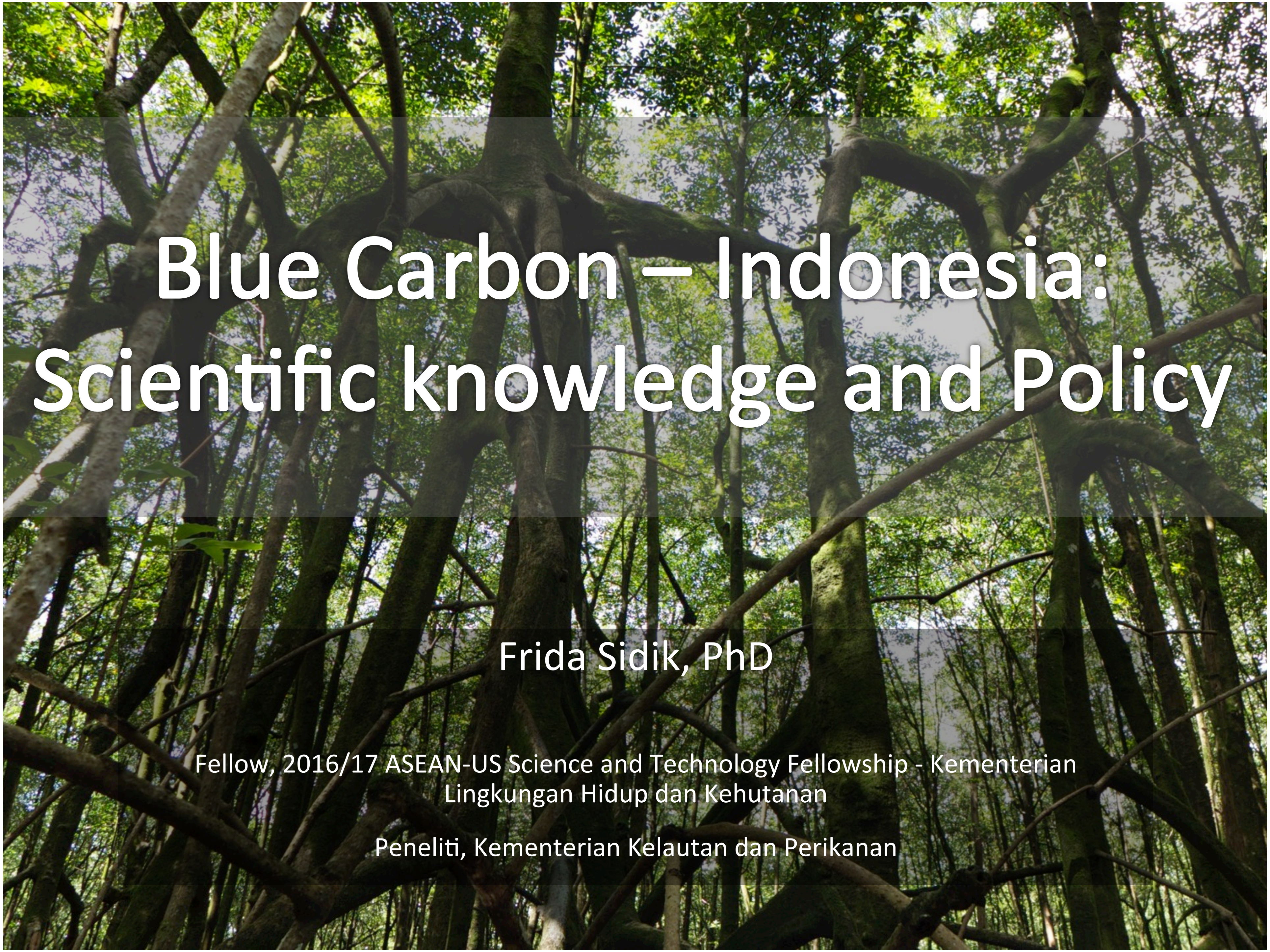


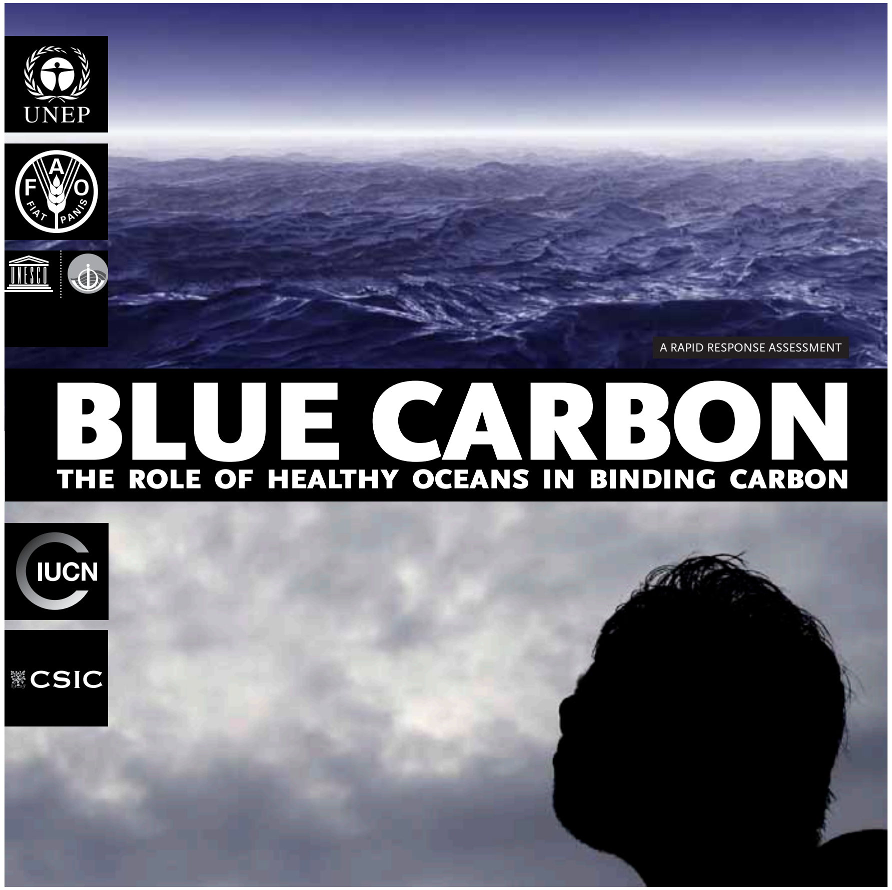
Blue Carbon – Indonesia: Scientific knowledge and Policy

Frida Sidik, PhD

Fellow, 2016/17 ASEAN-US Science and Technology Fellowship - Kementerian Lingkungan Hidup dan Kehutanan

Peneliti, Kementerian Kelautan dan Perikanan

Blue Carbon

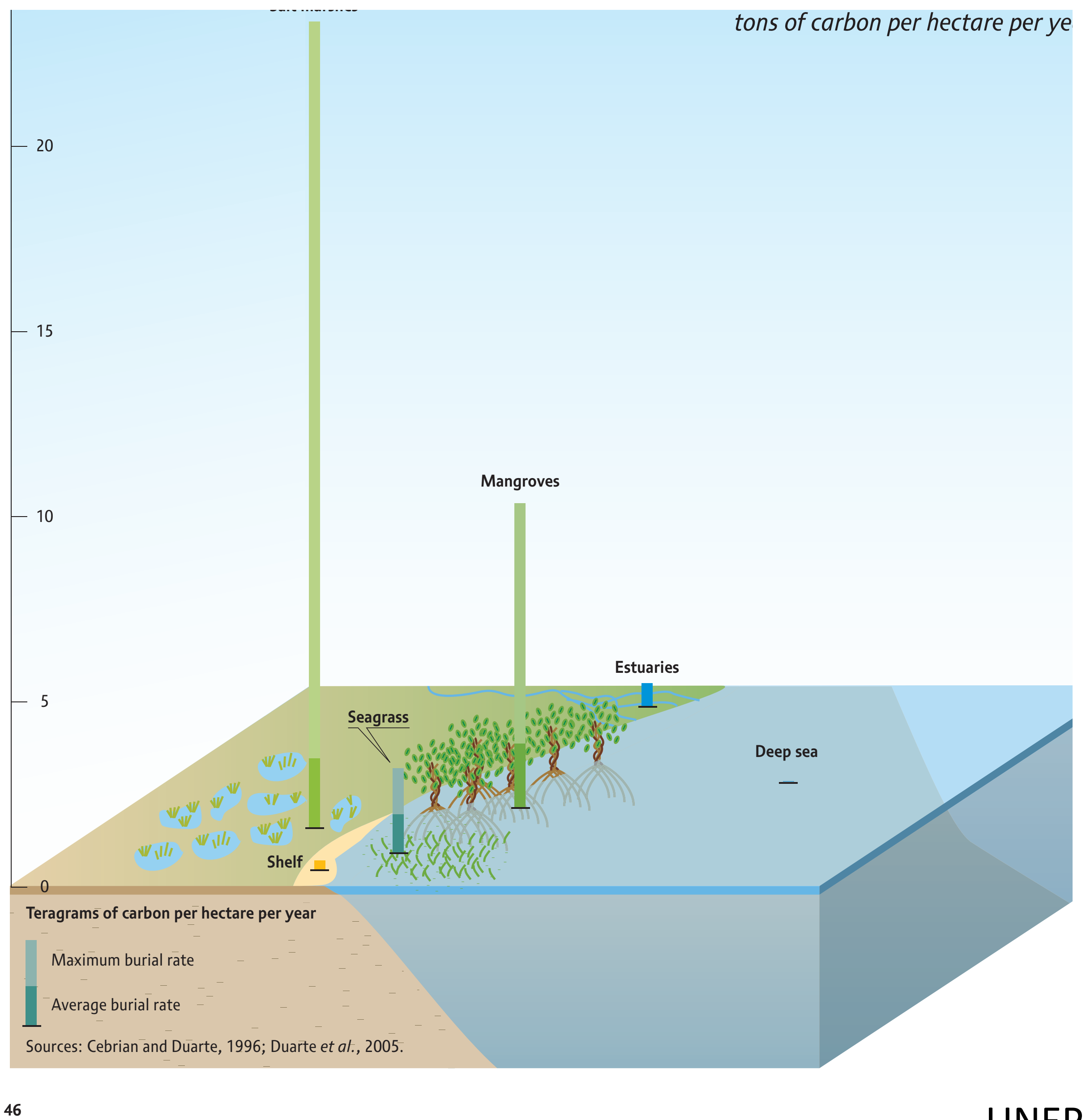


UNEP, 2009

Half of biological carbon is capture by marine living organisms

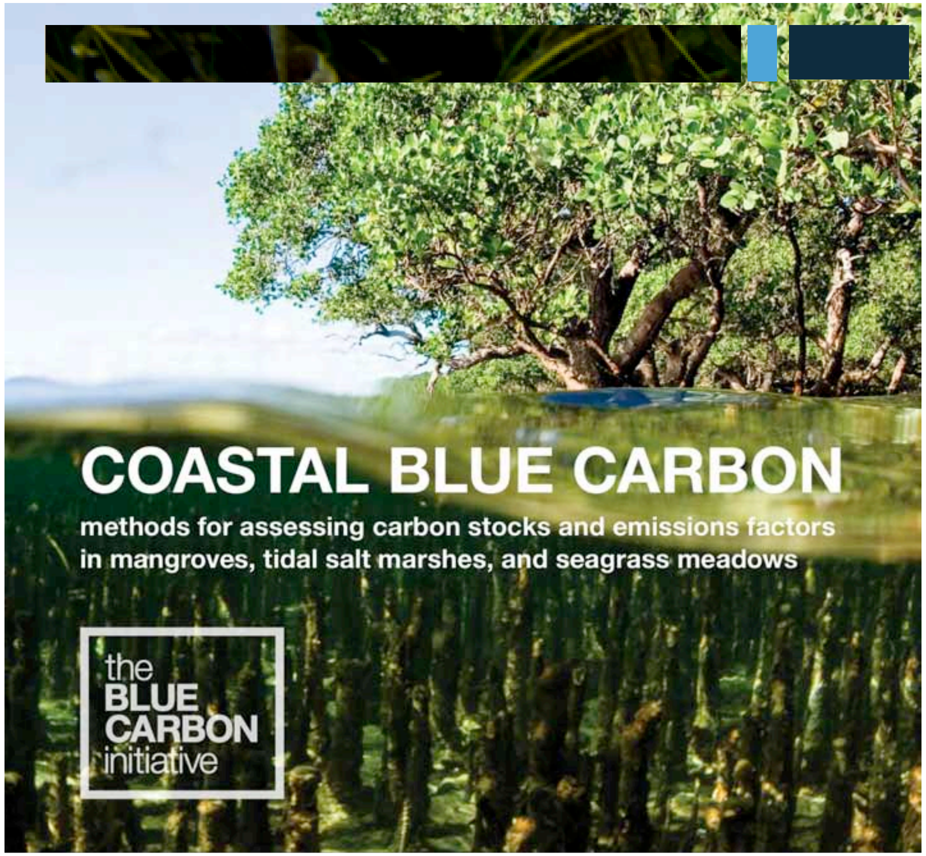
Facts:

- Natural ecosystems are being degraded, reducing their ability to absorb CO_2
- Critical role of ocean has been overlooked

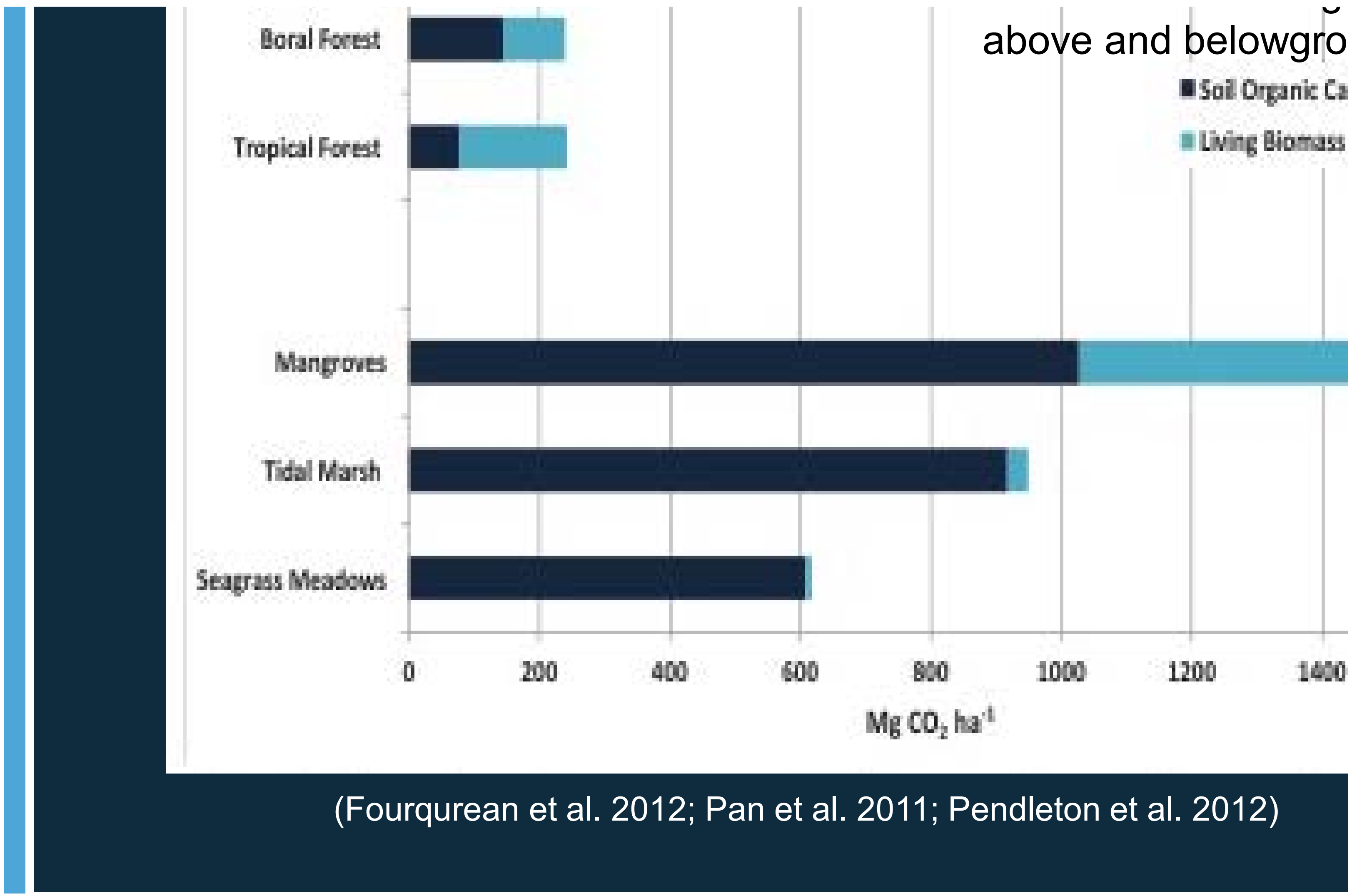


tons of carbon per hectare per ye
20
15
10
5
0
Mangroves
Estuaries
Seagrass
Deep sea
Shelf
Teragrams of carbon per hectare per year
Maximum burial rate
Average burial rate
Sources: Cebrian and Duarte, 1996; Duarte et al., 2005.
46

UNEP, 2009

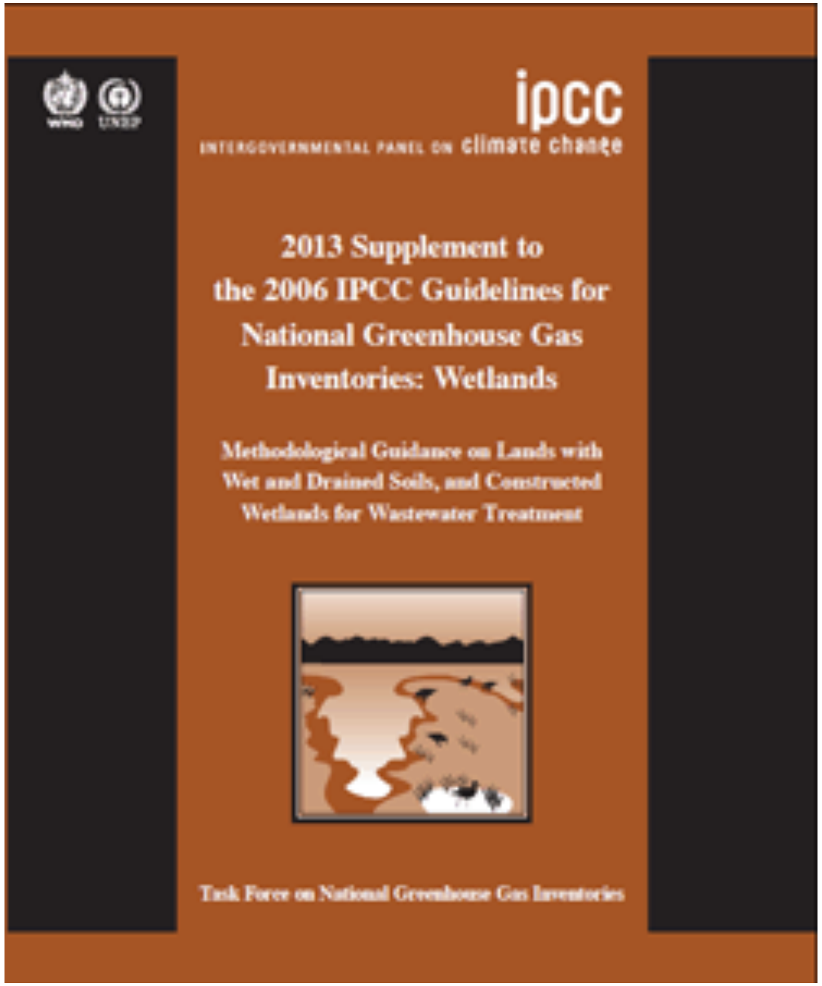


“Carbon stored in mangroves, salt tidal marshes, seagrasses within the soil, living biomass (aboveground and belowground) and non living biomass.”



Carbon sequestered in coastal soils can be extensive and remain trapped for very long periods of time

Blue Carbon ecosystem for climate change adaptation and mitigation



	control) to supplement that given in Volume 1 of the *20*

A summary of the main methodological updates to the *2006 IPCC Guidelines* is provided belo a decision tree to help inventory compilers determine which chapters of this supplement to a coverage and definitions of the wetland types.

Peatlands and organic soils. The *2006 IPCC Guidelines* included some guidance on drainage and peat extraction (Chapter 7, Volume 4), but not on rewetting. In this supplement, peatla with organic soils and both drainage and rewetting are covered. Updated emission factors and for both drained and rewetted organic soils including for off-site carbon dioxide (CO_2) em carbon losses. Guidance on methane (CH_4) emissions from rewetting of organic soils (Cha *Supplement*), ditches on drained inland organic soils and CO_2, CH_4 and carbon monoxide (CO fires are also provided (Chapter 2 of the *Wetlands Supplement*).

Peatland managed for peat production. Peat production is covered in the *2006 IPCC* (Volume 4) and no additional guidance is given here except some updated emission factors in (

Rice cultivation. Rice cultivation is covered in the *2006 IPCC Guidelines* (Chapter 5, Vol emission factors for lowland rice production are given in Chapter 2.

Coastal wetlands. The *2006 IPCC Guidelines* provide no specific guidance for coastal wetla is given in Chapter 4 of this supplement on how to treat anthropogenic emissions and ren

Worksheets that can be used for estimating emissions and removals for each category using the Ti and revised background tables, are included in the annex of the chapter.

1. Parties should take action to **conserve and enhance**, as appropriate, **sinks and reservoirs of greenhouse gases** as refer to in Article 4, paragraph 1(d), of the Convention, including forests.

Art. 4 p.1d of the Convention reads:

(d) Promote sustainable management, and promote and cooperate ir the conservation
and enhancement, as appropriate, of sinks and reservoirs of all greenhouse gases not controlled
by the Montreal Protocol, including biomass, forests and oceans as w as other terrestrial, **coastal and marine ecosystems**;

United nations confer
on climate change
COP21/CMP11

UNFCCC COP 22

MARRAKECH 2016
COP22 | CMP12 | CMA1
UN CLIMATE CHANGE CONFERENCE

Blue Carbon in Indonesia: Opportunities and Challenges

5. HALTING MANGROVE DEFORESTATION COULD MAKE A WHOLE LOT OF DIFFERENCE TO CLIMATE CHANGE

Stopping mangrove destruction could meet

of Indonesia's **26%** emissions reduction target for 2020...

...equivalent to **40,000,000** fewer cars on the road

References:

Illustration & design: Jim O'Neill

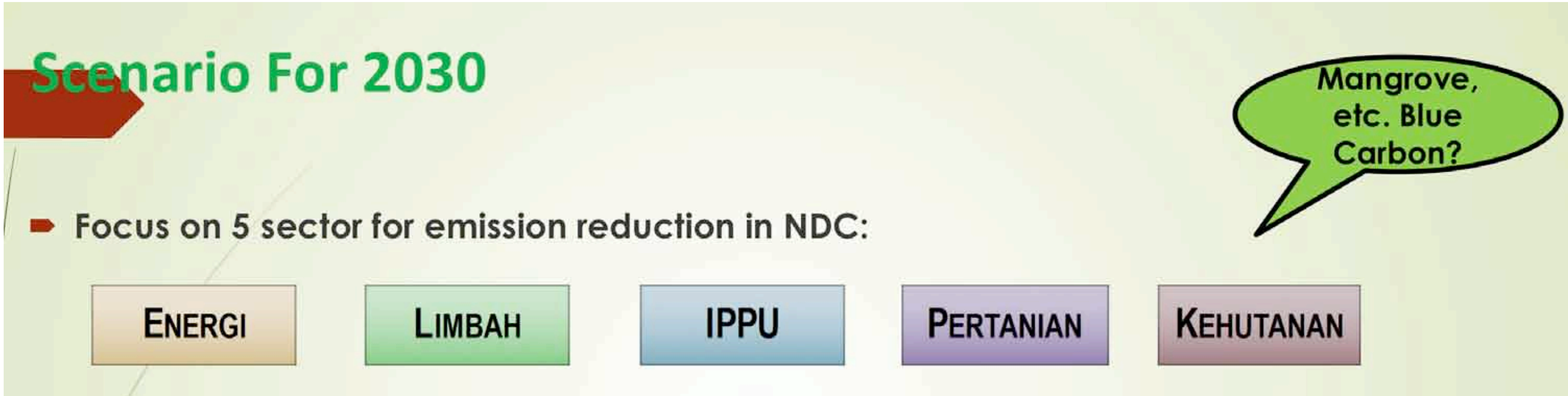
Cut emissions, not mangroves: Indonesia's best hope for slowing climate change
blog.cifor.org/31112

Available for download:
http://dx.doi.org/10.1038/nclimate2734

Read more:
blog.cifor.org/wetlands

Full infographic and additional references:
blog.cifor.org/31193

Blue carbon – Climate change

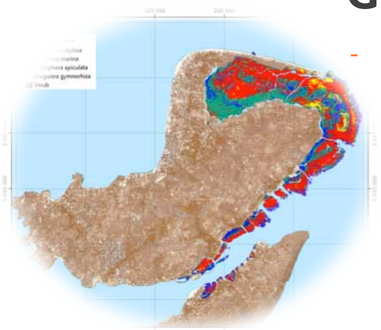


(KLHK, 2016)


Next Steps for Coastal Wetlands in NDC?
Review Perpres 61/2011
Integrated Land and Coastal Climate Change Mitigation and Adaptation Effort
Updates of Progress and Results: CTU
Identify Gap and Challenges: MRV and SRN
Communication and Submission as part of NDC?
(KLHK, 2016)

Knowledge gaps

GEOGRAPHICAL EXTENT



Map of existing habitat, loss or change

EMISSION AND REMOVAL

Emission from exposed organic soil and removal to restored ecosystem

(Blue Carbon Protocol, 2014)

SEQUESTRATION AND STORAGE

Data in scientific literatures

HUMAN DRIVERS

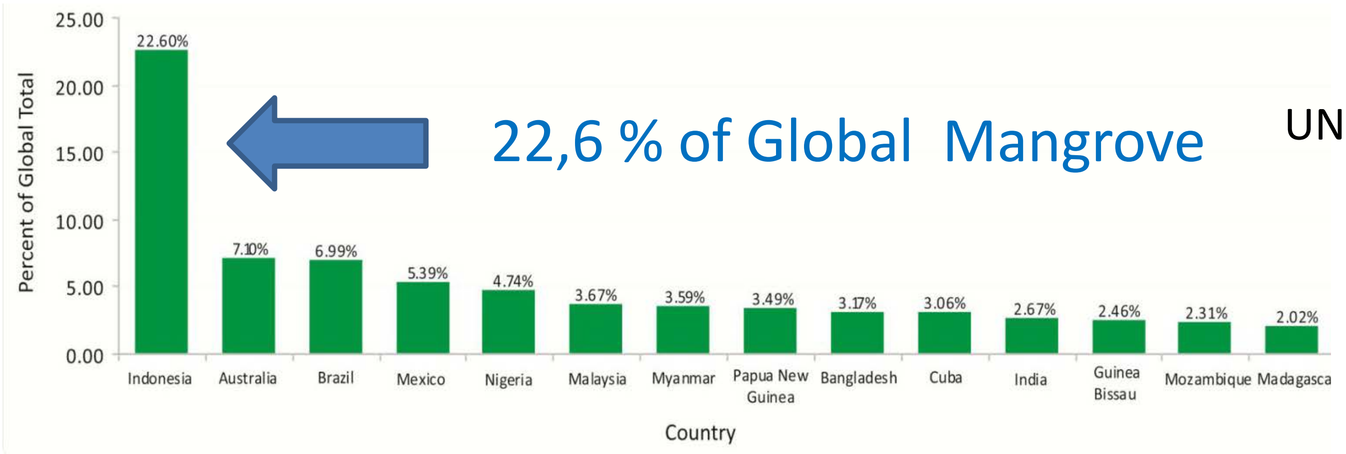
Emission rates associated with human activities

COASTAL EROSION

Fate of eroded coastal carbon


Source: UNEP-WCMC, 2009;
Duarte *et al.*, 2008.
Salt Marshes
30%
25%
20%
15%
10%
5%
0%
Habitat lost
since 1940s
Habitat l
rate per
in recent

36


22,6 % of Global Mangrove
Percent of Global Total
25.00
20.00
15.00
10.00
5.00
0.00
22.60%
7.10%
6.99%
5.39%
4.74%
3.67%
3.59%
3.49%
3.17%
3.06%
2.67%
2.46%
2.31%
2.02%
Indonesia
Australia
Brazil
Mexico
Nigeria
Malaysia
Myanmar
Papua New Guinea
Bangladesh
Cuba
India
Guinea Bissau
Mozambique
Madagasca
Country

UNEP, 2009

some countries results in potentially unrealistic estimates of when mangroves may be lost outside protected areas (Table 4), based on the assumption that each country had 20.7% of its mangrove resource under protection (the global average).

For most countries, however, such worst-case scei unlikely, due to the high variability amongst trends, possible policy responses to rapidly declining mangr Indeed, although a subset of 13 countries may los

Year

FAO (2007a) trend — FAO (2010) — Academic — All
FAO (2007a) projection — Government — Remote sensing

as policy-makers react to declining mangrove cover. For these reasons, we do not extrapolate deforestation trends to an unrealistic 0% mangrove cover.

RESULTS

Annual rates of mangrove change

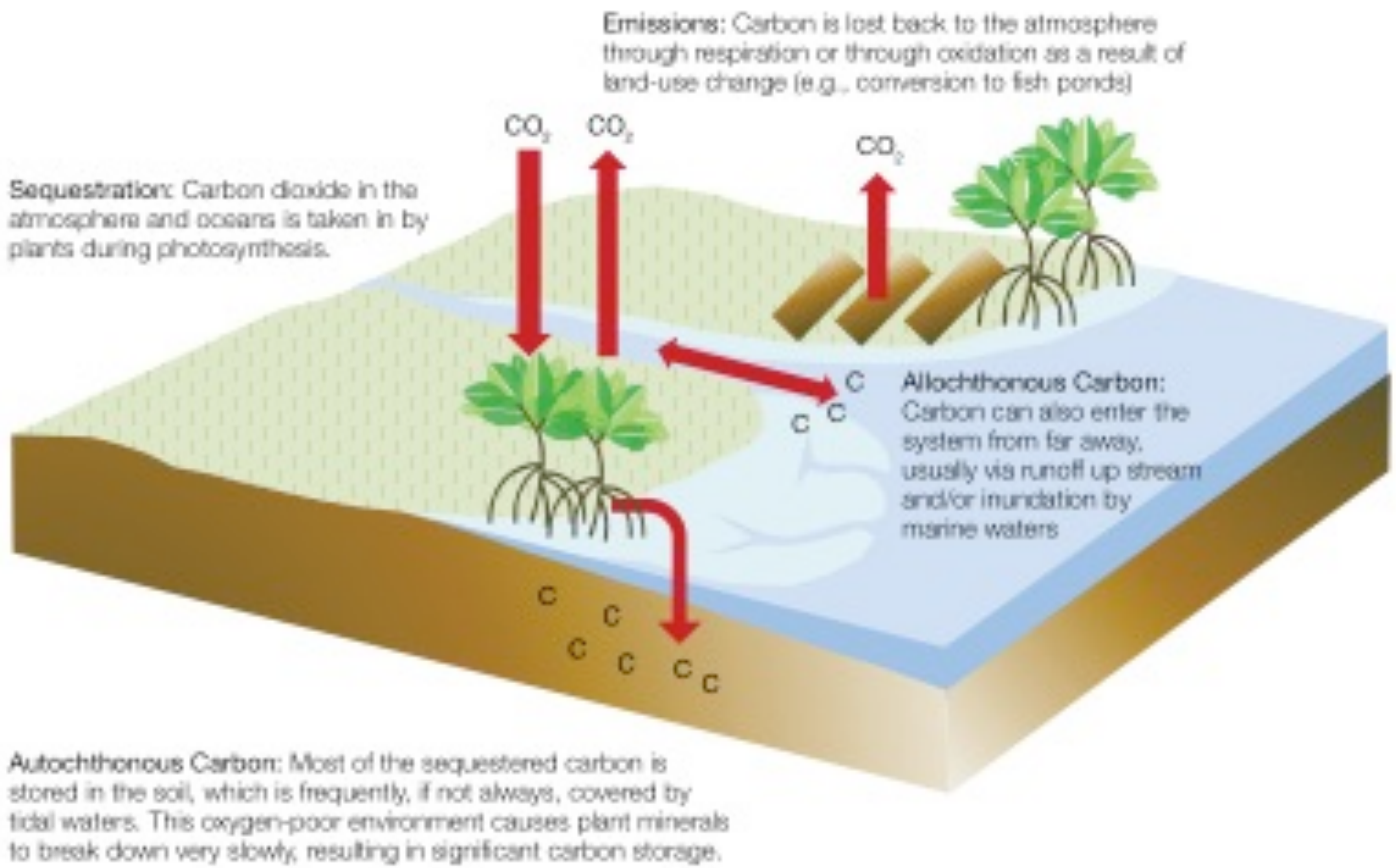
There is considerable variability in the estimated rate of change of mangroves, depending on the data being modelled (Fig. 1), particularly for Indonesia, Brazil, Malaysia, Bangladesh, Cuba, the Philippines, Thailand and Singapore; for these countries, we were able to derive models of forest loss, of forest gain or of no change (Tables 2 & 3). High variability meant that many countries showed a large standard deviation in mangrove change when averaged across all models, such as Nigeria (−92.09 ± 188.95 km^2 yr^{-1}), Bangladesh (6.98 ± 29.75 km^2 yr^{-1}), Cuba (−34.82 ± 142.17 km^2 yr^{-1}), the Philippines (−2.86 ± 36.44 km^2 yr^{-1}) and Thailand (7.08 ± 42.99 km^2 yr^{-1}). High variability between data points also manifests itself in a very wide 95% individual prediction interval (see Fig. 2, highlighting selected countries). For example, using all data points, historical projections of mangrove area in Australia in 1888

may r
value
Wit
largest
(−331
to on
483.6
(FAO,
percer
grove
yr^{-1} b
trend)
with
rapid
gapor
mang
2008.
Thi
mang
an im
mates
from
may a

(Friess et al, 2013)

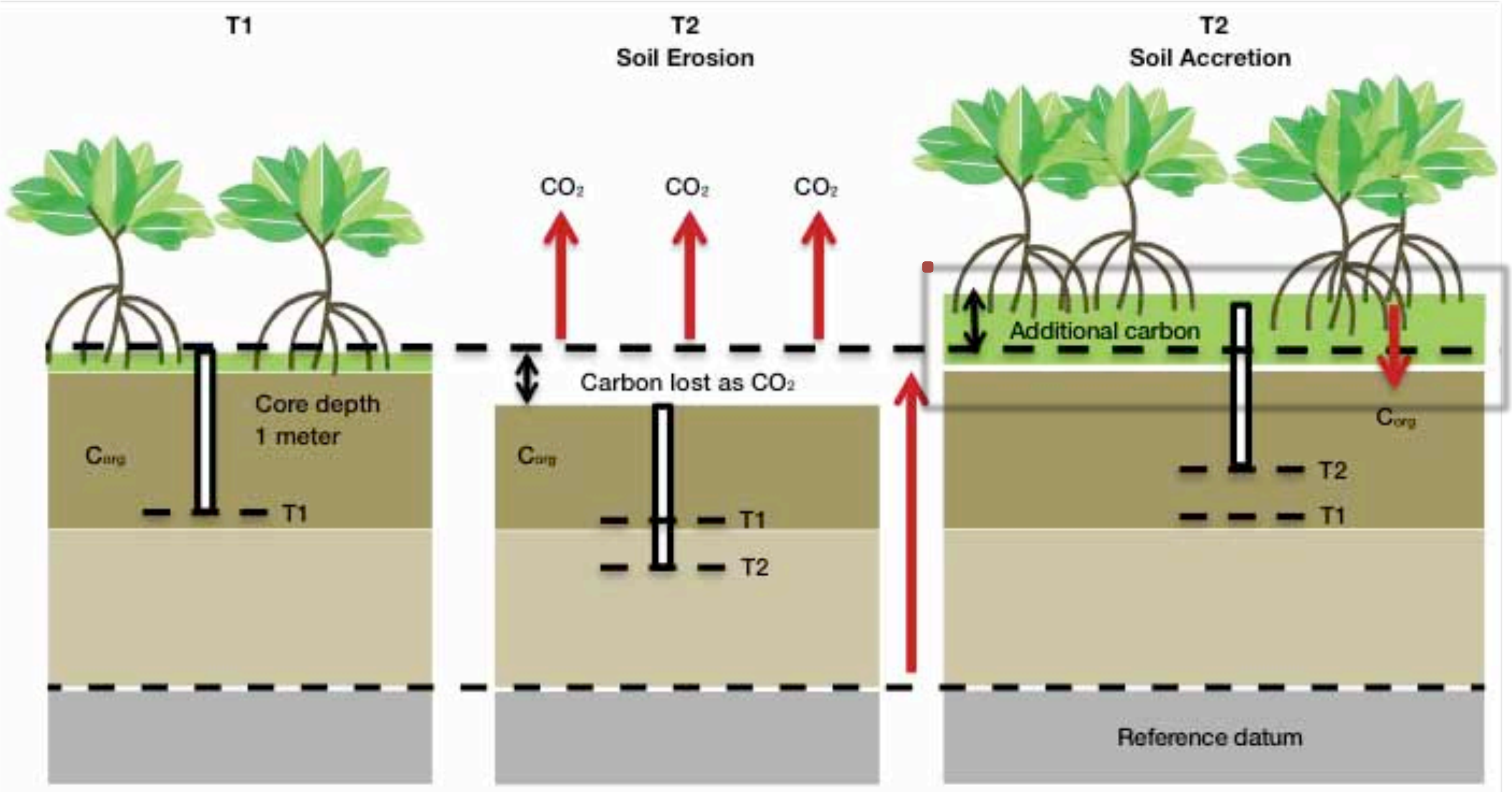
Carbon sequestration, storage, emission, removal:

How much carbon stored and sequestered ?
Where?
What are the potential emissions ?



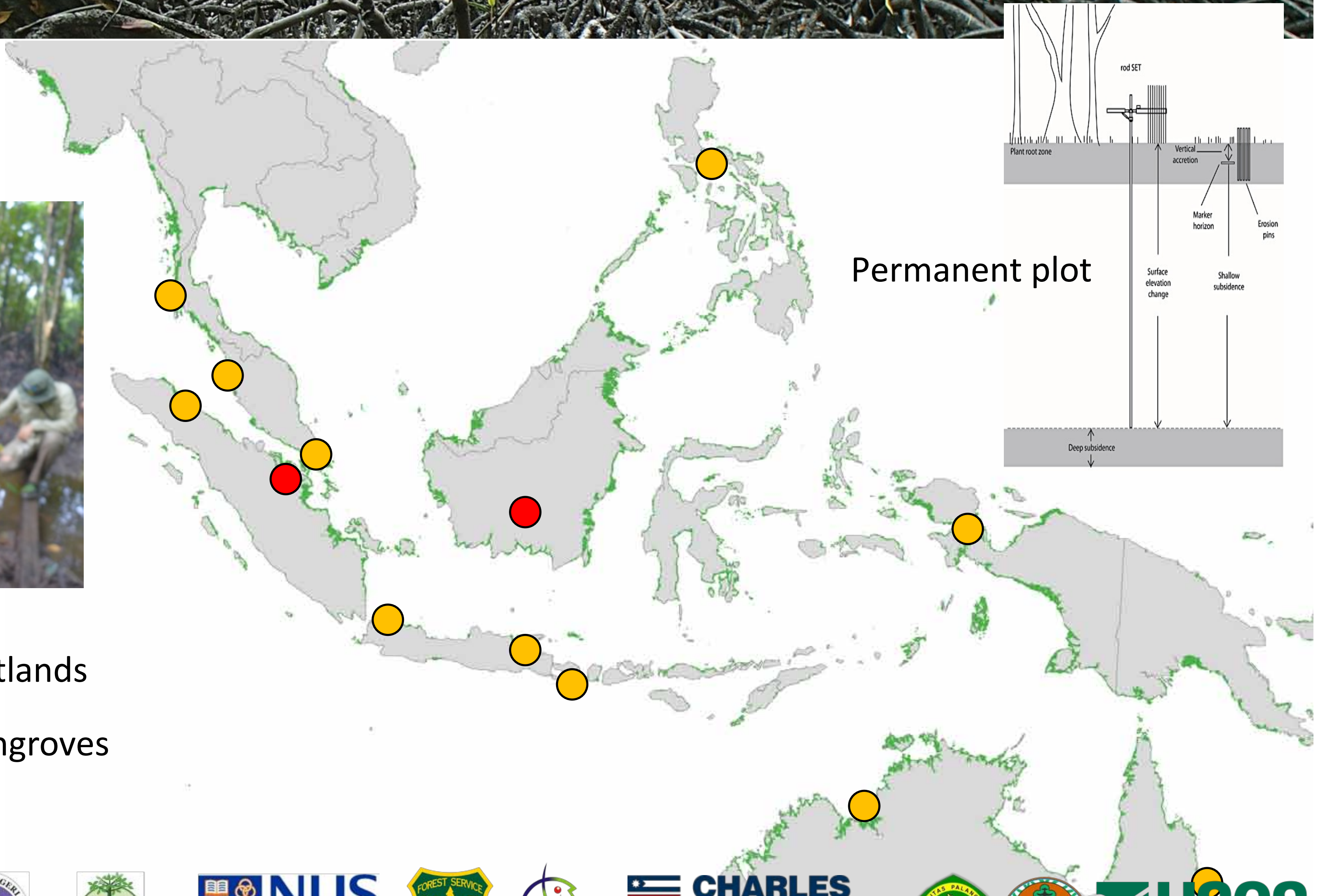
(Blue carbon protocol, 2014)

Gain or Loss ?



(Blue Carbon Protocol, 2014)

RSET-MH Network (Indo-Pacific)

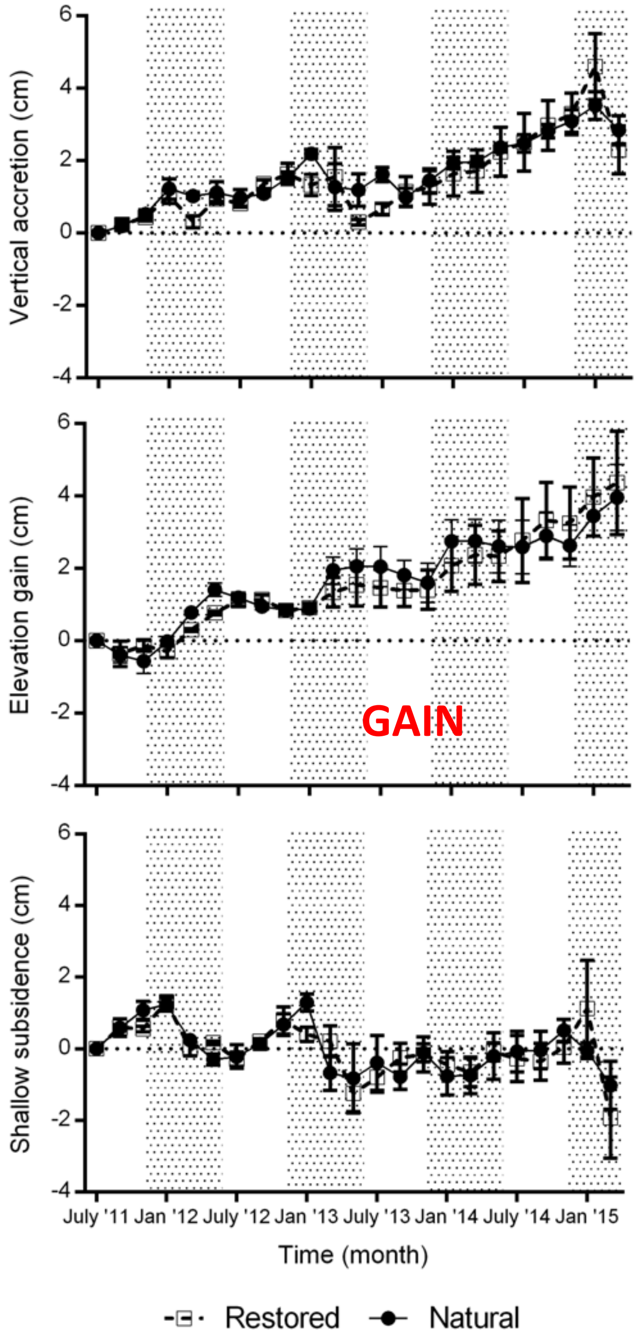


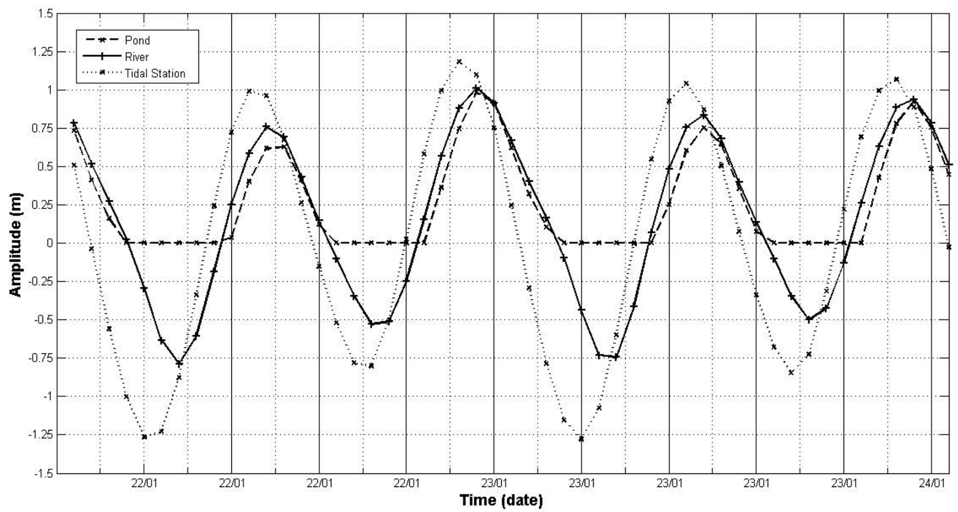
Peatlands

Mangroves

Permanent plot

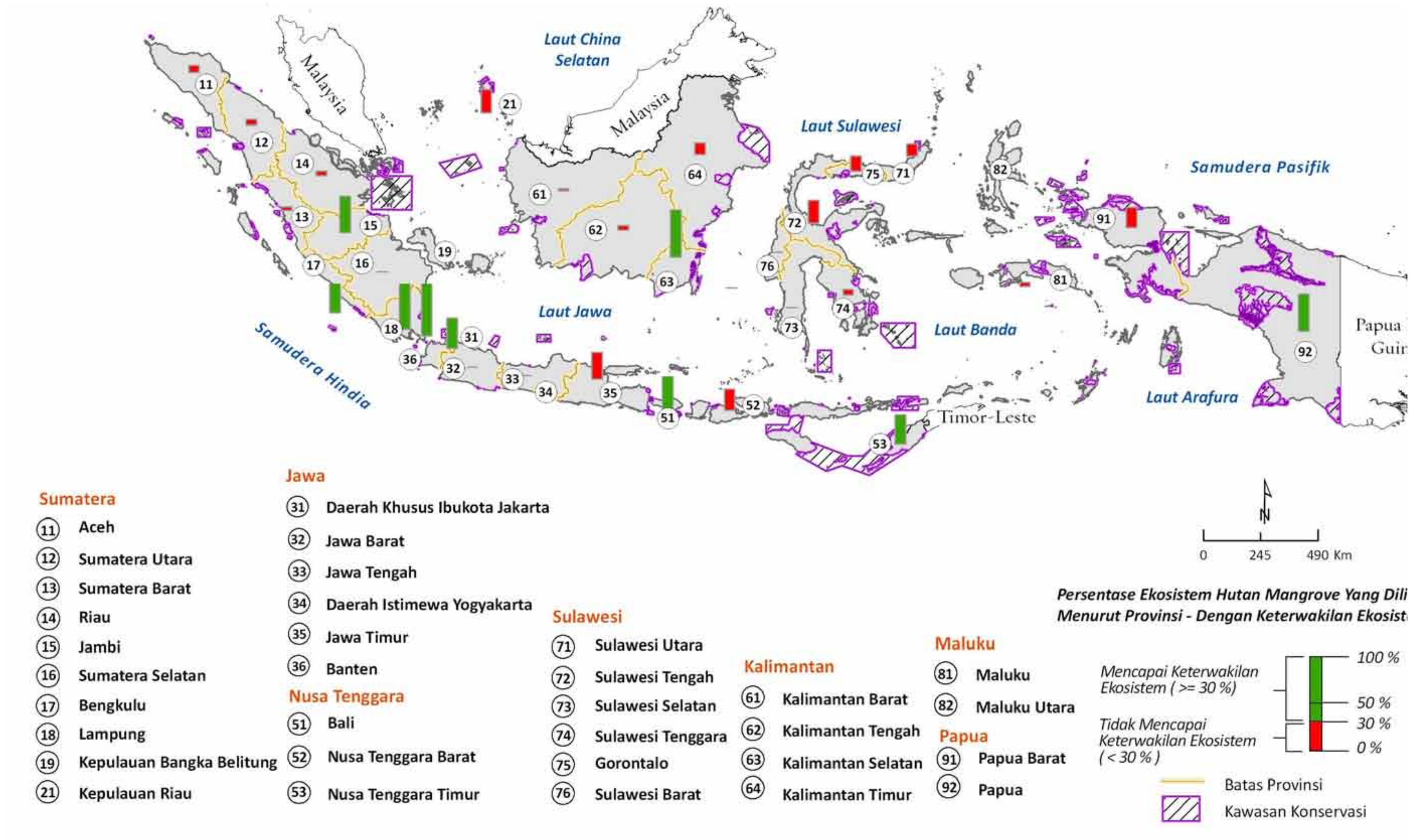
Similar trends in restored and natural forests
(elevation: 1.0 ± 0.1 cm $year^{-1}$) (Sidik *et al*, in prep)





What's next ?

- Science:
  - National mapping and assessments
- Policy:
  - National GHG inventories
  - Mangroves into national REDD+ strategies
  - Coordination among ministries-local government-NGOs, policy development and implementation



Laut China Selatan
Malaysia
Malaysia
Laut Sulawesi
Samudera Pasifik
Laut Jawa
Laut Banda
Samudera Hindia
Laut Arafura
Timor-Leste
Papua Guin
0 245 490 Km
Persentase Ekosistem Hutan Mangrove Yang Dili
Menurut Provinsi - Dengan Keterwakilan Ekosist
Sumatera
11 Aceh
12 Sumatera Utara
13 Sumatera Barat
14 Riau
15 Jambi
16 Sumatera Selatan
17 Bengkulu
18 Lampung
19 Kepulauan Bangka Belitung
21 Kepulauan Riau
Jawa
31 Daerah Khusus Ibukota Jakarta
32 Jawa Barat
33 Jawa Tengah
34 Daerah Istimewa Yogyakarta
35 Jawa Timur
36 Banten
Nusa Tenggara
51 Bali
52 Nusa Tenggara Barat
53 Nusa Tenggara Timur
Sulawesi
71 Sulawesi Utara
72 Sulawesi Tengah
73 Sulawesi Selatan
74 Sulawesi Tenggara
75 Gorontalo
76 Sulawesi Barat
Kalimantan
61 Kalimantan Barat
62 Kalimantan Tengah
63 Kalimantan Selatan
64 Kalimantan Timur
Maluku
81 Maluku
82 Maluku Utara
Papua
91 Papua Barat
92 Papua
Mencapai Keterwakilan Ekosistem (>= 30 %)
Tidak Mencapai Keterwakilan Ekosistem (< 30 %)
100 %
50 %
30 %
0 %
Batas Provinsi
Kawasan Konservasi

Terima kasih

1) drained mineral soil

2) wet mineral soil

3) wet organic soil

4) drained organic soil.

In the case of dry mineral soil, the guidance in the Forest Land, Cropland or Grassland Chapters *IPCC Guidelines* should be used as appropriate. Chapter 4 of the *Wetlands Supplement* provides n for drained coastal mineral soils, and Chapter 5 presents new guidance for drained inland wetland ı

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[1] Cf. Section 3.3.1, Chapter 3 in Volume 4 of the *2006 IPCC Guidelines*

[2] Other management activities on coastal wetland mineral soils covered in the Supplement include extraction and aquaculture.

[3] The guidance for rice cultivation provided in Chapters 2 and 5 of the *Wetlands Supplement* should be used i with Chapters 5 and 11 in Volume 4 of the *2006 IPCC Guidelines*.