Blue Carbon: Important Missing Sinks and Sources

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CONSERVATION INTERNATIONAL

Coastal Wetlands

LONG-TERM CARBON SEQUESTRATION AND STORAGE

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Mangroves and emissions.

Global extent of mangroves: 137,760 km^2
    declined by 30–50% in the last 50 years

Global C emissions from mangrove conversion: 0.02 – 0.12 Pg C yr^{-1}

(Giri et al 2011, Donato et al 2011)

Global forest net Carbon sink
    = 1.1 Pg C y^{-1}
Tropical deforestation net
emissions = 1.3 Pg C y^{-1}

Pan et al. (2011)

Seagrasses and emissions.

Global extent of Seagrasses: 300,000-600,000 km^2 of seagrasses declined by 1.5% y^{-1} over last 100 years

Global C emissions from seagrass conversion: 0.06 – 0.3 Pg C yr^{-1}

Fourqurean et al (2012)

Global forest net Carbon sink = 1.1 Pg C y^{-1}
Tropical deforestation net emissions = 1.3 Pg C y^{-1}

Pan et al. (2011)

Ecosystem Services

# GHG Sequestration and Emissions from Terrestrial Ecosystems

Tropical forests are being lost at ~0.5% per year

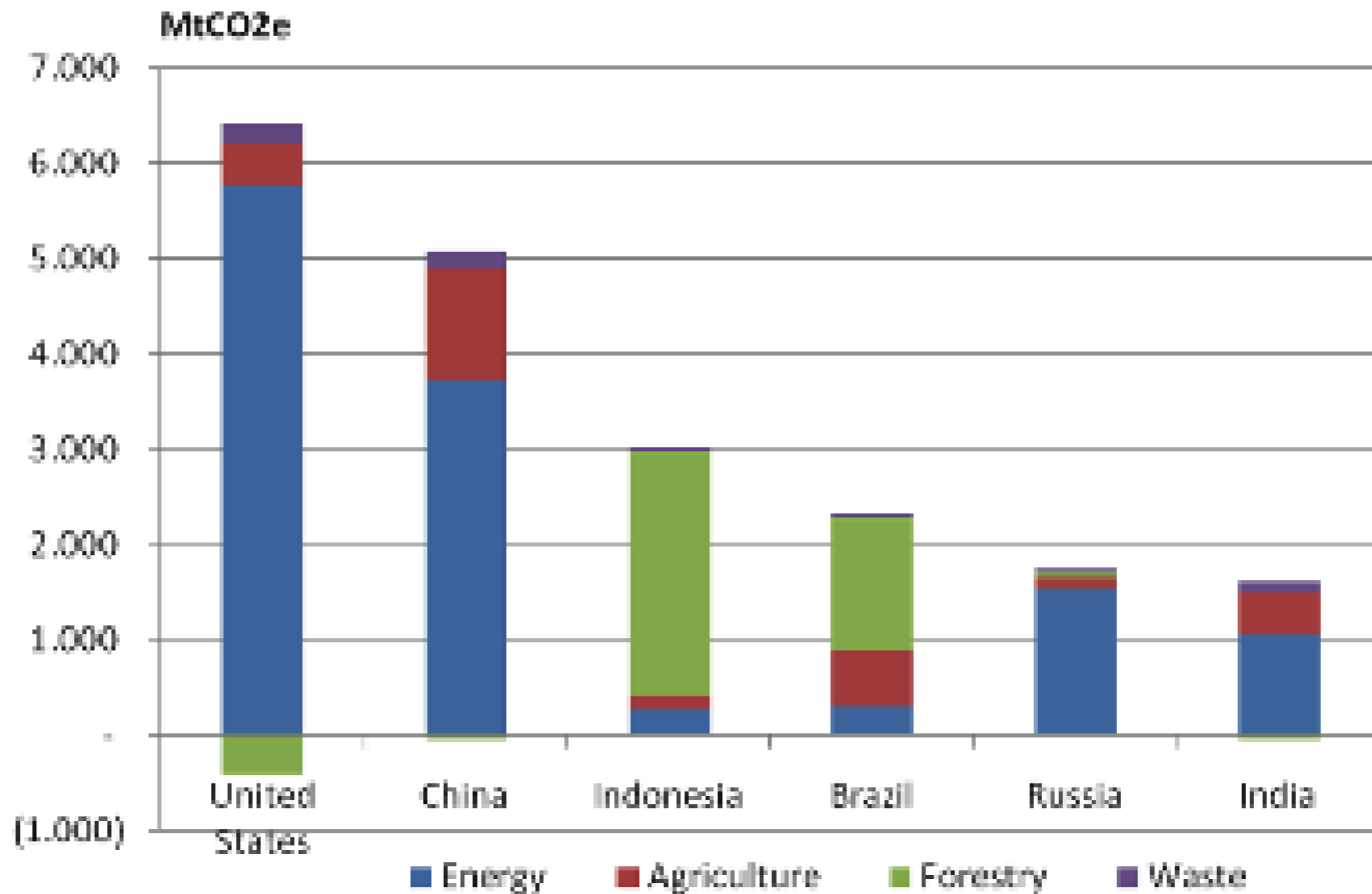Deforestation and forest degradation contribute ~12-20% GHG emissions annually

- Carbon offset projects planting millions of trees per year
- Increased recognition of the importance of forests for GHG sequestration   Eg. UNFCCC
- Market/financial incentives to reduce GHG emissions from deforestation and degradation (REDD+ etc.)

Terrestrial carbon and biodiversity richness

Strassburg *et al (2010)*
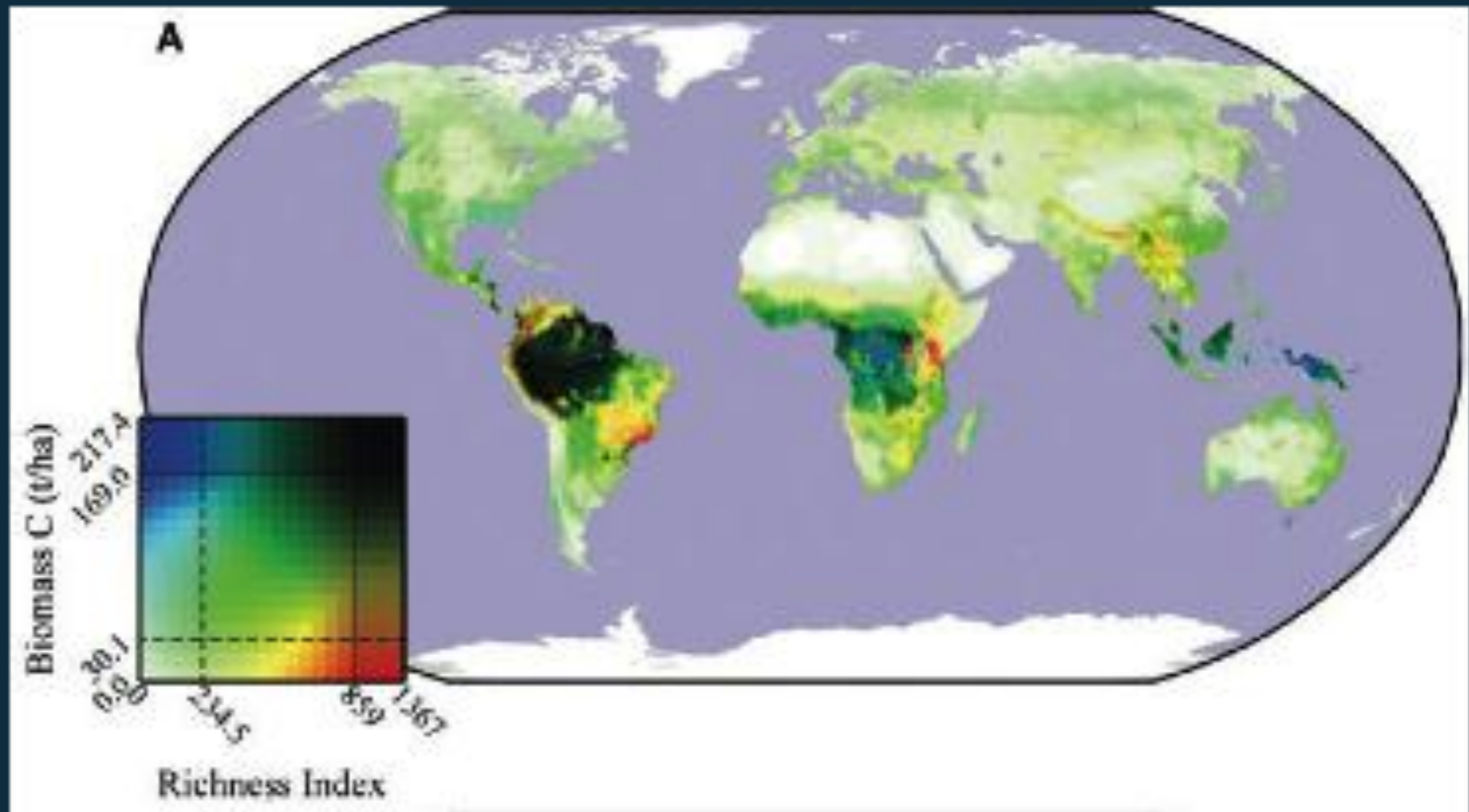
Largest GHG emitters

Indonesia: An urgent priority and opportunity

Deforestation and degradation
= 85% of Indonesia's annual CO2 emissions

In next 10 years (by 2020):
9 million ha of fiber plantations
10 million ha of new oil palm plantations

Voluntary commitment to reduce
GHG emissions by 26%, or
Up to 41% with international aid

To date
A National Carbon Accounting System (NCAS)
Multiple forest carbon pilot projects recognized by
   the government

Alto Mayo Forest Conservation Initiative : An Example

350,000 hectares of threatened forests in northwestern Peru

Current deforestation rate in the project area = 0.35%/year
= 520,000 tons of carbon emissions per year

Conservation agreements include:
    forest protection, reforestation and agroforestry
    reduce carbon emissions by 4.2 million tons over 30 years.

Can "blue" carbon leverage better management, conservation and restoration of coastal ecosystems?

Increase recognition of mitigation value
- National policy and action
- International policy through IPCC, UNFCCC

Improve management and regulation
- actions that maintain stored carbon, minimise emissions

Provide basis for incentives to conserve or restore
- philanthropic giving
- conservation / development incentive agreements
- financial incentives for carbon credits (e.g. Voluntary Carbon Market)

The Blue Carbon Initiative

Increased conservation, restoration and sustainable management of coastal Blue Carbon ecosystems

- International Blue Carbon Science Working Group
- International Blue Carbon Policy Working Group
- Blue Carbon research projects
- Demonstration projects
- Capacity building

Need to establish the Scientific basis for Blue Carbon

What is the rate of carbon sequestration by coastal ecosystems? And the resulting carbon stocks ?

What are the emissions resulting from clearing or degradation of coastal ecosystems?

Does restoration of coastal ecosystems impact emissions?

Recent papers:
  Lovelock et al (2011)
  Donato et al (2011)
  Donato et al (2012)
  Fourqurean et al (2012)

IPCC revising national GHG accounting guidance with improved consideration of wetlands

Peatlands
Coastal wetlands
Other wetlands

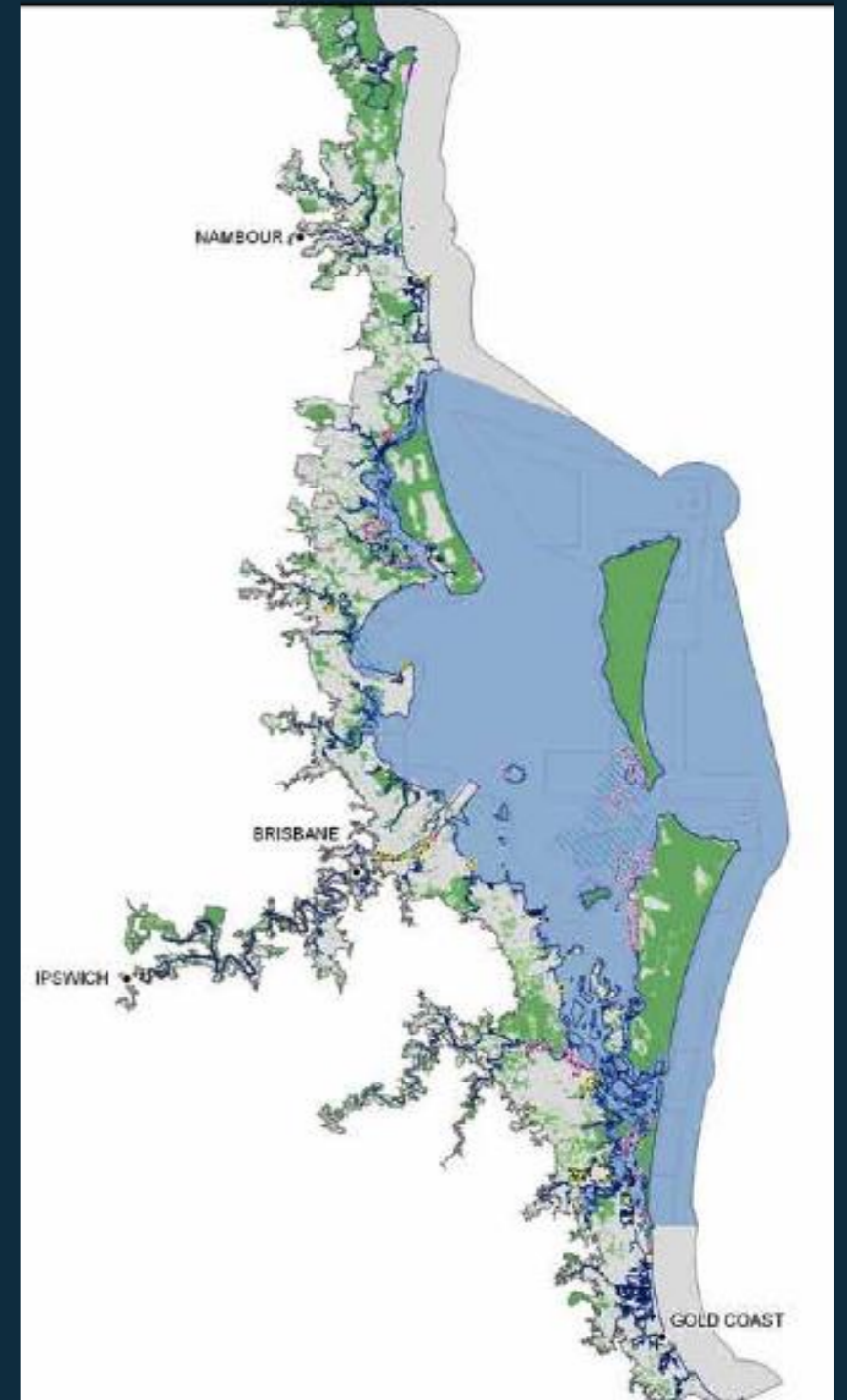Due 2013

Needed Data – GHG Emissions

Estimates of CO_2 efflux from mangroves and similar systems with peat soils

Habitat	Modification	CO_2 efflux tonnes km^{-2} $year^{-1}$	Method	Reference
Mangrove, Belize	Cleared	2900	CO_2 efflux	THIS STUDY
Mangrove, Honduras	Forest damaged by hurricane	1500	Inferred from peat collapse	Cahoon et al. 2003
Mangrove, Australia	Shrimp pond	1750 (220-5000)	CO_2 efflux	Burford and Longmore 2001
Rainforest, Indonesia	Drained for agriculture	3200	Inferred from peat collapse and measured as CO_2 efflux	Couwenburg et al. 2010 and references therein
Tundra, Alaska	Thawed	150-430	CO_2 efflux	Schuur et al. 2009

Lovelock et al., 2011

Coastal Planning and Management

Integrate conservation and restoration of coastal carbon systems into
- National coastal and marine policy
- Climate Policy
- Local and regional coastal planning and management
- National inventories of coastal carbon systems