International Conference on Sustainable Mangrove Ecosystems:
Managing a vital resource for achieving the SDGs and the Paris Agreement

18-21 April 2017, Bali, Indonesia

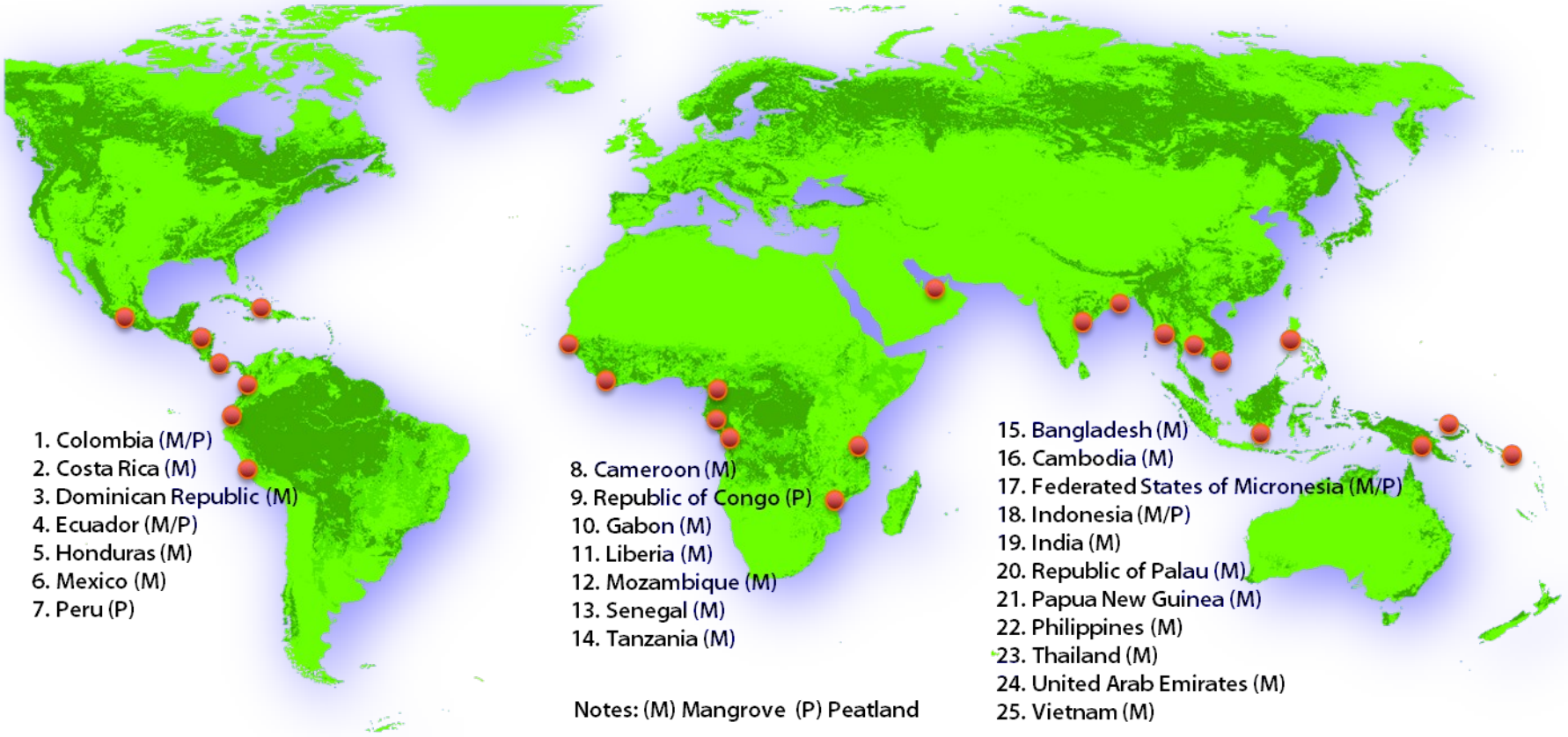
Mainstreaming blue carbon science into global and national policy processes and implementations

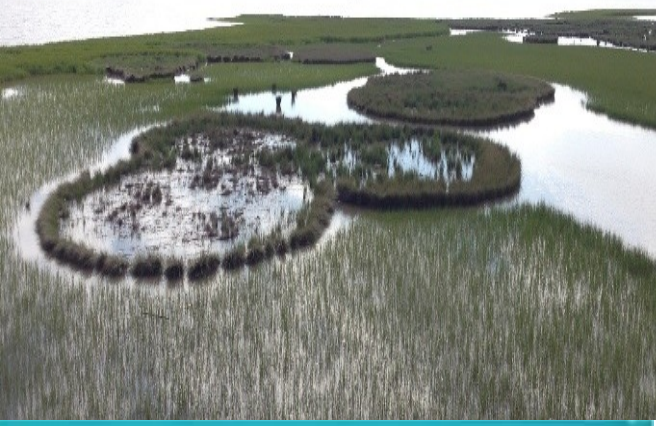
Daniel Murdiyarso

Outline

- Introduction
- What do we know?
  - ✓ *Carbon burial rates*
  - ✓ *Deforestation rates*
  - ✓ *GHG emissions*
- Mangroves & Paris Agreement
  - ✓ *Climate change mitigation*
  - ✓ *Climate change adaptation*
- Resilience enhancement & ES
- Mangrove restoration & SDG
- Concluding remarks

SWAMP Global Network

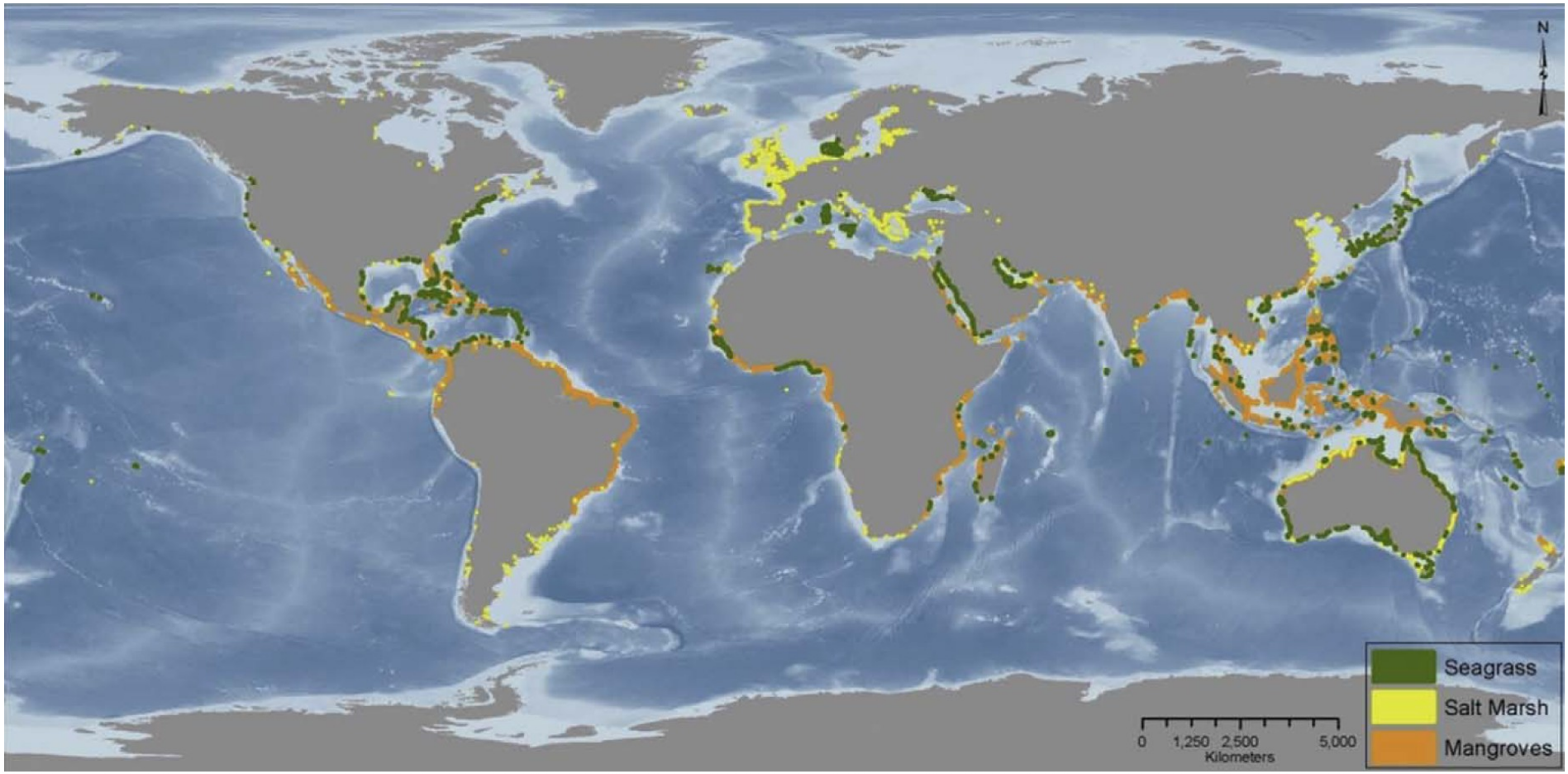




Definition

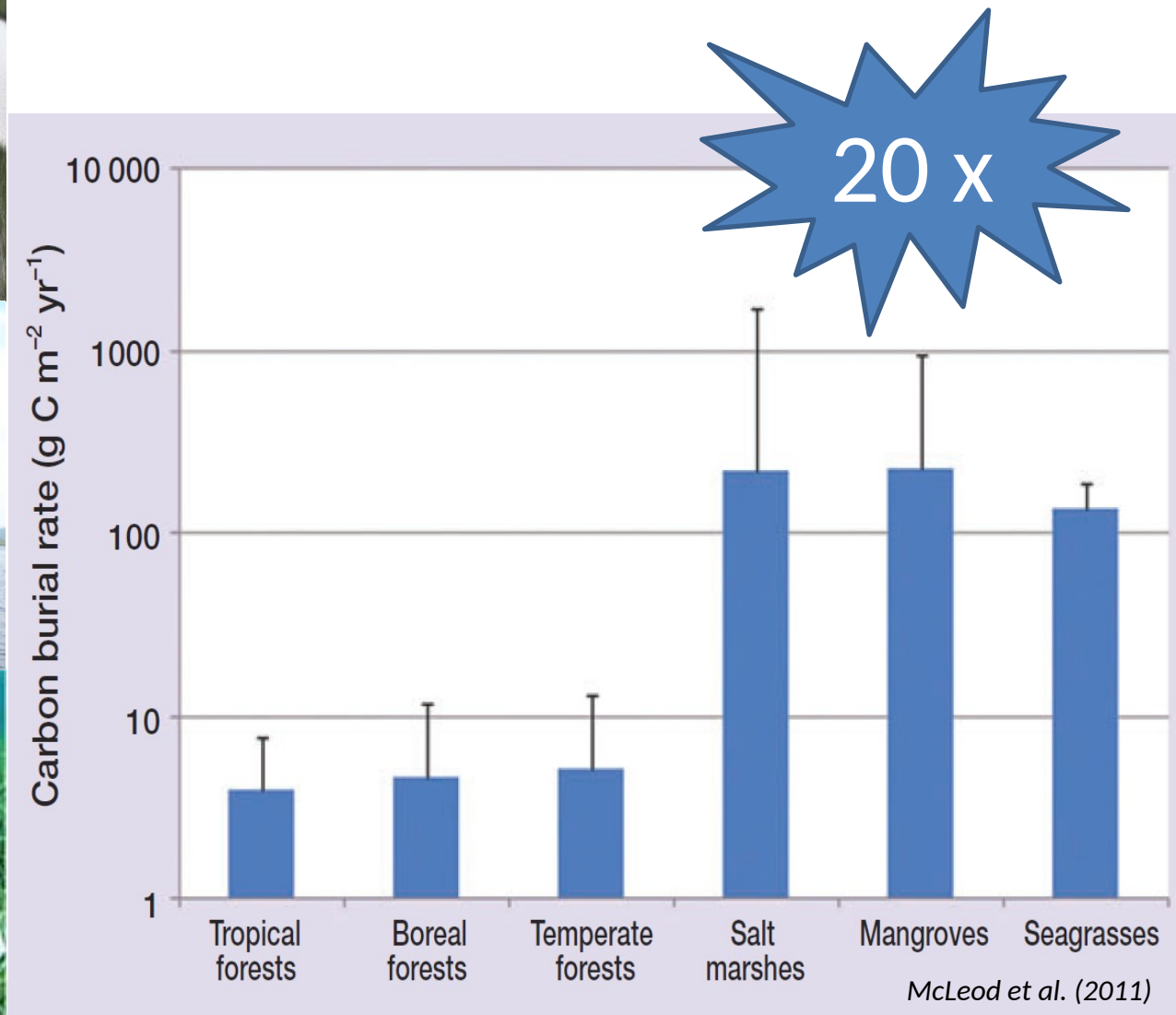
- **Blue Carbon** includes *ocean blue carbon* that represents carbon stored in open ocean carbon pools.
- **Coastal Blue Carbon** – The carbon stored in tidal wetlands, which includes tidally influenced forests, mangroves, tidal marshes and seagrass meadows, within soil, living biomass and non living biomass carbon pools.

Blue carbon distribution



UNEP-WCMC, ISME 2011

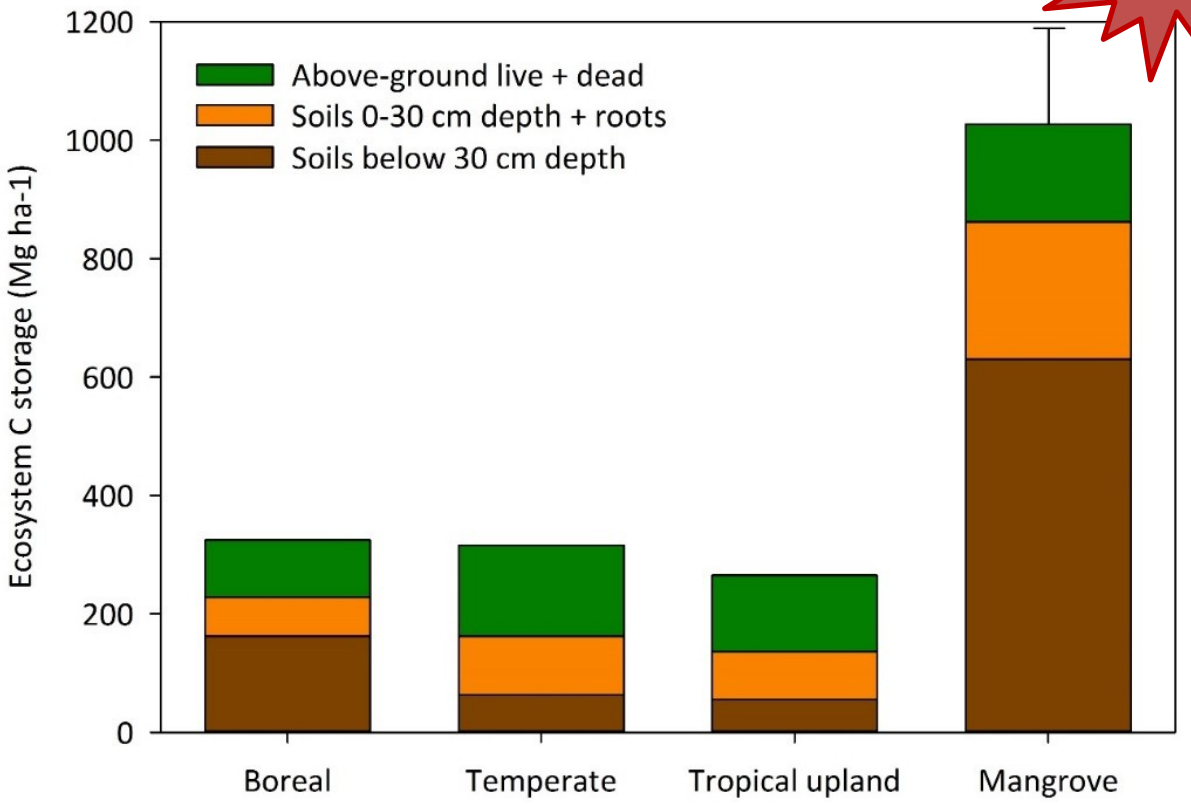
Carbon burial rates



McLeod et al. (2011)

Ecosystem C stocks

3-4 x



Source: Donato et al. (2011). *Nature Geoscience*.

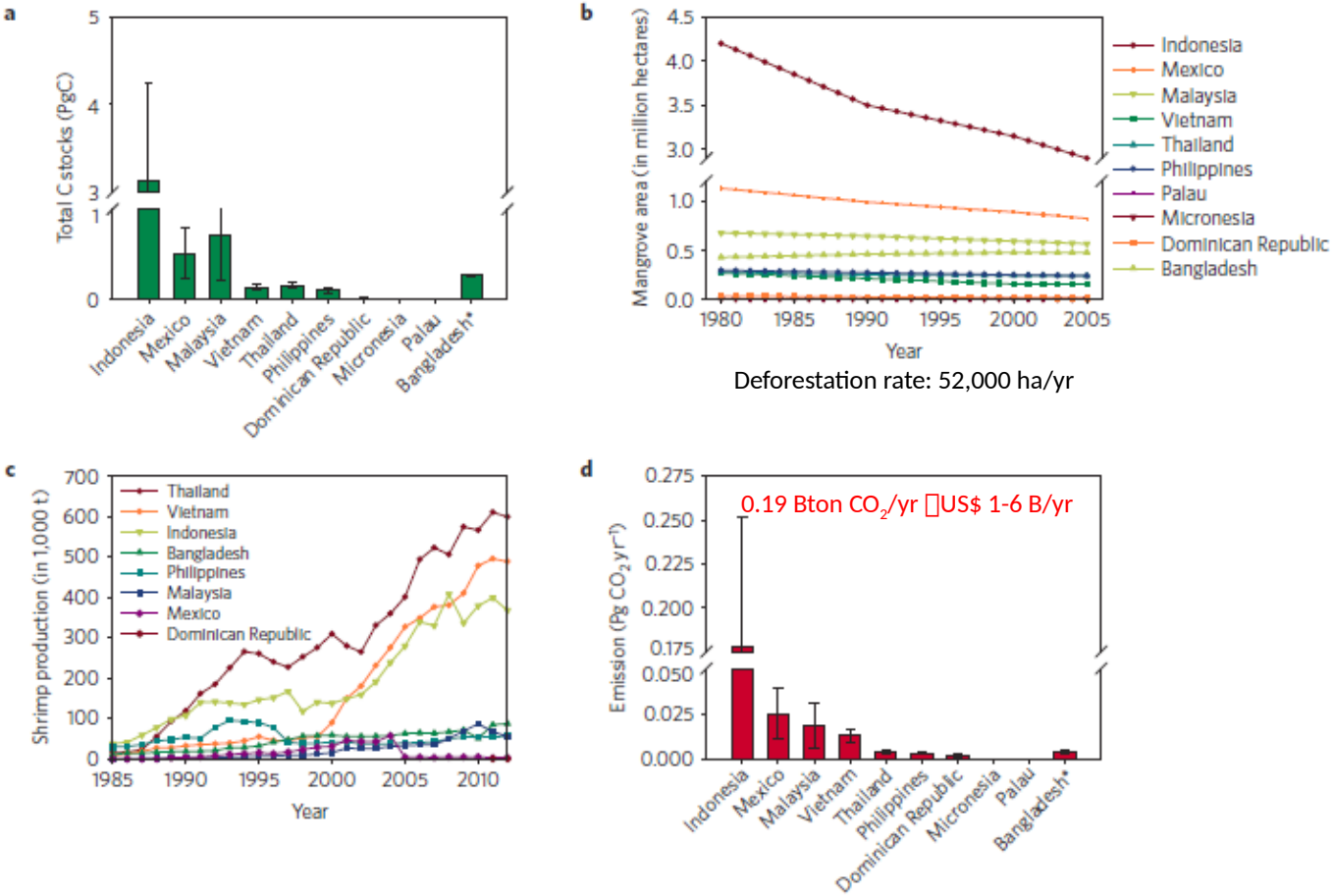
nature climate change

LETTERS

PUBLISHED ONLINE: 27 JULY 2015 | DOI: 10.1038/NCLIMATE2734

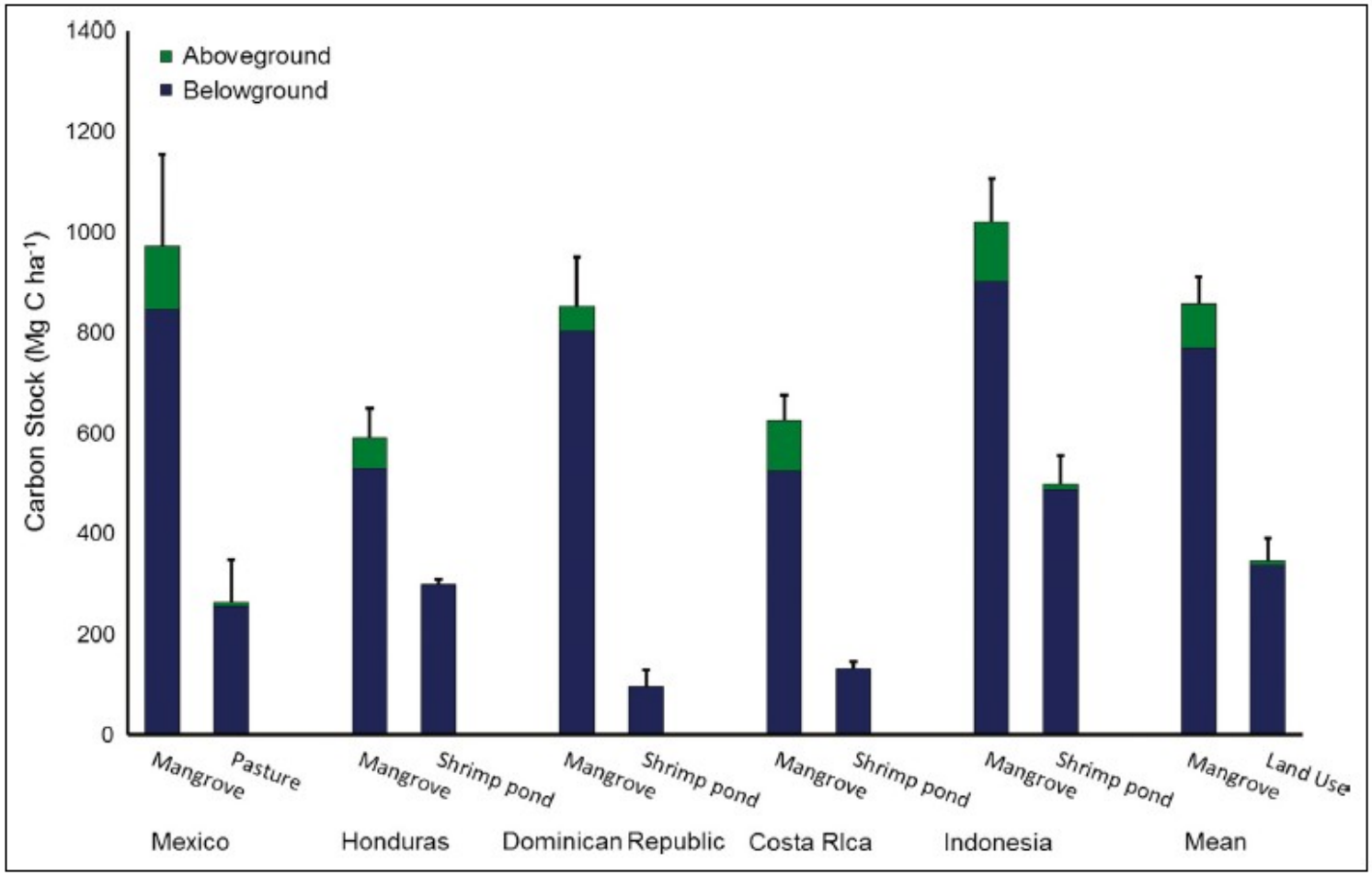
The potential of Indonesian mangrove forests for global climate change mitigation

Daniel Murdiyarso[1,2*], Joko Purbopuspito[1,3], J. Boone Kauffman[4], Matthew W. Warren[5], Sigit D. Sasmito[1], Daniel C. Donato[6], Solichin Manuri[7], Haruni Krisnawati[8], Sartji Taberima[9]



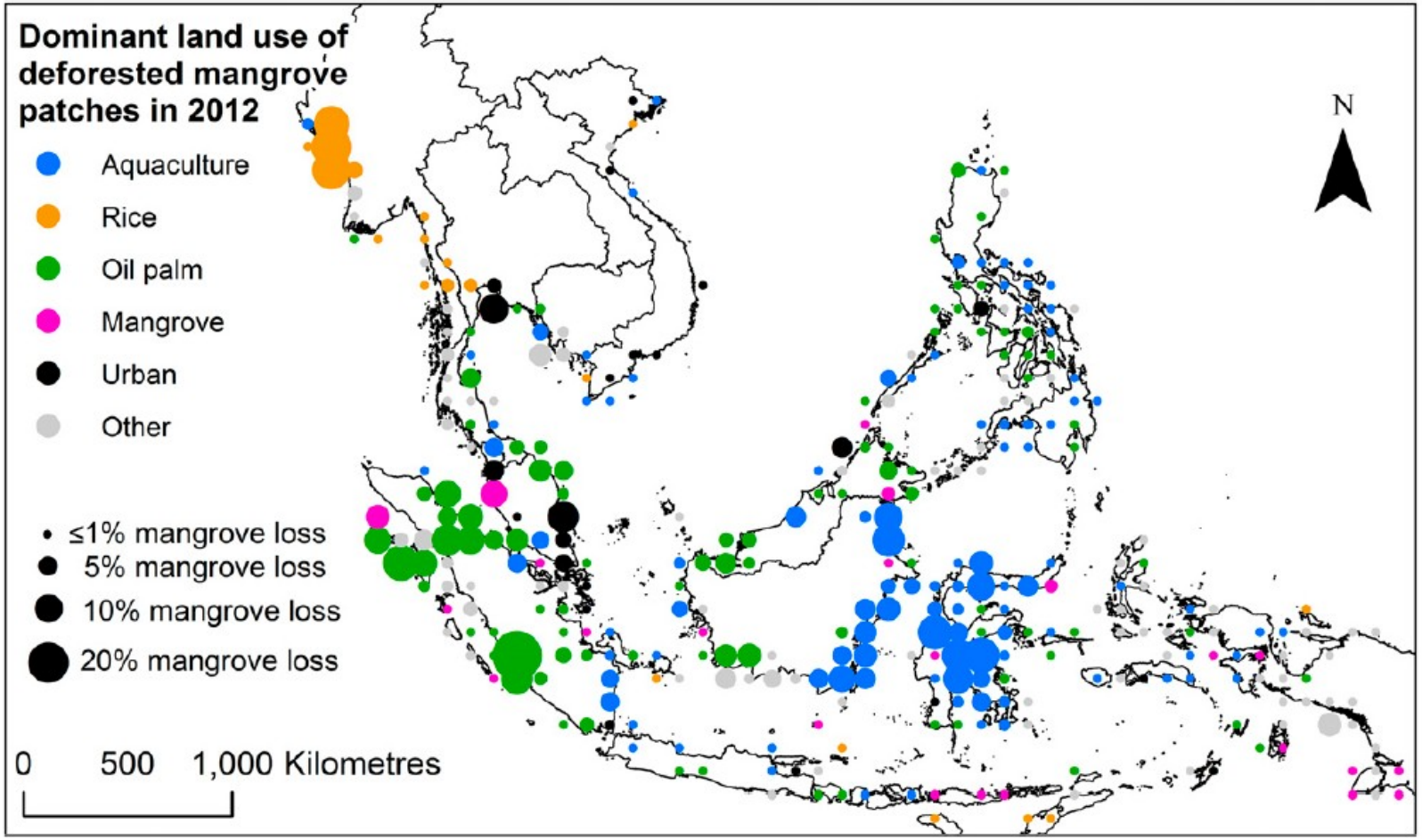
40,000,000 fewer cars on the roads

LUC carbon footprints



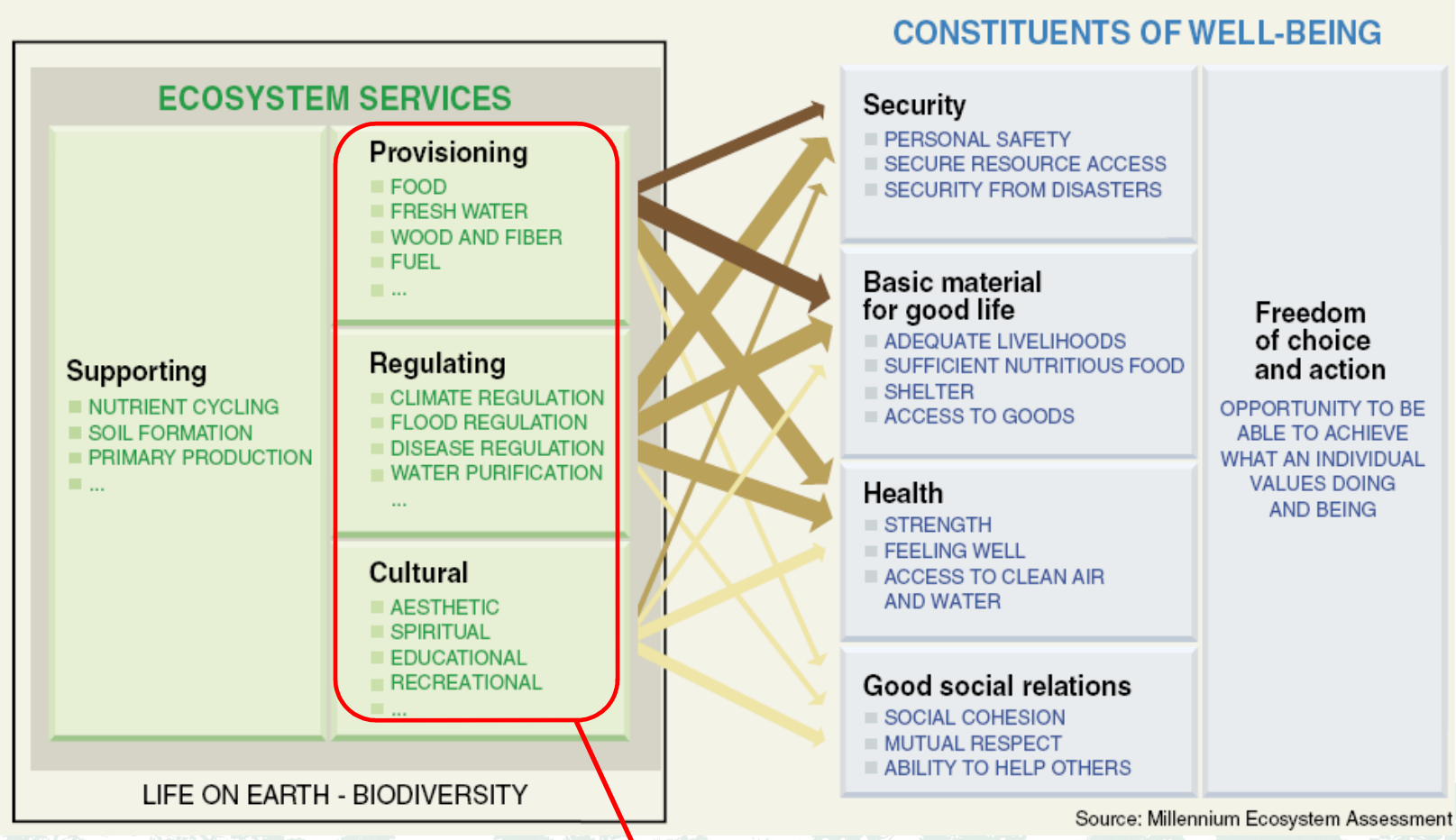
Kauffman et al. 2017 (Frontier Ecol. Environ.)

Dominant land-use after mangrove conversions



Richards and Fries (2015), PNAS

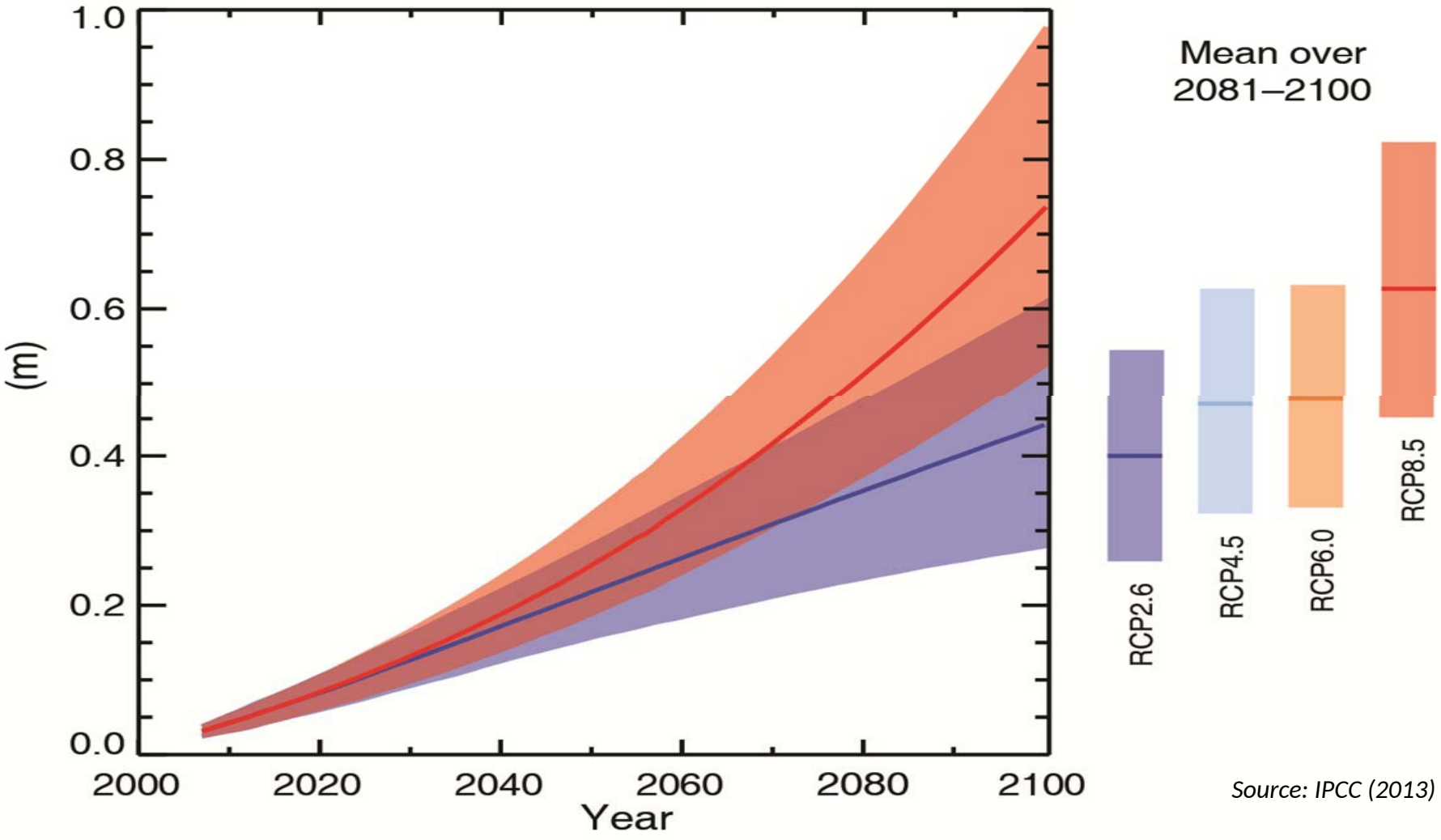
Mangroves: providers of ecosystem services



Direct benefits to the community

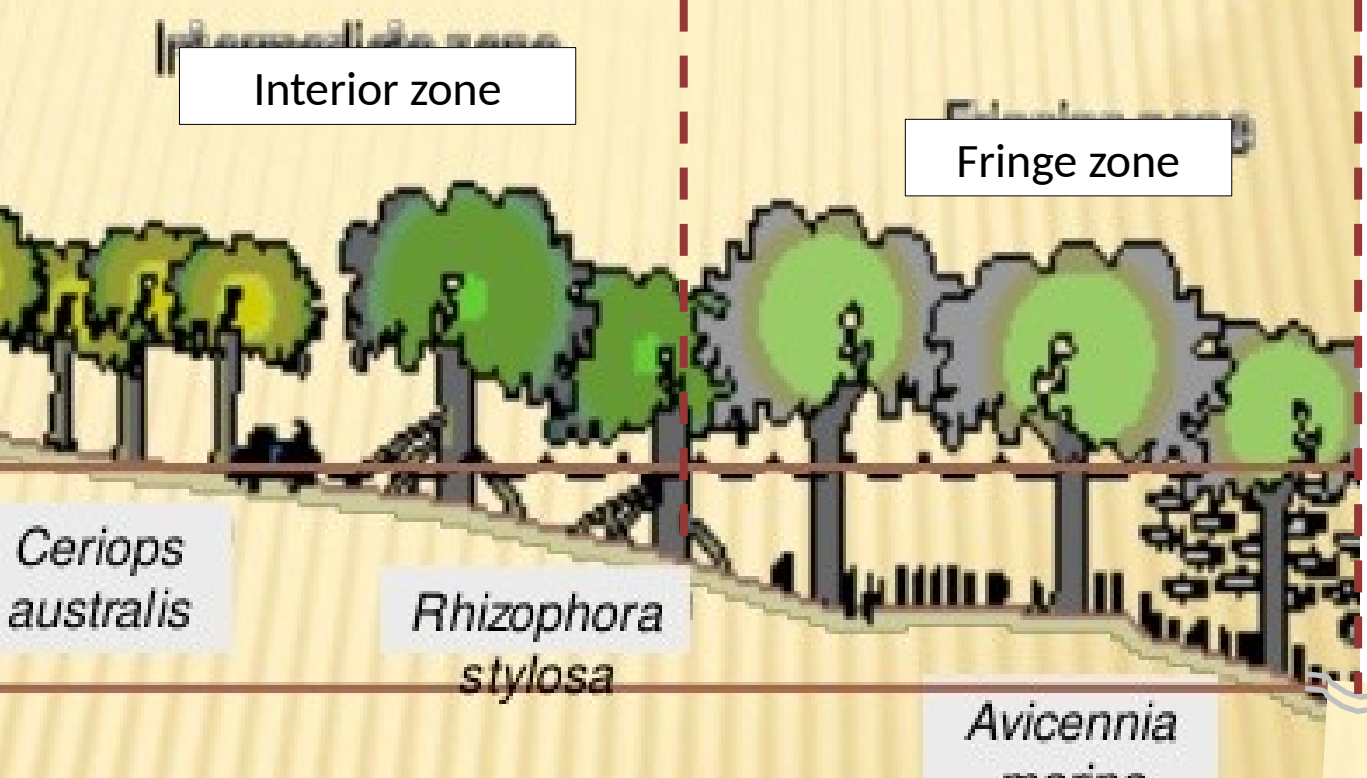
Supporting and regulating services

Sea Level Rise – IPCC AR5



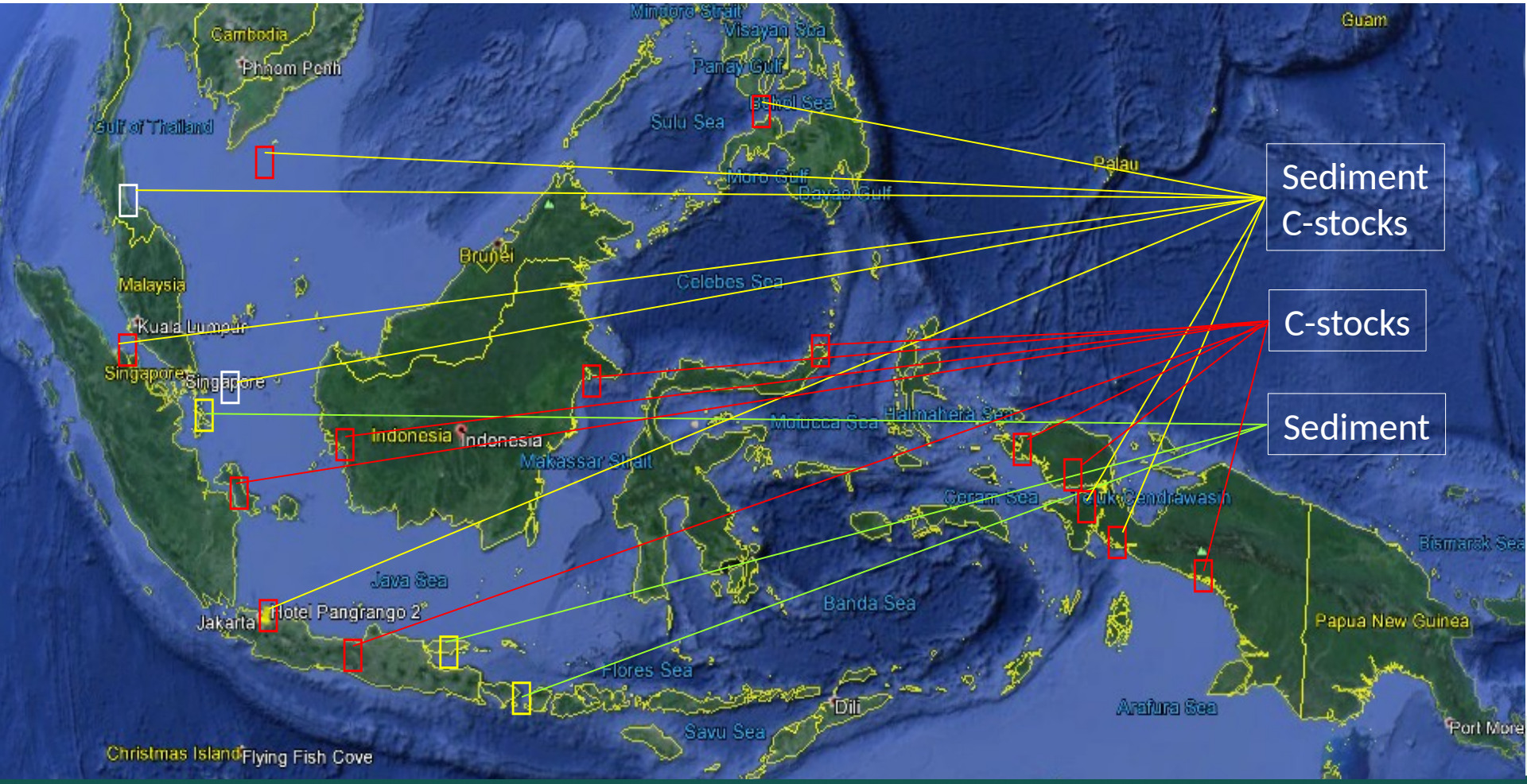
Source: IPCC (2013)

Land building and hydro-geomorphic setting

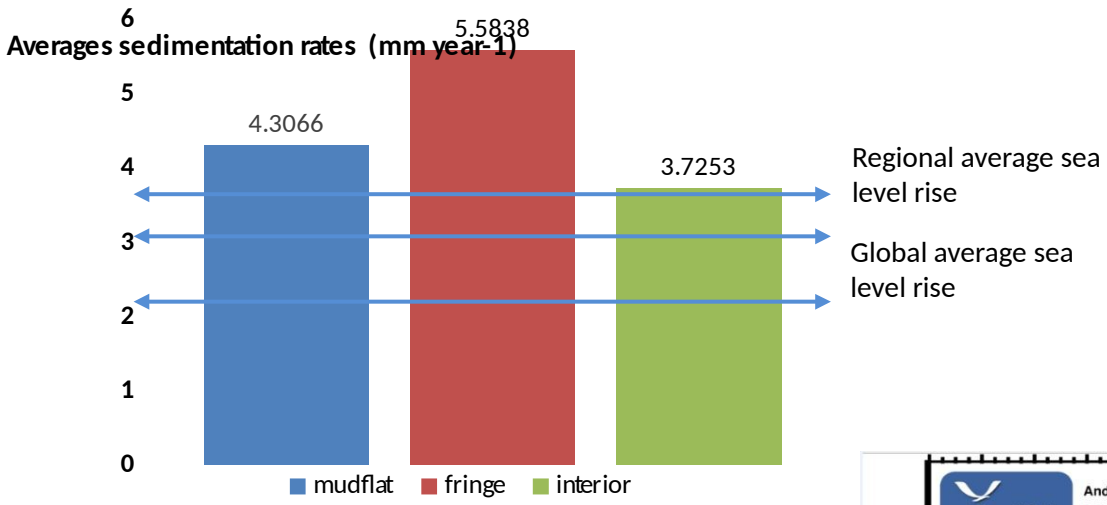


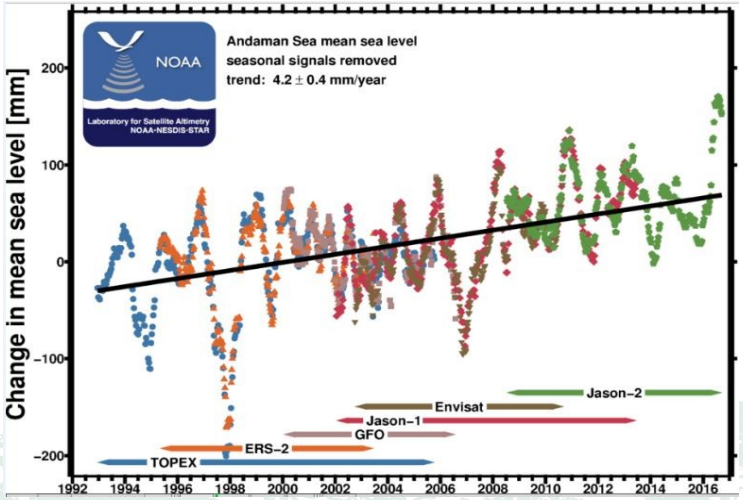
Mudflat zone

Sediment and C-stocks measurements in SEA



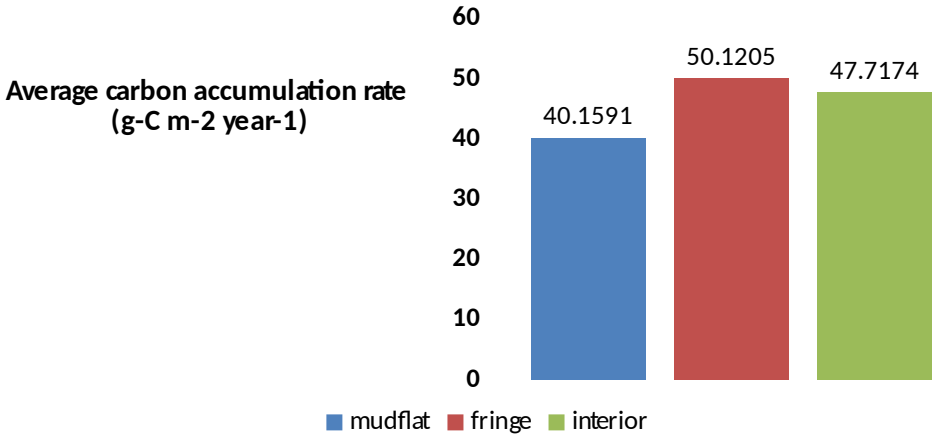
Sedimentation rate vs sea level rise

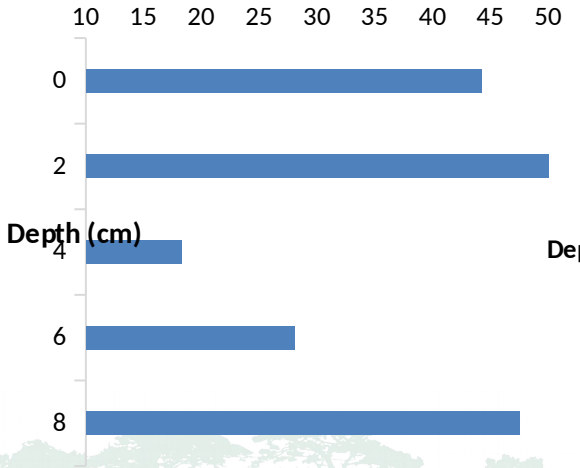




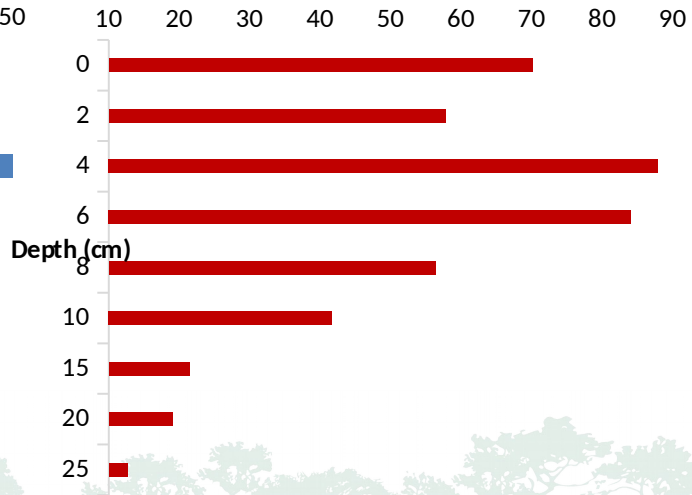
Source: *star.nesdis.noaa.gov*

Soil carbon accumulation rate

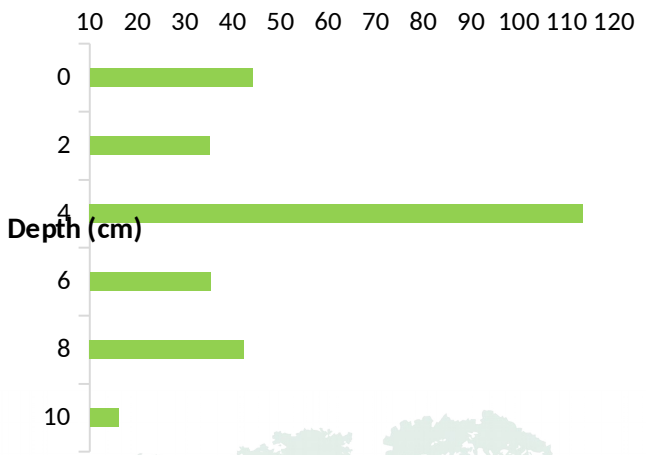




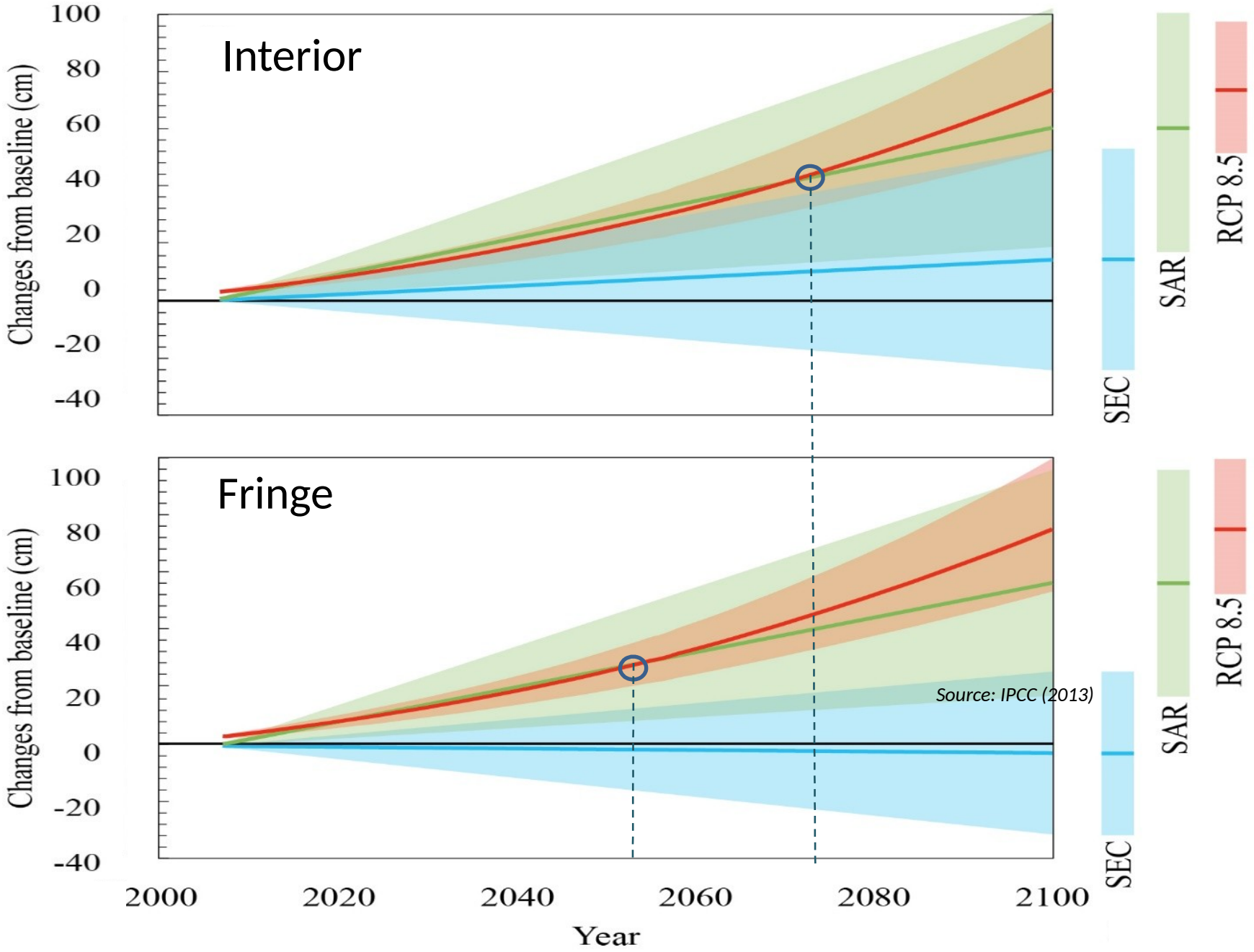
Mudflat



Fringe



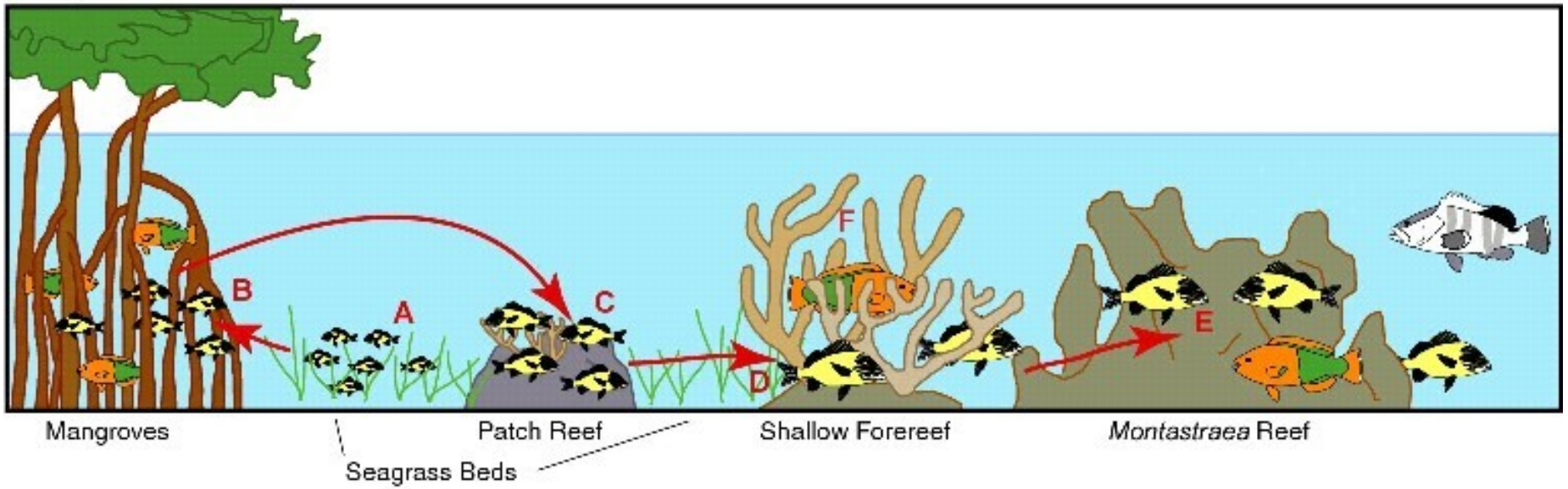
Interior



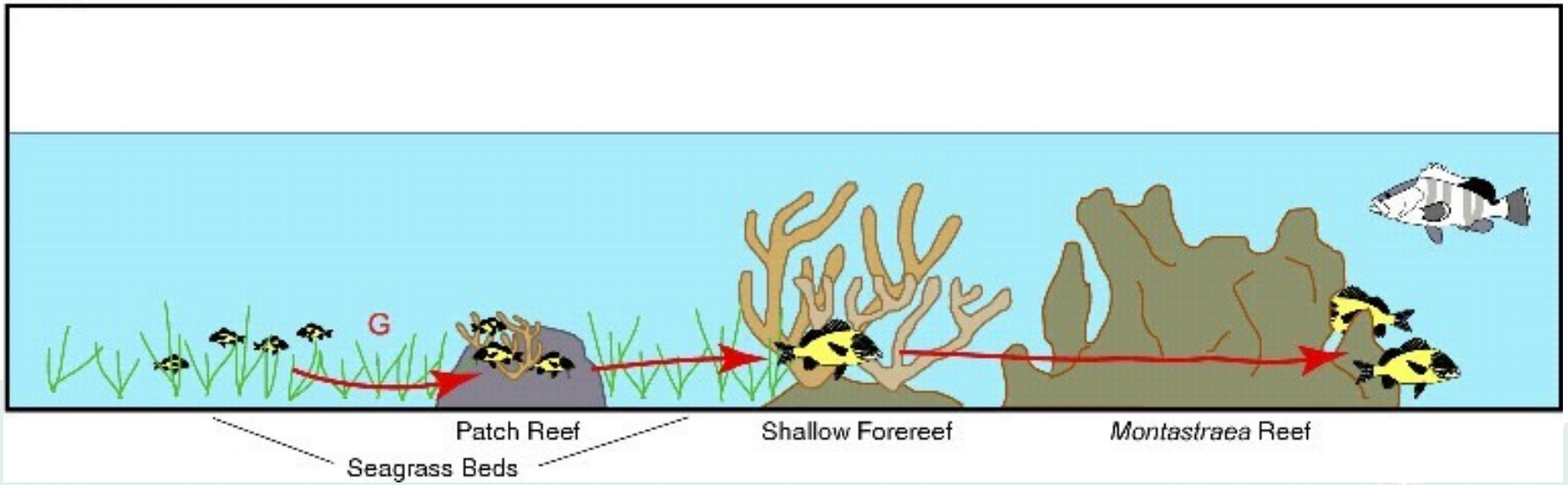
Sasmito et al. 2016

Provisioning and cultural services

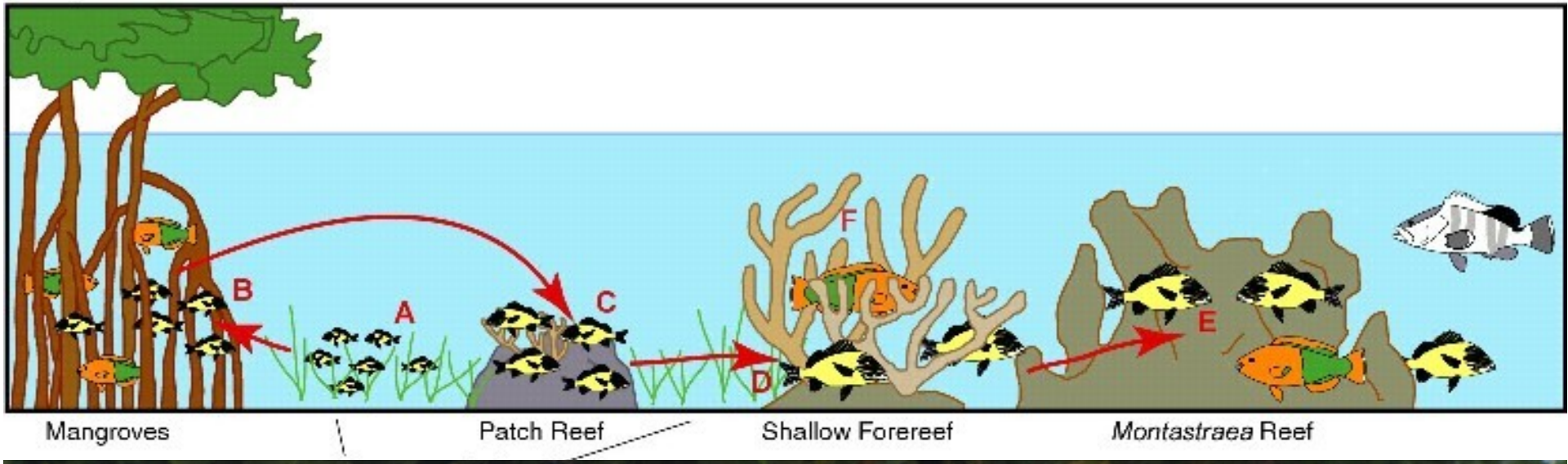
Mangroves Present



Mangroves Absent



Mangroves Present

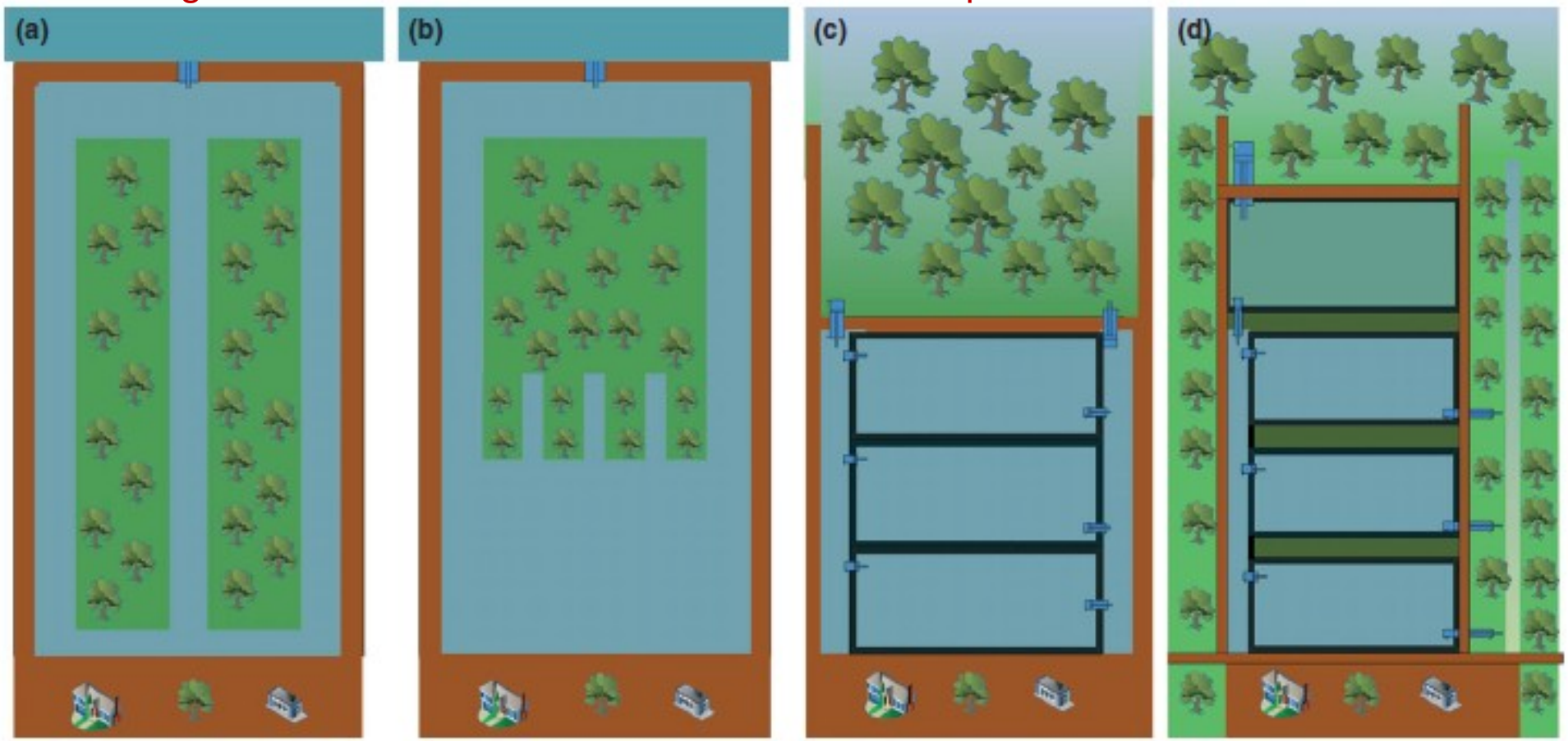


Sustainable Development Goals

By 2020, sustainably manage and protect **marine and coastal ecosystems** to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans

New approaches for restoration and sustainable management

- Integrating science with local objectives

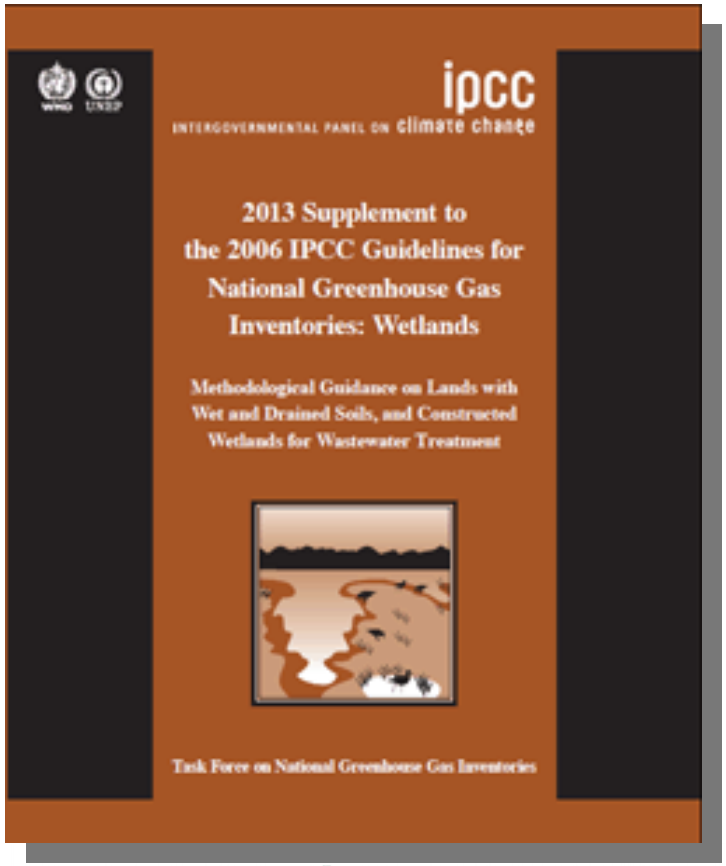


Bosma et al. 201

Paris Agreement

- NDC (Art.4)
- REDD+ (Art.5)
- Adaptation (Art.7)
- Loss and Damage (Art.8)
- Green Climate Fund (GCF)
- Global Environment Facility (GEF)
- Special Climate Change Fund (SCCF)
- Global Environmental Facility (GCF)

Methodology - reporting



1. Introduction
2. Drained Inland Organic Soils
3. Rewetted Organic Soils
4. Coastal Wetlands
5. Inland Wetland Organic Soils
6. Constructed Wetlands for Wastewater Treatment
7. Cross-cutting Issues and Reporting

BLUE CARB

http://bluecarbonpartnership.org/

Mainstreaming “blue carbon” – Marrakech COP22

AHAN IKLIM

ɔon Biru Berpotensi Tak Masuk NDC

ESH, KOMPAS — belum menempatkan an ekosistem mang- ai bagian komitmen emisi gas rumah kaca. nya jauh lebih sedikit utan daratan, mang- mun memiliki fungsi karbon amat tinggi. negara punya potensi , 50 di antaranya me- lam NDC (komitmen emisi). Indonesia tak 50 negara itu," kata diyarso, peneliti seni- Riset Kehutanan In- (Cifor), Selasa (15/11), si "Karbon Biru" di donesia, di sela-sela Perubahan Iklim erti dilaporkan war- *pas*, **Ichwan Susanto**, sh, Maroko. disayangkan karena nemiliki 17-20 persen karbon biru dunia atau 3,14 giga ton setara karbon dioksida. Mengutip Kementerian Kehutanan 2009, luas hutan mangrove di Indonesia 2,9 juta hektar (ha).

Angka deforestasi 52.000 ha per tahun untuk kegiatan tambak, infrastruktur pesisir, dan permukiman. Meski deforestasi itu 6 persen dari deforestasi di hutan daratan, emisi gas rumah kaca yang dilepas deforestasi mangrove hingga 30 persennya.

Stok karbon

Ekosistem mangrove terdiri atas tanaman berbatang kecil, tetapi menyimpan stok karbon tinggi di bawah tanah. Stok karbon di bawah tanah 80 persen dari seluruh ekosistem mangrove. "Untuk *sea grass* (lamun) sama dengan mangrove, stok karbon banyak di bawah tanah," ucapnya.

Potensi penyimpan karbon, secara global *blue carbon* 6-40 miliar dollar AS. Perlindungan ekosistem gambut dirasakan manfaatnya oleh masyarakat pesisir karena ekosistem itu jadi lokasi perkembangbiakan ikan komersial dan benteng alami pesisir dari kenaikan muka laut.

Karbon biru seperti mangrove secara saintifik termasuk hutan, sehingga bisa masuk skema penurunan emisi lewat pengurangan deforestasi dan degradasi hutan (REDD+). "Tergantung pemerintah melihatnya. Kalau tak dianggap jadi bagian *land use*, sulit (masuk REDD+)," ucapnya.

Menurut Dirjen Pengendalian Perubahan Iklim KLHK Nur Masripatin, karbon biru seperti mangrove bisa masuk NDC Indonesia. "NDC itu *living document* sehingga bisa direvisi," katanya.

MEDIA

l Butuh Skema Perlindungan Karbon Biru

NESIA memiliki 17%-20% cadangan *carbon (*karbon biru*)* dunia. Na- hingga kini belum ada peta jalan ıdungannya yang terkandung dalam stem mangrove dan padang lamun ɔut. Secara global, sebanyak 151 ne- memiliki karbon biru, tetapi hanya ng memasukkan perlindungannya ke ibusi nasional yang diniatkan untuk ırangan emisi (NDC).

cara total terdapat potensi US$6 miliar ai US$40 m dari *market capture global*, ıdonesia yang memiliki hampir seper- ɛarbon biru dunia ada potensi US$6 m ;a US$12 miliar," ucap Peneliti Senior r for International Forestry Research r) Daniel Mudiyarso saat ditemui ıawan *Media Indonesia* **Richaldo Y ındja,** di Konferensi Perubahan Iklim CoP) ke-22, di Marrakesh, Maroko.

Menurut catatan, tiap tahunnya terjadi deforestasi 52 ribu hektare (ha) kawasan ekosistem yang mengandung *blue carbon*. Karena itu, diperlukan instrumen khusus untuk melindunginya. Langkah itu bukan hanya melindungi pemangkasan mangrove, tetapi juga lumpur yang menjadi tempat mangrove tumbuh di pesisir pantai. Secara alamiah, para peneliti mendefinisikan mangrove sebagai hutan.

Sekema perlindungan karbon biru, lanjut Daniel, dapat dimasukkan ke skema Pengurangan Emisi dari Deforestasi dan Degradasi Lahan (REDD+).

"Kalau *blue carbon* termasuk *ocean*, itu akan sulit masuk. Sebabnya, REDD itu hutan, kalau sektor melihat mangrove sebagai hutan, bisa masuk REDD+. Namun, kalau tidak dianggap sebagai *land use sector*, akan sulit," terang dia.

Di tempat yang sama, Menteri Lingkungan Hidup dan Kehutanan Siti Nurbaya Bakar menyatakan pemerintah Indonesia akan memasukkan perlindungan mangrove ke dokumen NDC.

Menurutnya, ekosistem mangrove sangat tepat didefinisikan sebagai kawasan hutan. Siti menyatakan telah mengadakan pembicaraan dengan Menteri Lingkungan Hidup Australia untuk mengambil peran bersama dalam membangun kesadaran terhadap perlindungan mangrove. Pasalnya, 10% ekosistem mangrove dunia berada di Australia.

"Mangrove yang masuk skema penurunan emisi dari sektor lahan akan menyumbang 17% reduksi emisi dalam NDC. Kalau di dalam negeri, saya akan lihat wilayah KLHK dan Kementerian Kelautan dan Perikanan (KKP)." (X-7)

Concluding remarks

- Costal Blue Carbon, including mangroves and segrass meadows have huge potential for CC A&M
- Promoting ES provided by coastal BC is timely
- Managing coastal BC including restoration are biophysically and socially complex but possible
- Coastal BC is globally recognized and should be mainstreamed in the (sub)national agenda

Thank you

www.cifor.org/swamp

CIFOR CGIAR

CGIAR RESEARCH PROGRAM ON Forests, Trees and Agroforestry