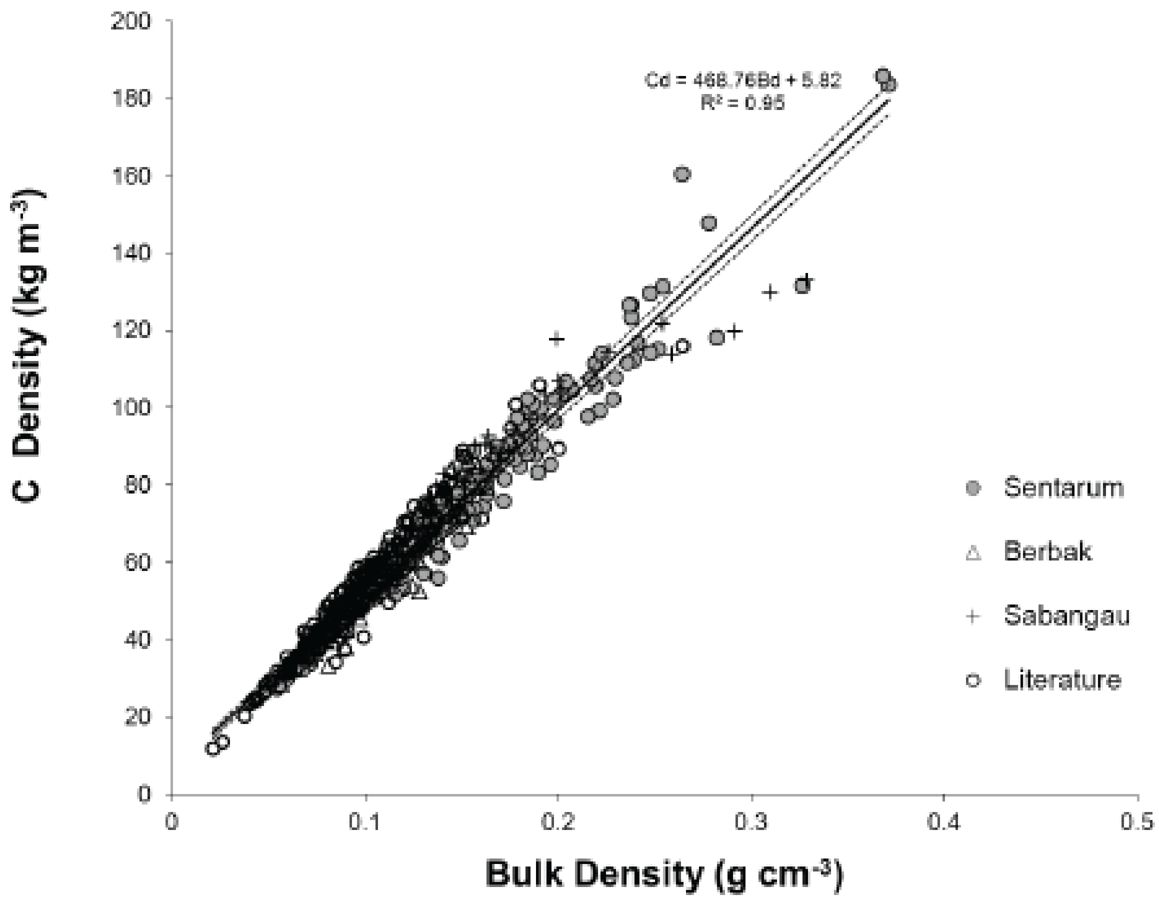
Source: Murdiyarso et al. 2013

LU category, activity data, emission factors of tropical peatlands in SEA

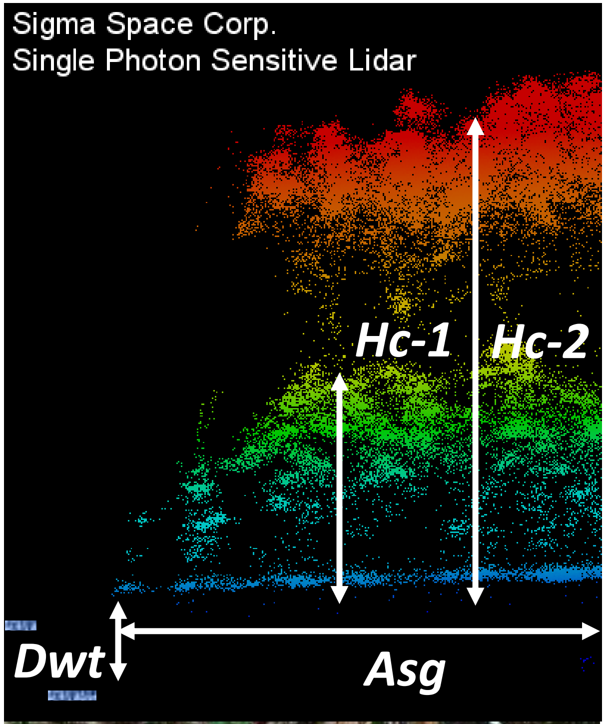
Land-use category	Net CO_2 emission rate ($Mg\ CO_2\ ha^{-1} y^{-1}$)	Total GHG emission rate ($Mg\ CO_{2\text{-}eq}\ ha^{-1}\ y^{-1}$)
Degraded forest	19.4 ± 9.4	20.9 ± 9.4
Croplands and shrub lands	41.0 ± 6.7	43.8 ± 6.8
Rice fields	25.6 ± 11.5	36.1 ± 12.9
Oil palm	29.9 ± 10.6	30.4 ± 10.6
Acacia crassicarpa	71.8 ± 12.7	72 ± 12.8
Sago palm plantations	5.2 ± 5.1	8.6 ± 5.3

Source: Hergoualc'h and Verchot 2013

Estimating C density using BD



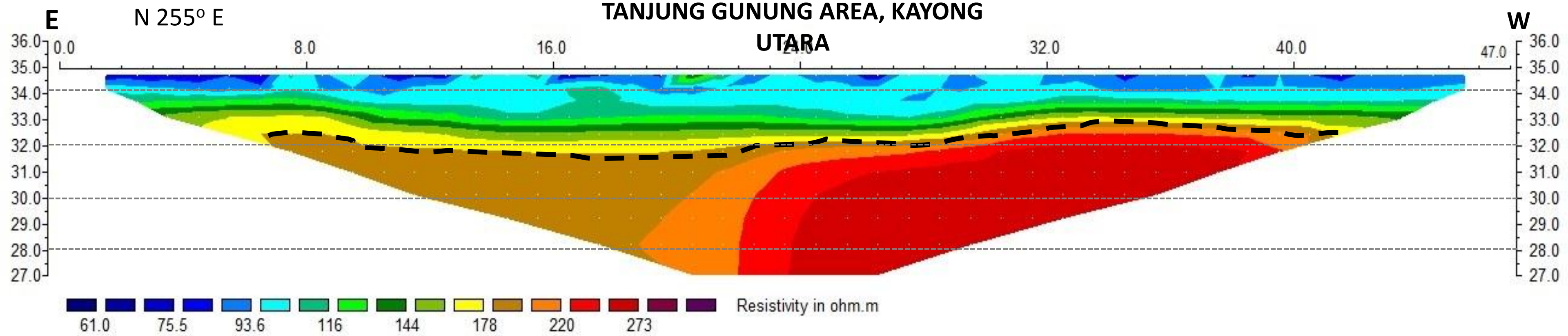
Source: Warren et al. 2012



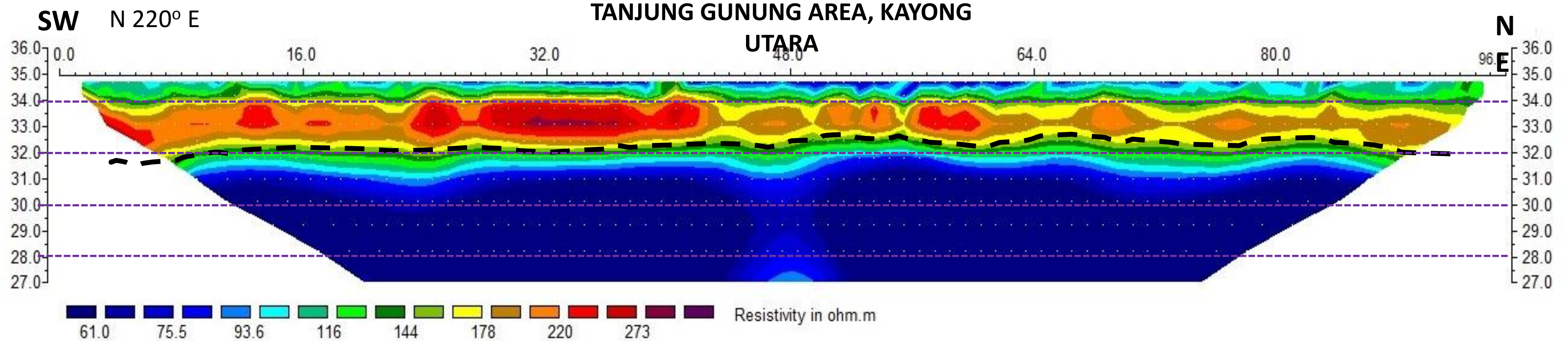
Some gaps where science is needed

- Better estimate of peat depth/ thickness
- For more accurate estimate of peat volume
- Airborne and Ground Penetrating Radar (A/GPR) may be used to
  - Reduce uncertainties
  - Improve accountability

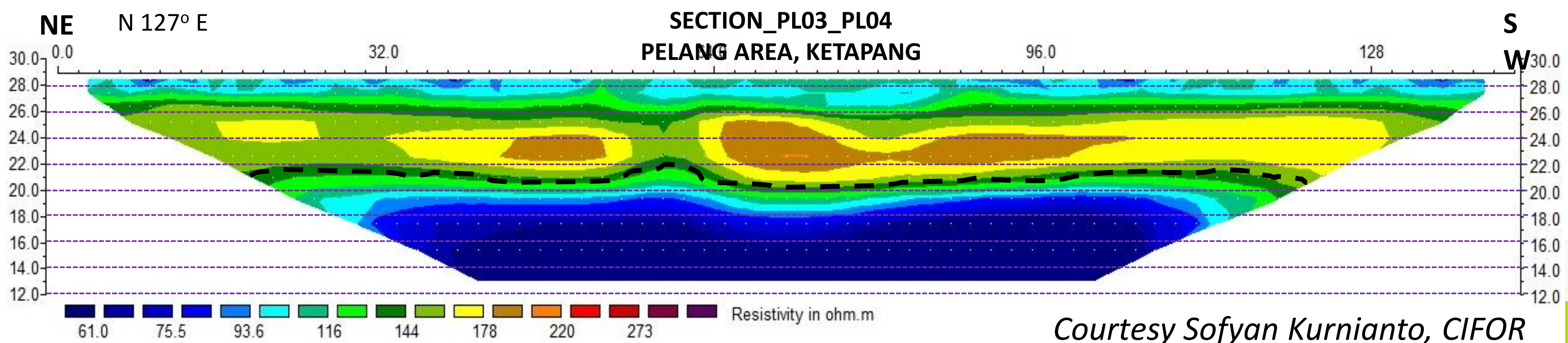
2D RESISTIVITY SECTION_TG01 TANJUNG GUNUNG AREA, KAYONG UTARA



2D RESISTIVITY SECTION_TG03-TG05 TANJUNG GUNUNG AREA, KAYONG UTARA

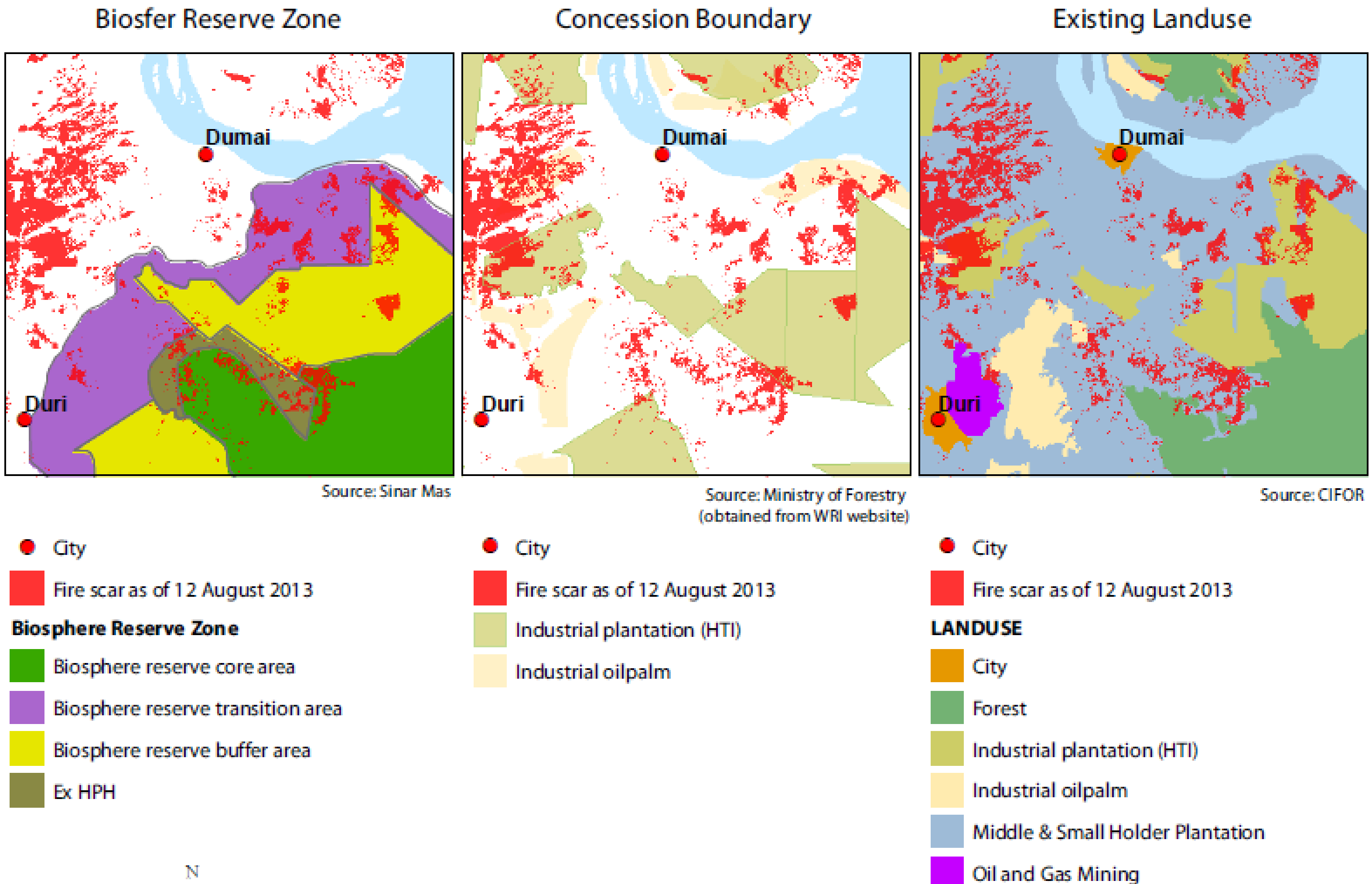


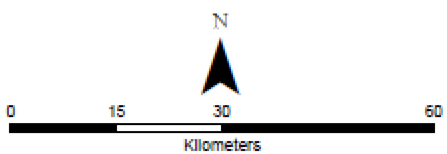
2D RESISTIVITY SECTION_PL03_PL04 PELANG AREA, KETAPANG



Courtesy Sofyan Kurnianto, CIFOR

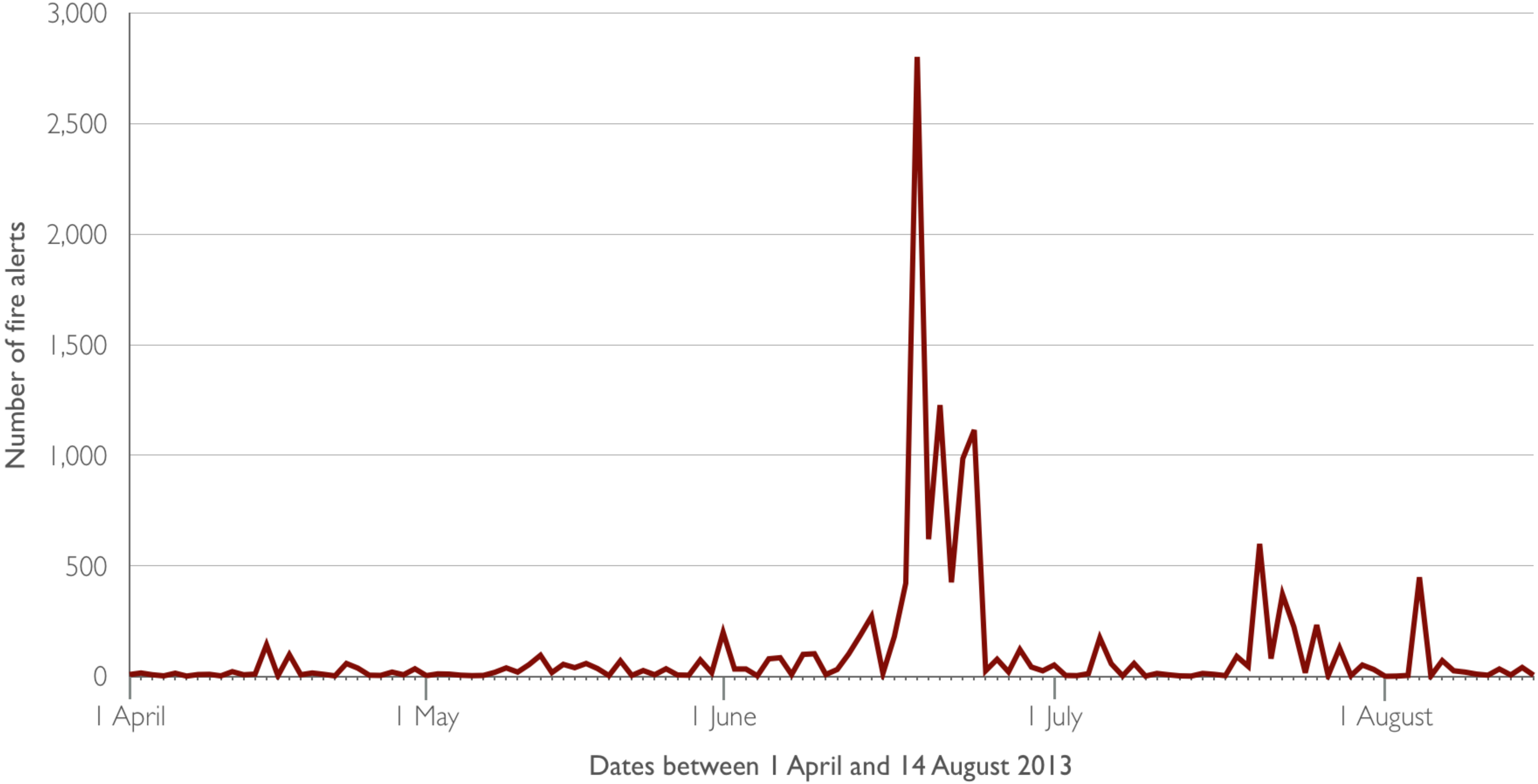
Fire emissions

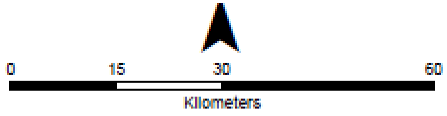




Courtesy David Gaveau, CIFOR

Fire emissions





Courtesy David Gaveau, CIFOR

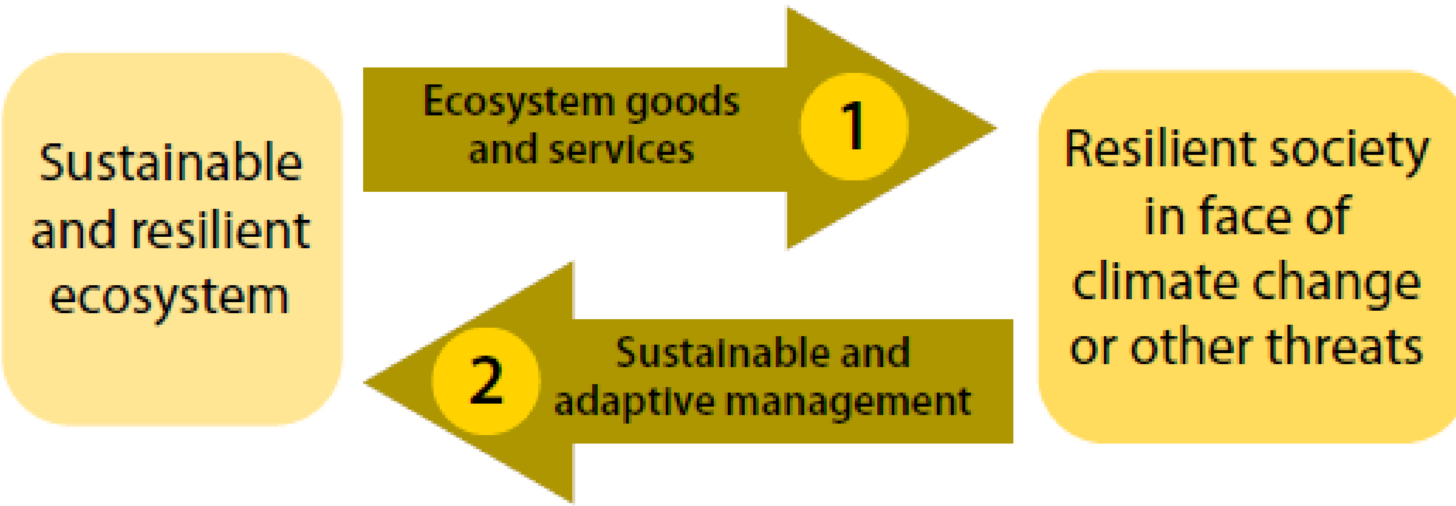
- The Technical Workshop was held in Dar es Salaam on 21-23 March 2013
- EBA approach was adopted and supported by information compiled in FCCC/SBSTA/2011/INF.8
- Wetlands are identified among the vulnerable ecosystems that require more attention:
  - Capacity building through trainings
  - Public awareness through improved communication
  - Good understanding of ecosystem services
  - Promoting policy (changes) and measures for EBA

Synergizing adaptation and mitigation

- ES provided by wetlands ecosystem can be used as an entry point
  - ***supporting*** (primary production of terrestrial and aquatic forms of lives, nutrient accumulation)
  - ***provisioning*** (food, fuel, fiber/wood)
  - ***regulating*** (climate, fresh water cycles, pollution control)
  - ***cultural*** (aesthetic, recreational, educational, spiritual)
- Identifying and estimating co-benefits

Photos by: Faizal Parish, GEC

Ecosystem Based Adaptation Framework



1. Ecosystems that provide goods and services that help human populations survive climate change

2. Sustainable and adaptive management of that help wetland ecosystems survive climate change

Source: Locatelli, 2011

Concluding remarks

- In light of using new "2013 Wetlands Supplement" it is timely to produce high Tier EFs and ADs for tropical PSF
- EFs for drained peatlands are more readily available but more work is needed to develop high Tier EFs for rewetted and restored degraded peatlands
- Monitoring peat depth is crucial but technologically poses a huge challenge
- Recurrent fires significantly affect C-loss – fire emissions should be factored in
- EBA approaches should be promoted in managing PSF to identify co-benefits of the ecosystem services

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