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The Economics of Coastal Blue Carbon

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Based on work by

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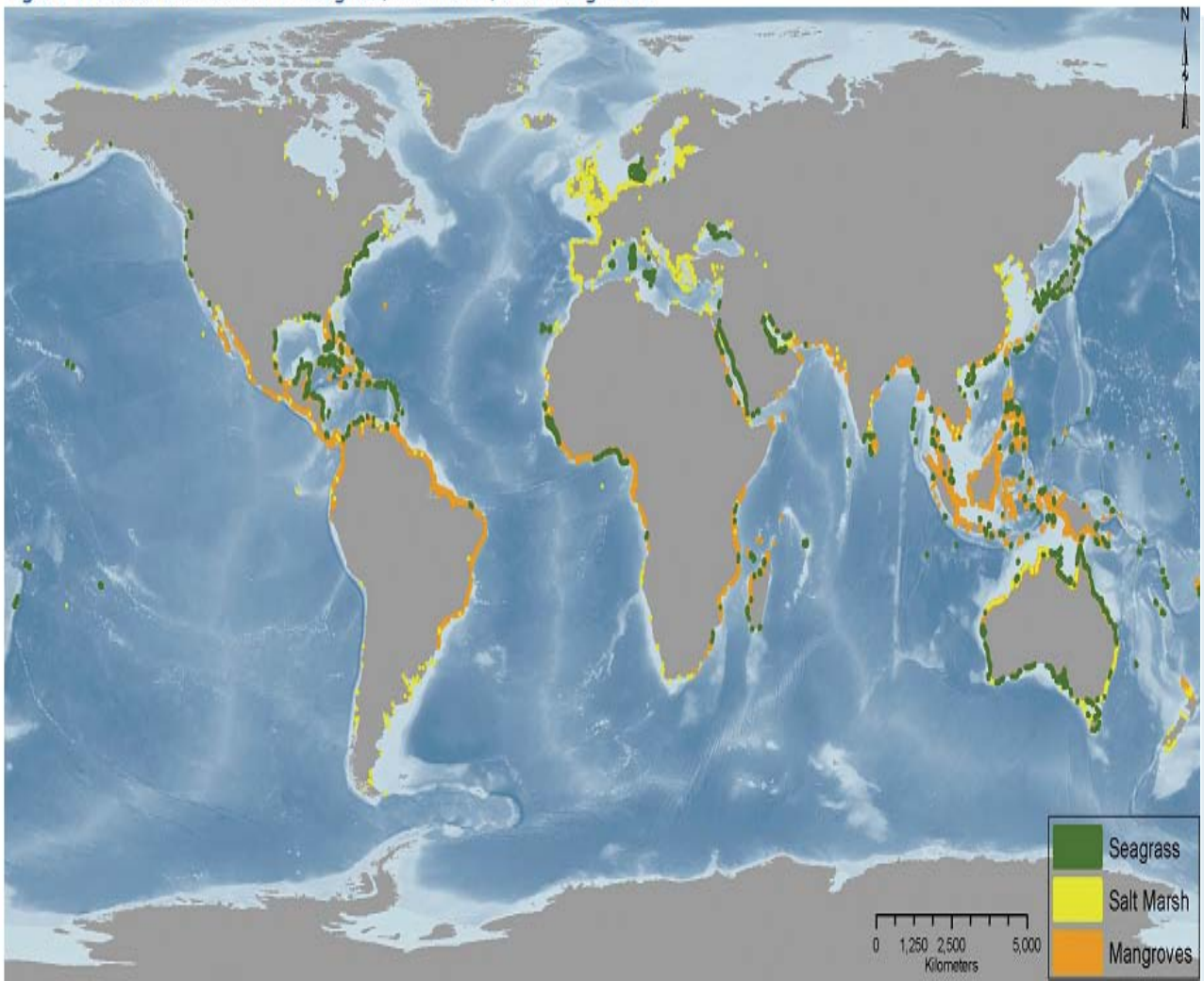
Coastal Blue Carbon Is Widespread

Figure 1. Global distribution of seagrass, salt marsh, and mangroves.



Seagrass meadows are communities of underwater flowering plants found in coastal waters of all continents except the Antarctic. There are more than 60 known seagrass species and up to 10 to 13 of them may co-occur in tropical sites.

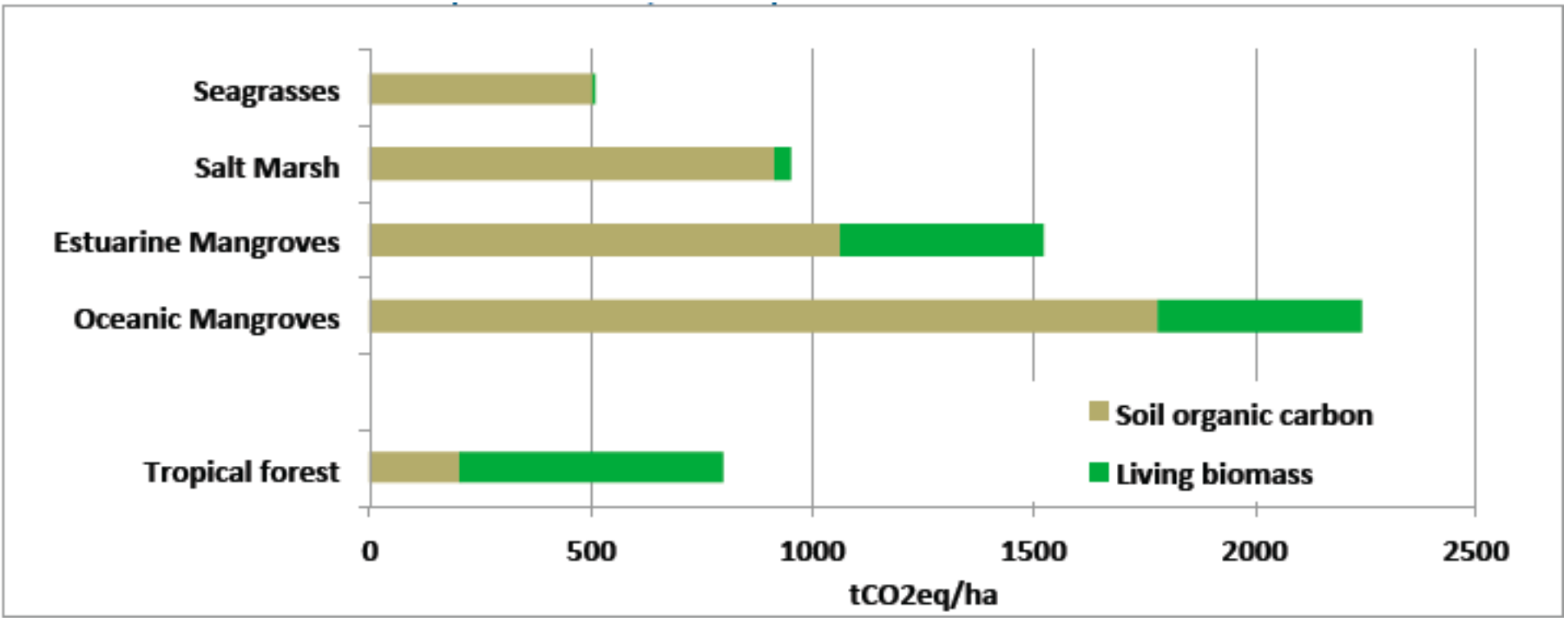
Tidal salt marshes are intertidal ecosystems occurring on sheltered coastlines ranging from the sub-arctic to the tropics, though most extensively in temperate zones. They are dominated by vascular flowering plants, such as perennial grasses, but are also vegetated by primary producers such as macroalgae, diatoms, and cyanobacteria.

Mangroves are salt-tolerant flowering plants, predominantly arboreal, that grow in the intertidal zone of tropical and subtropical shores. They are estimated to occupy almost 40% of tropical coasts worldwide, down substantially from 75% in the recent past.

The Blue Carbon Story

- Coastal ecosystems have value
  - "blue carbon"
  - ecosystem services
- Conversion due to economic pressures (aquaculture, agriculture, development,…)
- Carbon markets: New incentives to protect?
  - Payments for reducing conversion and restoration
  - Similar to forests (REDD+)

…Coastal Habitat Protects Massive Amounts of Carbon

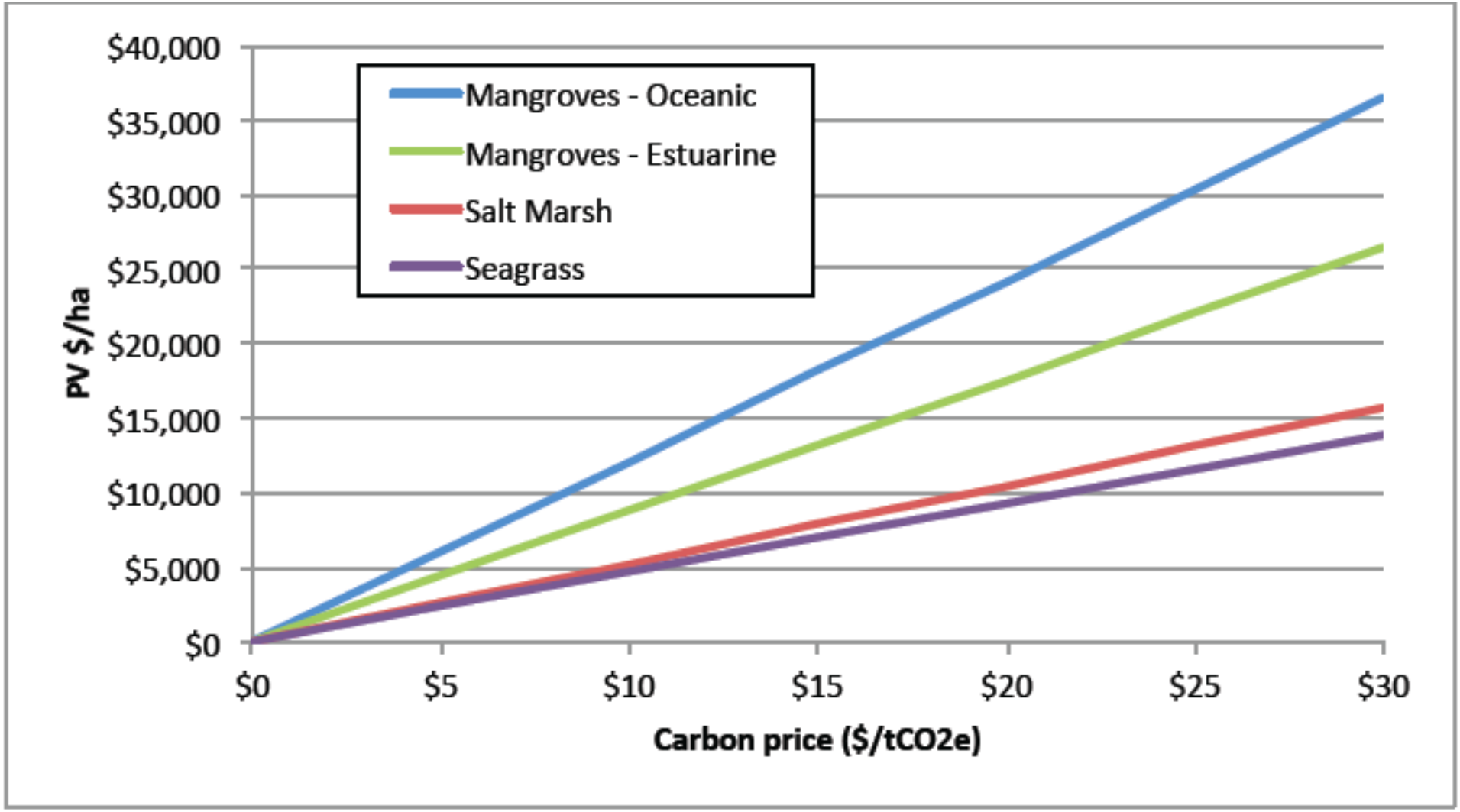


Soil carbon estimates for top meter.

What May Be Eligible for Crediting?

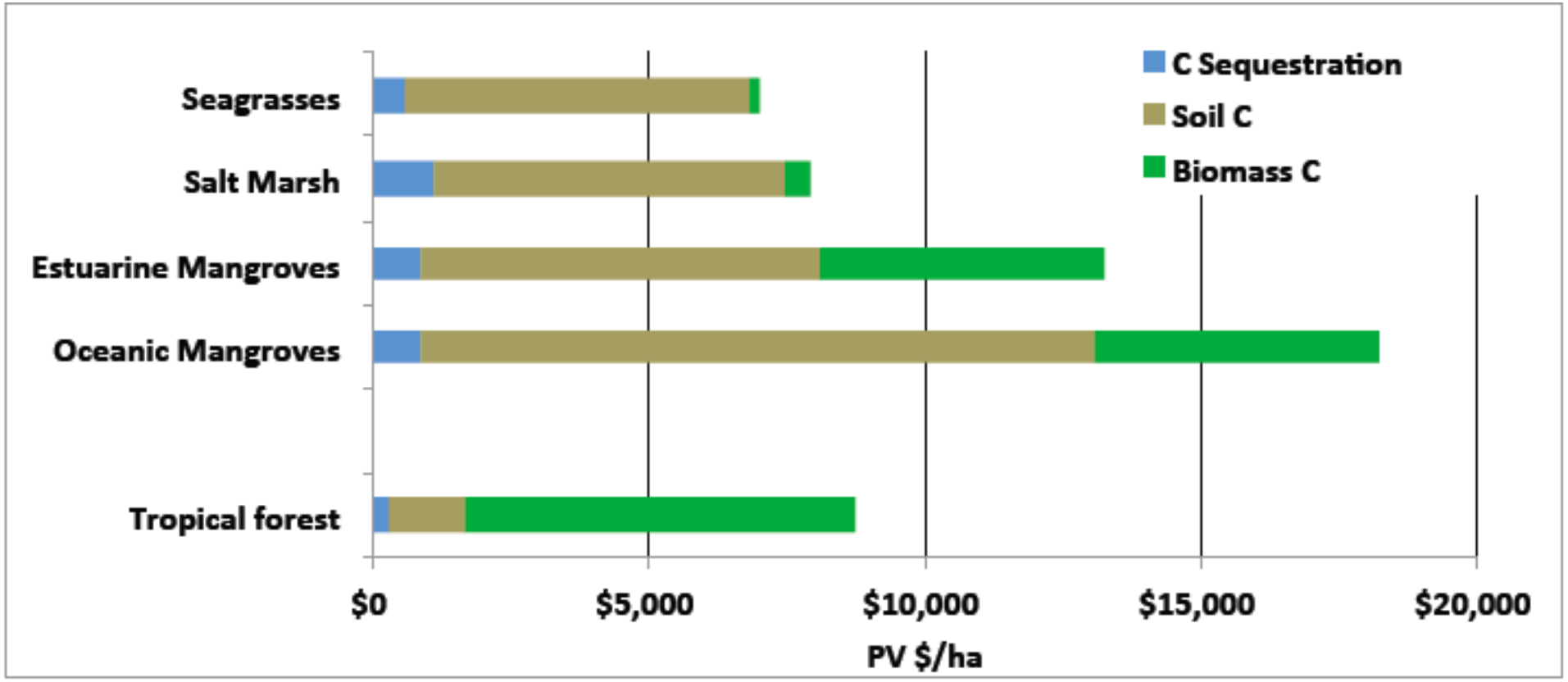
Potential Credit Source	Time Period	Ecosystems
Avoided Loss of Sequestration Flux	Perpetuity	Seagrasses Tidal Salt Marshes Mangroves
Avoided Emissions from Soil Carbon	Several Years to Decades	Seagrasses Tidal Salt Marshes Mangroves
Avoided Emissions from Biomass (REDD)	Immediate	Mangroves

Gross Financial Returns



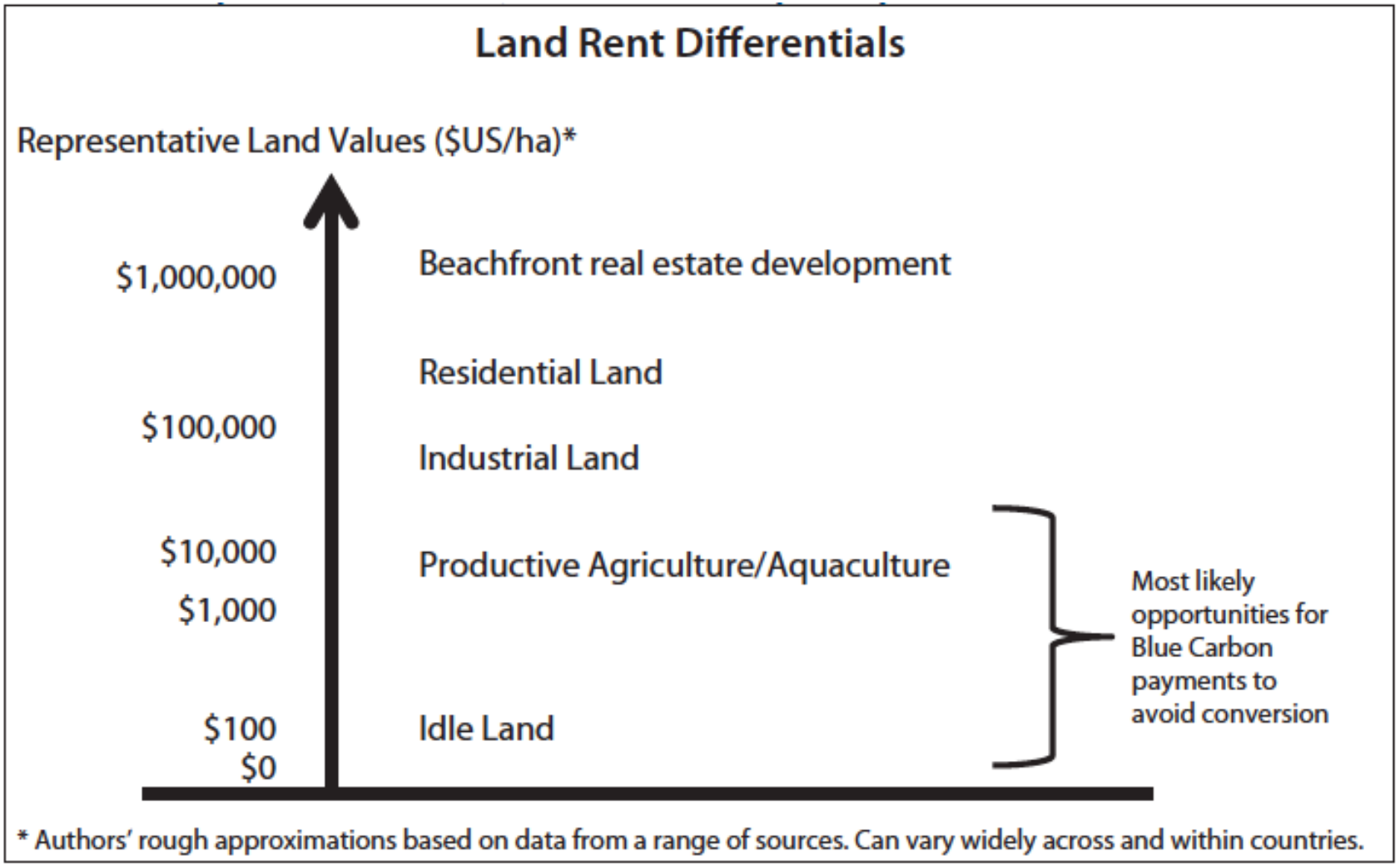
Source: Authors.

Potential Carbon-Credit Values



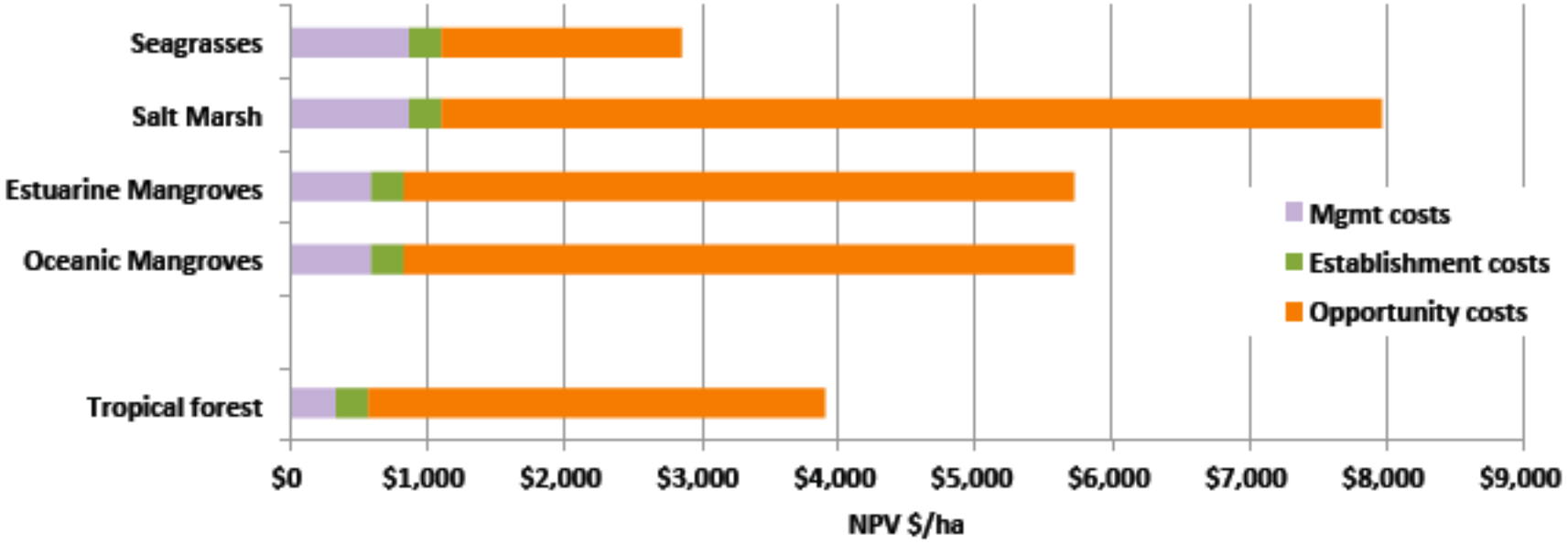
Source: Authors:

Opportunity Cost

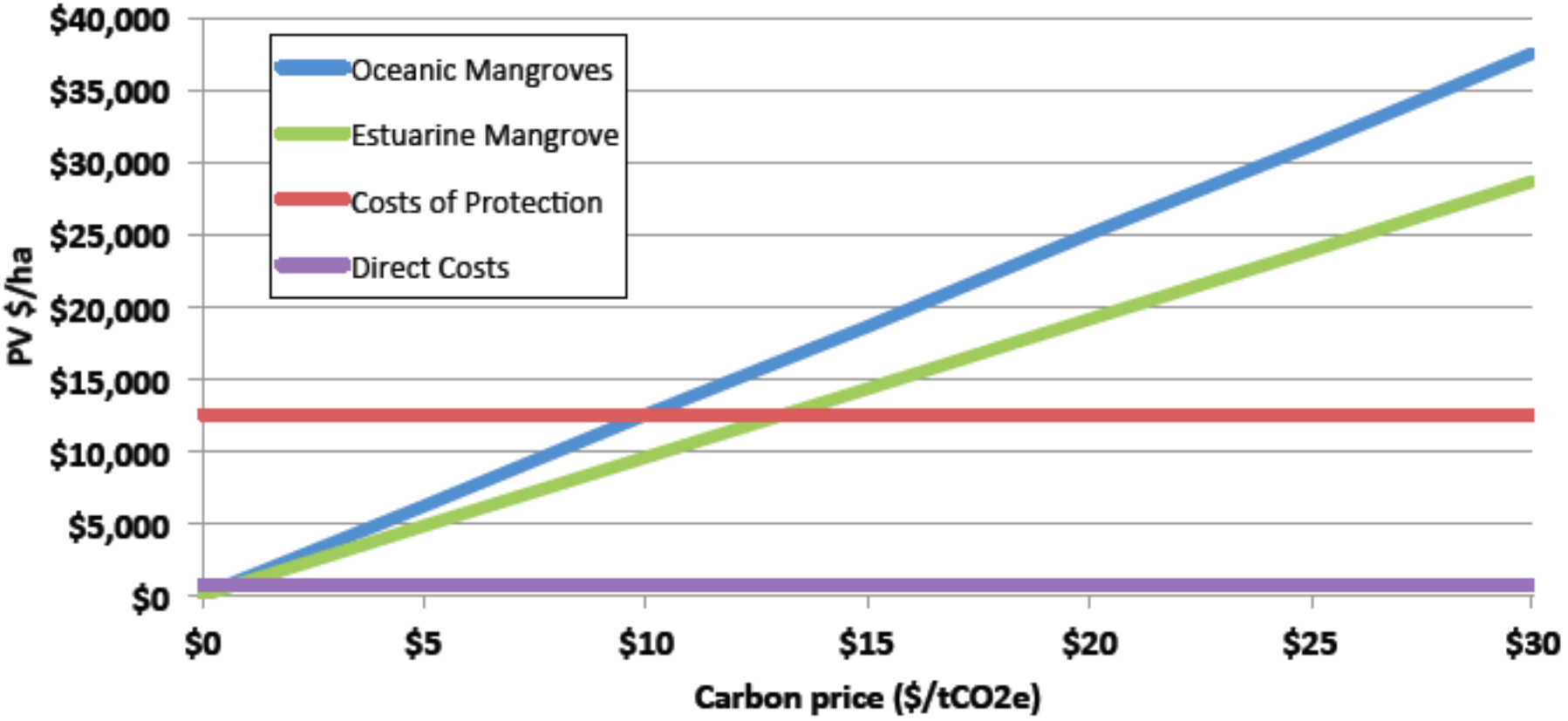


Source: Authors.

Cost of Protection



Net Benefits of Blue Carbon: mangroves



What We Know

Carbon Sequestration

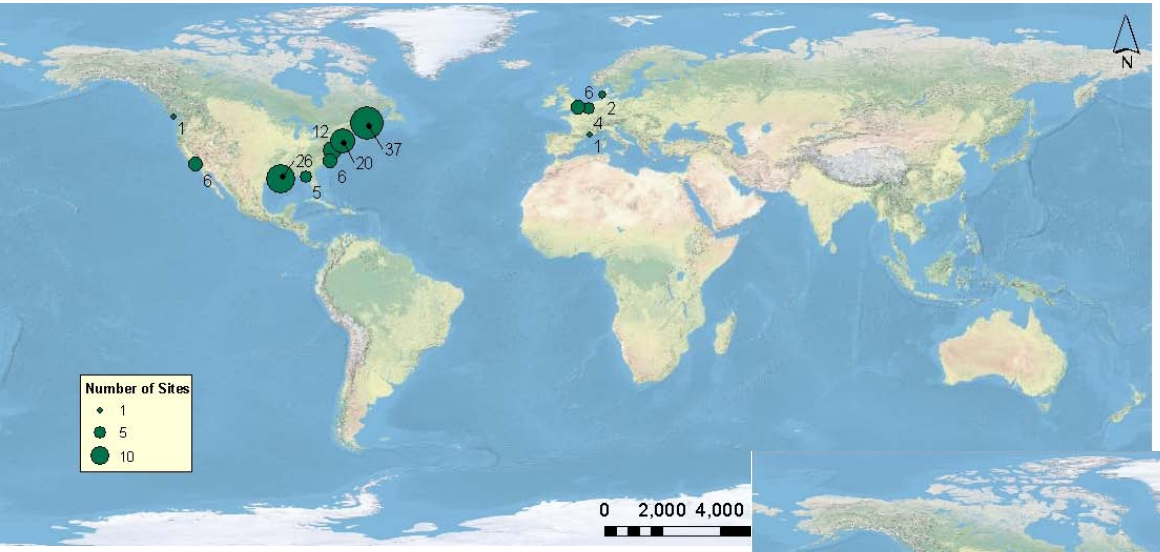
- **Mangroves** 39 sites
  - 0.126 to 23.98 MgCO2eqha-1yr-1
  - (< 7 MgCO2eqha-1yr-1)
- **Marshes** 122 sites
  - 0.01 to 62.81 MgCO2eqha-1yr-1
  - (<8 MgCO2eqha-1yr-1)
- **for seagrasses** 377 sites
  - -77 to 85 MgCO2eqha-1yr-1
  - (<7 MgCO2eqha-1yr-1 with a large number of estimates showing net losses).

Carbon Storage (1m)

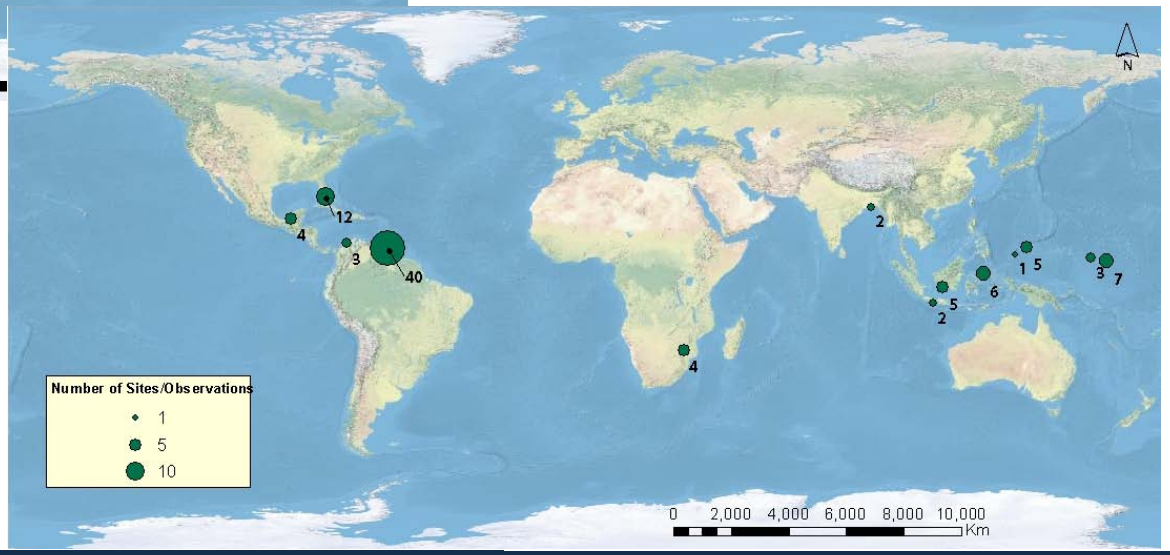
- **for mangroves** 62 sites
  - 570 to 4712 MgCO2eqha-1
  - (800 and 3,000 MgCO2eqha-1)
- **coastal marshes** 126 sites
  - 174 to 6,967 MgCO2eqha-1
  - (900 and 1,700 MgCO2eqha-1)
- **for seagrasses** 10 sites from 3 studies, all from the Med.)
  - 880 to more than 6,000 MgCO2eqha-1yr-1, but not estimated just for top meter

Geography of Knowledge (Soil C)

Salt Marshes



Mangroves



Conclusion

1) Economic value of blue carbon > financial value
2) Payments for blue carbon ➔ conservation
   - in some cases, but not all
3) Polluters pay for habitat protection and restoration
4) Value of protection >> Value of restoration
5) Policy challenges
   - protocols (how much, additionality, stacking)
   - tenure
6) Science challenges
   How much, where, emissions?

Possible Next Steps

1) Protocols
   Start with voluntary markets?
2) Identify C opportunities or Habitat opportunities
   single commodity vs. multiple ecosystem services
3) Fill science gaps
4) CSF's Carbon Payment Calculator