Economic Valuation of Coastal Wetlands and Carbon Storage

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Overview

• Approaches to valuing carbon storage benefit
  • Social cost of carbon
  • Carbon market prices
• Compensation (payment) schemes: sequestration and discounting
• Other coastal wetland services
• Suggested references
Valuing carbon storage in coastal wetlands

- Coastal wetlands (e.g. marsh, mangroves) and other estuarine systems (seagrass beds) sequester a substantial amount of carbon, especially in soils.
- Between 50% and 90% of all coastal wetland carbon, depending on vegetation type, is found in the soil, and can remain sequestered for centuries (effectively forever).
- Carbon in the plant biomass is stored for years or decades.
- Estimating the source, amount and timing of carbon storage is the most difficult aspect of valuation.
- But choice of valuation method is important, as is consideration of timeframe and discounting, especially for designing a credit scheme.
Social cost of carbon (optimal value)

- A measure of all damages associated with an increase in GHG emissions in a given year.
  - Often used by governments to evaluate different climate change regulations.
- However, estimating the social cost of carbon requires considerable information on the physical, ecological, and economic impacts of climate change.
  - E.g., the IPCC suggests that current estimates might neglect key impacts, and thus under-represent the damages associated with climate change.
- Given this uncertainty, policy assessments usually cite a wide range of estimates.
  - E.g., the EPA’s social costs of carbon dioxide (CO₂) emissions varied from $11- $105/tCO₂
Carbon credit price (actual value)

• The price established in existing markets for carbon credits for trade or storage compensation.

• As there is no “global market” for carbon credits, prices vary considerably across different markets, and driven by policies.
  • E.g., $1-2/tC in “voluntary” schemes and credit markets
  • But could be 10 or even 100 times more in markets established by the imposition of carbon taxes or tradable permits.

• Prices will vary over time (supply and demand).
Compensation for storing carbon

• Compensation for carbon stored in coastal wetland biomass (years/decades) and soils (centuries) is equivalent to paying to “hold on” for an investment over many years/decades/centuries.

• Any realistic “compensation” scheme will also have limited timeframe; e.g., 10-20 years and at most 50-70 years.

• The value of storing carbon should also be considered as the present value return on this investment, which involves a specific timeframe and the discounting of future values to the initial starting period.
  • 3-4% is commonly used as the long-term discount rate (50-70 years); 10% for a shorter timeframe (10-20 years).
  • Sensitivity analysis
Other coastal wetland services

• A wide range of other values have been estimated.
  • Storm protection
  • Erosion control
  • Flood/sea level rise protection
  • Water pollution and sediment control
  • Raw materials and food
  • Nursery/breeding habitat for near-shore and marine fisheries
  • Tourism, recreation, education, and research
  • Cultural, spiritual and religious benefits.

• These additional benefits can be larger than carbon storage, for specific coastal wetlands.
Comparison of values (mangroves, Thailand)

- All values in NPV per ha (1996$), over 20 years, 10% discount rate.
- *Estimate of carbon sequestration value*
  - $413
- *Estimates of other benefits*
  - Coastal protection from storms $15,997
  - Habitat-fishery linkages $2,117
  - Collection of wood and non-wood products $864

Selected references


