Blue Economy and Blue Carbon

EAS CONGRESS 2018
THE EAST ASIAN SEAS CONGRESS

Ocean… the new frontier

Beyond fish and ships, our oceans provide…

CLIMATE REGULATION

70%

Covering 70% of the earth's surface, the ocean transports heat from the equator to the poles, regulating our climate and weather.

THE AIR WE BREATHE

>50%

The ocean produces over half of the world's oxygen and store 50 times more carbon dioxide than our atmosphere.

BLUE CARBON

Mangroves, seagrass and salt marshes **remove CO_2** from the atmosphere **10 times** more than a tropical rainforest – and **store 3 to 5 times more** carbon, thus decreasing the impacts of climate change.

Estimated blue carbon value in the EAS Region:

~ $111 B for mangroves

~ $77-95 B for seagrass

SHORELINE PROTECTION

Mangroves, seagrass and coral reefs are natural barriers… saving money and reducing impacts of storm surge, erosion and flooding.

- Coral reefs reduce 97% of wave energy.
- Mangroves reduce 66% of wave height.

OCEAN ENERGY

5x

The ocean can produce **thermal energy** from the sun's heat, and **mechanical energy** from the tides and waves. It is estimated that 0.1% of the energy in ocean waves could be capable of supplying the entire world's energy requirements five times over.

OFFSHORE WIND POWER

Higher wind speeds are available offshore compared to on land.

HOME

The East Asian Seas (EAS) region is home to 35% of the world's mangroves, 33% of seagrass beds, and 33% of the world's coral reefs, supporting diverse species of flora and fauna, and an array of ecosystem services.

FOOD

15% of animal protein comes from fish. Countries of the EAS region account for:

63% of total global fisheries

40% of world's capture fisheries = $35 B

80% of world's aquaculture = $100 B

TRADE AND TRANSPORTATION

90%

The East Asian Seas serve as conduit of 90% of world trade through shipping.

TOURISM AND RECREATION

>$200B

in tourism revenues. The EAS region account for 26% of worldwide tourist arrivals.

Swimming, boating, snorkelling, diving, dolphin and whale watching… the ocean provides us with so many unique amenities and activities.

OIL AND GAS

$34 B

There are around 1400 offshore oil and gas platforms in the EAS region… with production of 2 million barrels of oil per day.

INCOME AND JOBS

$1.4 T

The ocean economy contributes

3% - 87% of the GDP

of five countries in the EAS region.

MEDICINE

Many medicinal products come from the ocean, including ingredients that help fight infection, cancer, arthritis, heart disease, and Alzheimer's disease.

Ocean as source of income, livelihood, jobs

Ocean Economy

Fisheries and aquaculture

Ports and shipping

Coastal and marine tourism

Marine manufacturing: seafood processing; ship-building; biotechnology

Offshore oil and gas

Marine construction

Energy

Water

Marine business and services

Marine education, and R&D

Ocean as driver of innovations and growth

BLUE ECONOMY

Food security

Climate-smart aquaculture
Marine ranching
Crab condominium
Sustainable tuna fisheries

Desalination
Wastewater reuse

Water security

Blue Carbon
Green Ports

Climate Action

Energy security

Ocean energy
Offshore wind power
Floating solar farms

Marine biotechnology

Drugs and Food

Ocean as natural capital

Major coastal ecosystems – What is the value?

Near-shore terrestrial

- Dunes, cliffs, rocky and sandy shores, coastal xeromorphic habitats

Intertidal

- Estuaries, deltas, lagoons, mangrove forests, mudflats, salt marshes

Benthic

- Kelp forests, seagrass beds, coral reefs, and soft bottom environments

Pelagic

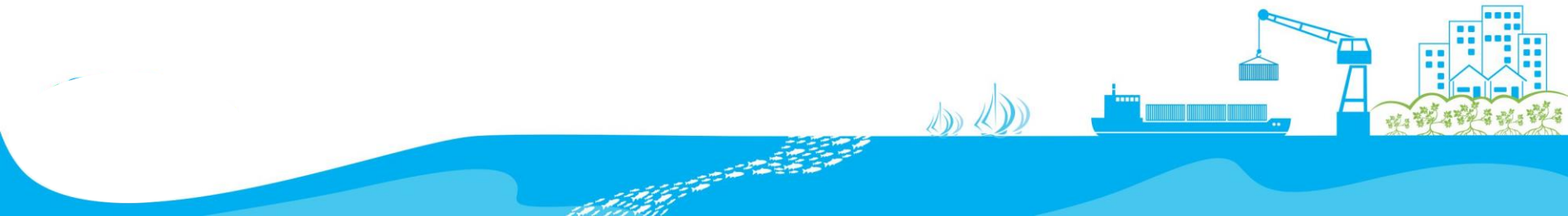
- Open waters above the continental shelf

Why value coastal and marine resources?

- **Coastal ecosystems in the EAS region are one of the most productive and biologically diverse in the world.**

- **Coastal ecosystems in the EAS region are under severe stress from human over-exploitation, physical disturbance, pollution, sedimentation, and general neglect.**

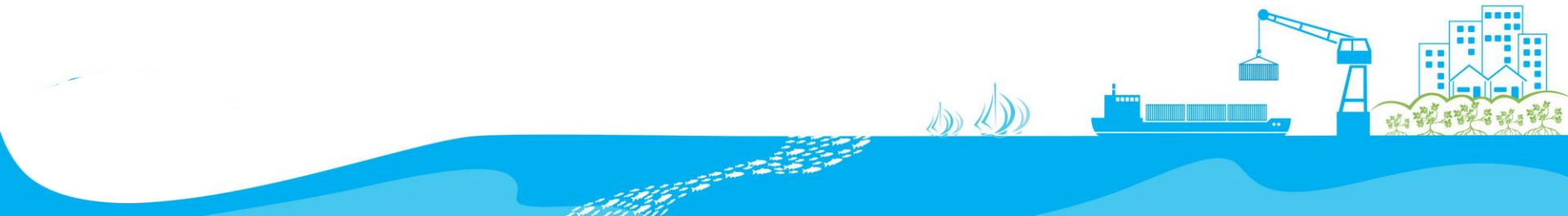
- **Improved management of coastal ecosystems through putting economic values on their presence, products and uses**



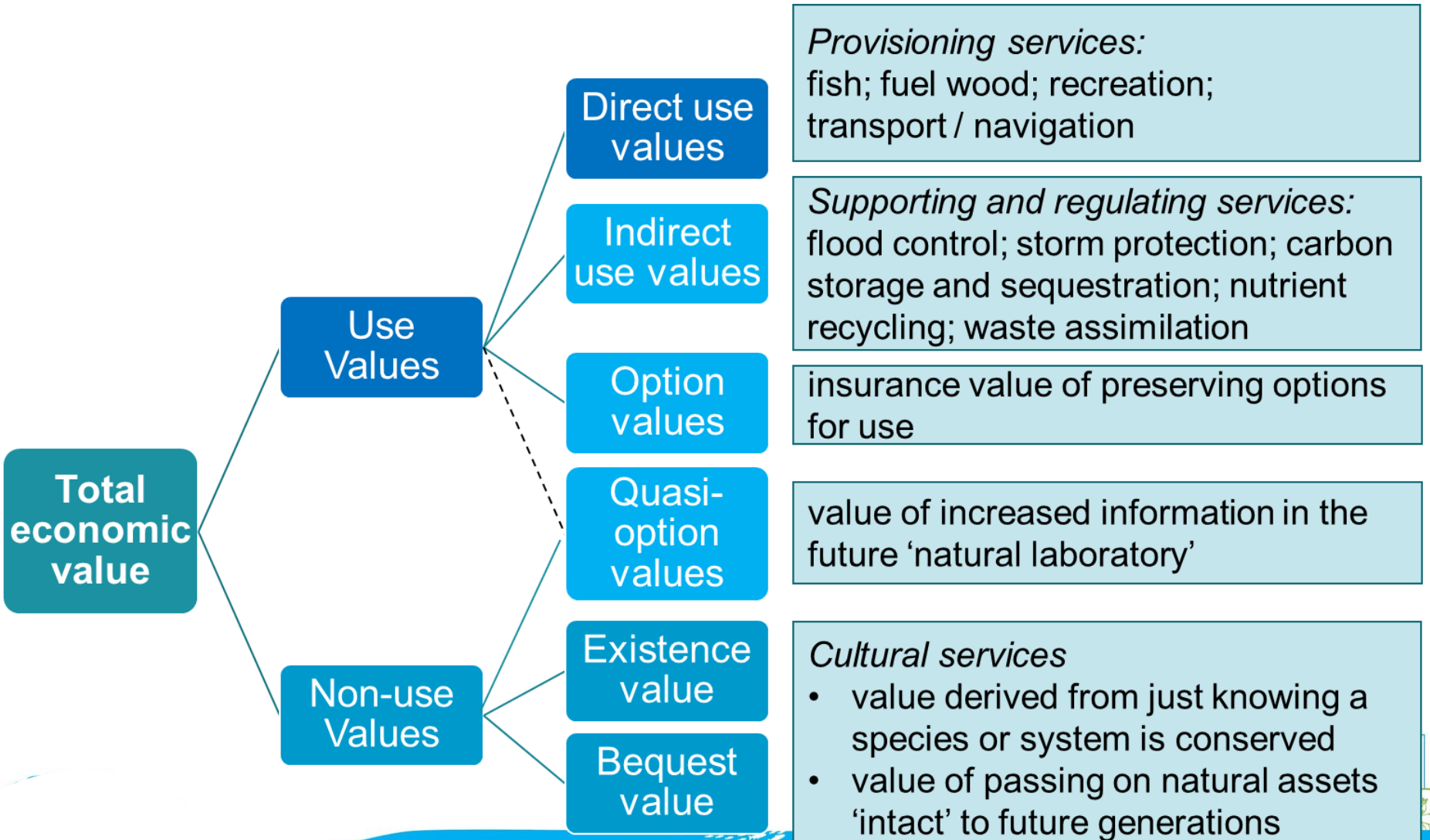
Irreversibility

- Each choice or option for the environmental resource – to leave it in its natural state, allow it to degrade, or convert it to another use – has implications in terms of values gained and lost.

- The decision as to what to pursue and whether current use or rates of resource loss are excessive – can be made only if these gains and losses are properly analyzed and evaluated.



Total economic value



Economic Value of Wetlands

Direct use	Indirect Use	Option	Existence
Fish	Nutrient retention	Potential future uses	Biodiversity
Agriculture	Flood control		Heritage
Fuel/wood	Storm protection	Future value of information	Bequest
Recreation	Groundwater recharge		
Transport	External ecosystem support		
Wildlife	Micro-climatic		
Harvesting	Shoreline protection		
Peat/energy	Stabilization, etc		

Valuation methods

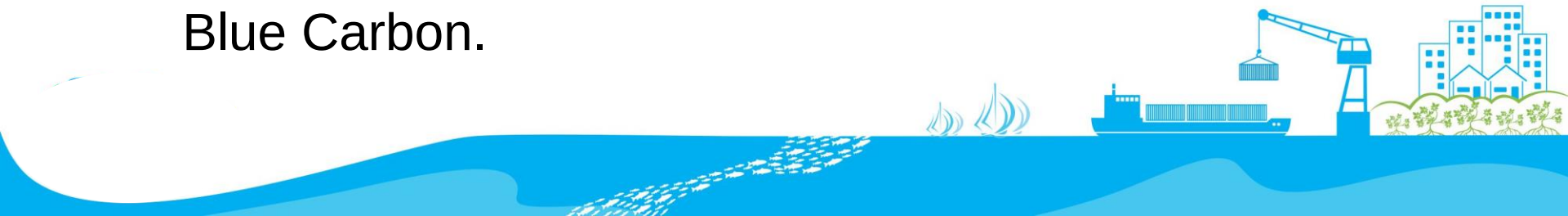
Provisioning	• Fish and seafood • Water • Medicines • Fuelwood	**Direct Value**	Market analysis; Travel cost method (TCM); Hedonic pricing (HP); contingent valuation method (CVM); indirect substitute (IS)
Supporting	• Nutrient cycling • Primary production • Habitat for species • Genetic diversity	**Indirect Value**	Shadow prices; Damage cost avoided; Preventive expenditures; Value of changes in productivity (relocation costs; replacement costs)
Regulating	• Climate regulation • Carbon sequestration • Shoreline protection • Water purification	**Option Value**	CVM
Cultural	• Recreational • Educational • Spiritual • Aesthetic	**Existence Value** **Bequest Value**	Market analysis; TCM, CVM

What is Blue Carbon?

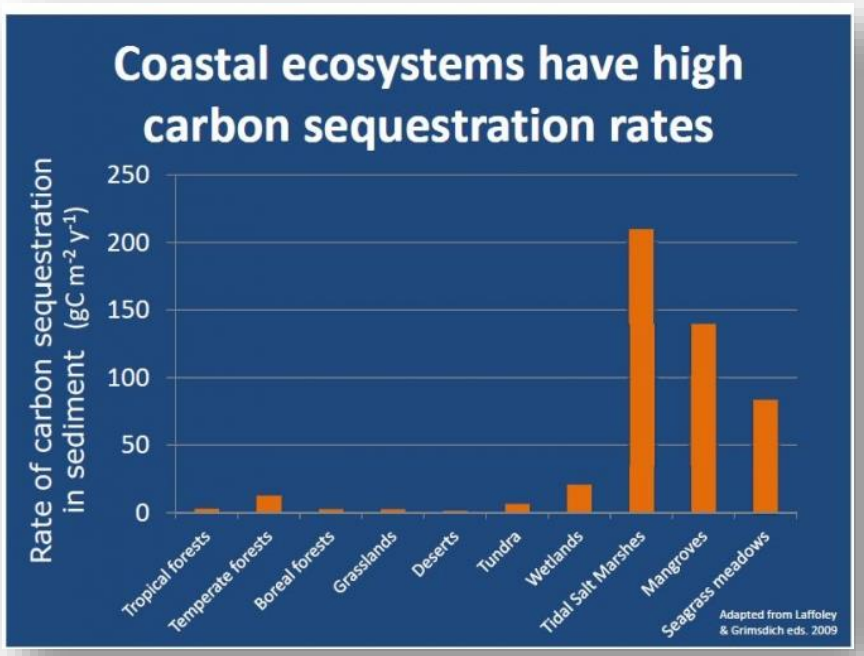
- Through photosynthesis and other natural processes mangroves, tidal marshes and seagrasses remove carbon dioxide from the atmosphere and ocean, storing it as carbon in biomass and soil.

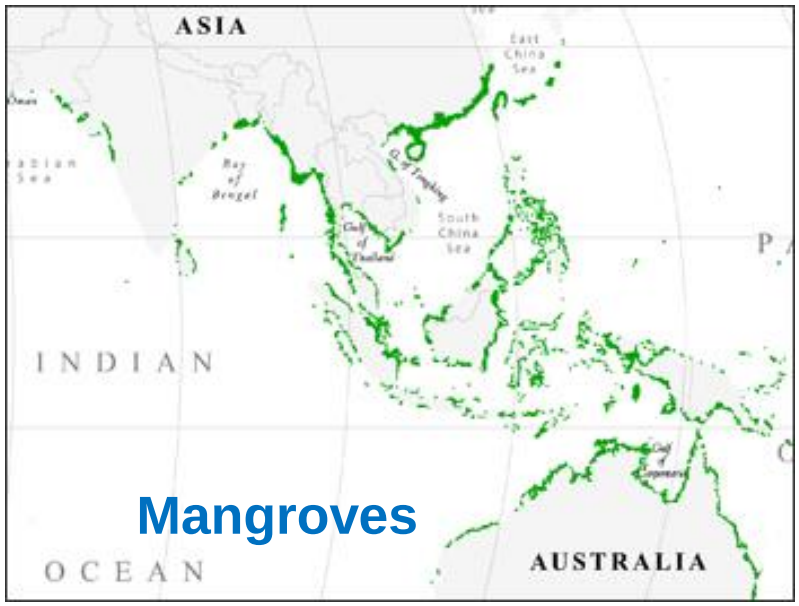
- These ecosystems are sequester vast amounts of carbon – each hectare can sequester carbon at rates higher than each hectare of mature tropical forest.

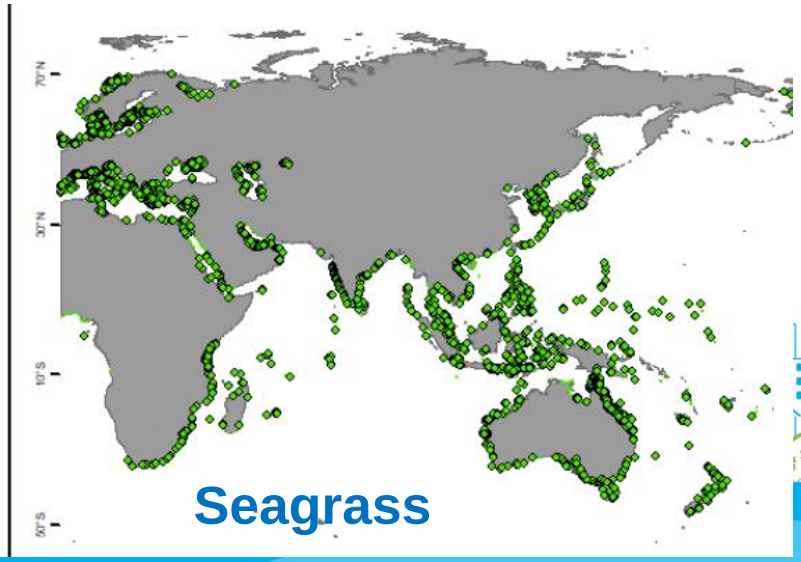
- This ‘commercialisation’ of the sequestered carbon in these coastal and ocean ecosystems is referred to as Blue Carbon.



The Opportunity

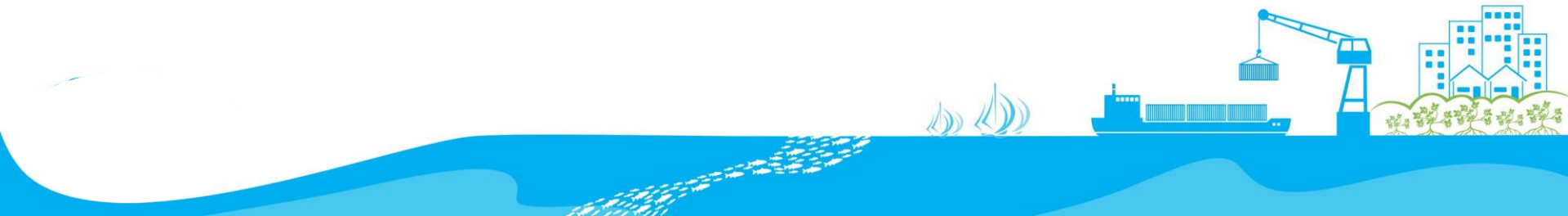






The Challenge

- Blue Carbon can be thought of as a means to incentivise habitat protection – Government see it as a preferred mechanism to encourage conservation and sustainable development.
- However, the challenge is to make Blue Carbon work ‘on the ground’.
- While emissions from the degradation and clearance of mangroves can be calculated with some confidence, existing international standards do not allow the estimation of emissions ‘removals’, therefore the quantification of carbon revenue streams is difficult and costly.
- Also, the global carbon price has been volatile in recent years.



More than blue carbon

Valuing co-benefits

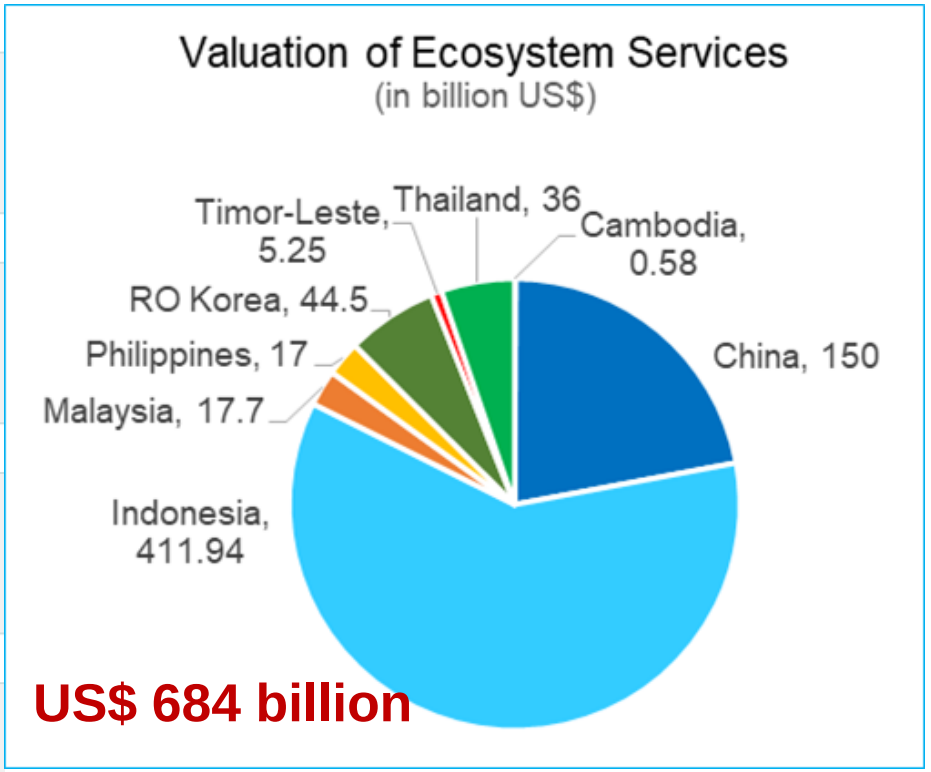
	Carbon	Shoreline Protection	Fish Nursery Habitat	Biodiversity	Water Quality
Mangroves	Store carbon in aboveground tree biomass as well in belowground roots and soils	Absorb and wave and wind energy; reduce erosion and storm surges; accrete sediment for adaptation to sea level rise	Form part of a network nursery habitats, refugia, and feeding grounds for many tropical fish species and invertebrates (e.g., shrimp, crabs and bivalves)	Maintain important and high land (e.g., birds and mammals) , coastal (invertebrates and fish), and ocean (e.g., coral reefs as part of the complex of tropical ecosystems) biodiversity	Filter pollution and waste (solid and dissolved), treat excess nutrients (e.g., nitrogen and phosphorus from land) and trap sediments

- **Mapping of our coastal and marine ecosystems**
- **Assessment of the condition of habitats**
- **Evaluation of the carbon sequestration**
- **Valuing the potential blue carbon and ecosystem services**

Ocean as natural capital

Ecosystem Services

Provisioning	• Fish and seafood • Medicines • Timber; fuelwood
Supporting	• Nutrient cycling • Habitat for species • Genetic diversity
Regulating	• Climate regulation • Carbon sequestration • Shoreline protection • Waste assimilation
Cultural	• Recreational • Educational • Spiritual • Aesthetic



Blue carbon value (est):
Mangroves: $111 B
Seagrass: $77-95 B

Conclusion

- The concept of Blue Carbon is fast becoming mainstream, with public funding increasingly flowing into research to understand the potential, risks and economics. Progress at an international level is however slow…
- The lack of a global emissions reduction methodology and volatile carbon price for Blue Carbon is however hindering private sector investment – which is required to get it to scale.
- There is an enormous opportunity to sequester carbon in marine ecosystems while improving ecosystem services and flow-on long-term economic benefits.
- In this regard, our East Asian seas are likely to be an important supplier of Blue Carbon offsets in the coming years as the low-carbon economy matures.
- But first, we need to understand and measure the potential of Blue Carbon.