Incorporating Carbon Management for Climate Change Mitigation into Coastal Management Planning

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Managing carbon

- Why you would want to manage carbon?
- How can you manage carbon?
  - Protect existing stocks (avoided emissions)
  - Create or restore stocks (carbon sequestration)
    - Wetland creation or restoration
    - Manage habitat to enhance carbon stocks
      - E.g., adjust tide gates to flood more but still use for agriculture

Many Blue Carbon projects will occur on the coast

Coastal management issues

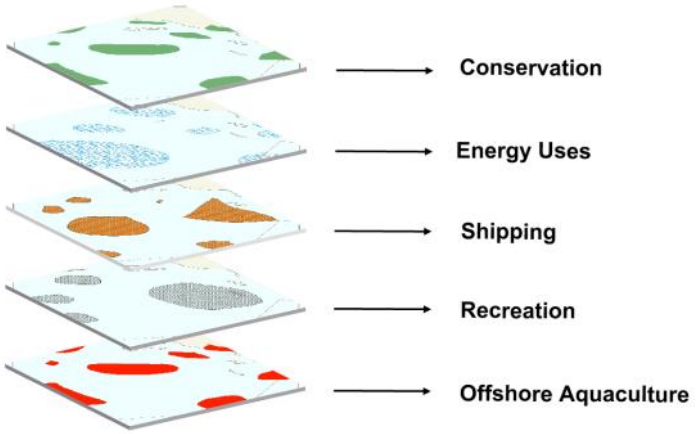
- High demand on coastal habitats and resources
  - More than half of U.S. population lives within 50 miles of the coast
- Multiple conflicting uses
  - Economic activities (58% of U.S. GDP): commercial and recreational fishing, transportation, energy production, tourism
  - Ecosystem protection
- Coastal habitats threatened by climate change


Darell Licht

Source: http://stateofthecoast.noaa.gov/

How coastal managers think

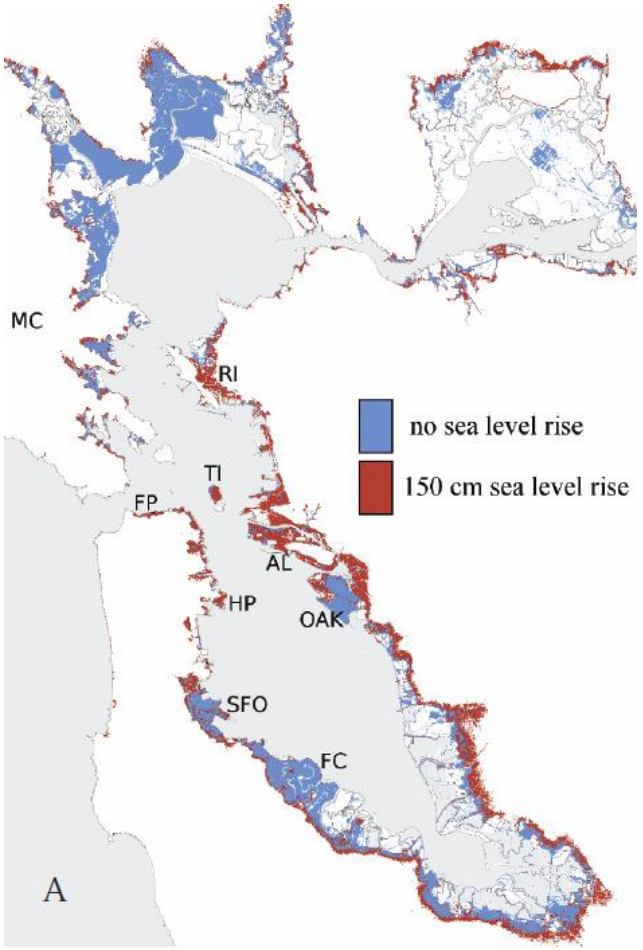
- Primarily **project-based** planning
- **Sector-based** (largely along the lines of agency mandates)
  - Fisheries, transportation, recreation/tourism, land use, energy production, endangered species
- Short-comings recognized, evolving towards more integrated planning
  - Integrated Coastal Zone Management
  - Ecosystem-based management
  - Coastal and marine spatial planning



http://www.oceanconservancy.org/our-work/marine-spatial-planning/

How coastal managers think: Climate change issues

- Planning approach to climate change has focused on **adaptation** or ensuring resilience to **sea level rise**
  - Hold the line (coastal squeeze unless add sediment)
  - Managed retreat (create space, remove infrastructure, restore)
  - Managed advance (sediment management)
  - Integration with flood management
  - Supporting ecology
  - Reducing social vulnerability
- Greenhouse gas mitigation generally not considered



Areas around San Francisco Bay inundated or vulnerable to inundation under 100-year high-water levels for present-day (blue) and 150-cm sea level rise (red). From Knowles 2010.

How carbon managers think

- Carbon sequestration projects have to meet certain conditions
  - Real
  - Leakage
  - Quantifiable
  - Verifiable
  - Additional
  - Permanence
  - Unambiguous ownership
  - Not harmful
  - Practicality

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"The unanticipated decrease or increase in greenhouse gas (GHG) benefits outside of the project's accounting boundary as a result of project activities."

Example: Project to protect forest, but logging simply displaced to an area outside the protected (project) area.

Planning for carbon requires a larger planning scale – temporal and spatial

- Leakage
  - Need to use a regional or larger spatial scale of planning
- Permanence
  - Planning time frame on the order of 100 years (compared to typical 10-year time frame)
  - Need to accommodate sea level rise

Planning for carbon can reinforce good planning practices

- Need to maintain a long-term carbon store
  - Buffers, which would allow wetlands to continue to sequester carbon by tracking sea level rise
  - Important to maintain supply of sediments to wetlands
- Requires a larger planning spatial scale
  - Consistent with an ecosystem-based management approach
  - **Coastal and Marine Spatial Planning** could help ensure a balance with different uses, including natural ecological functions

Planning for carbon management could conflict with other coastal uses

- There can be a conflict between planning for permanent carbon stores (100 years) versus short-term ecological benefits
  - May need to incorporate more high-elevation habitat to accommodate future sea level rise
  - May emphasize long-term development of wetland over immediate needs of endangered species
- Carbon management projects could preclude other uses for a very long time

Carbon management will introduce new trade-offs

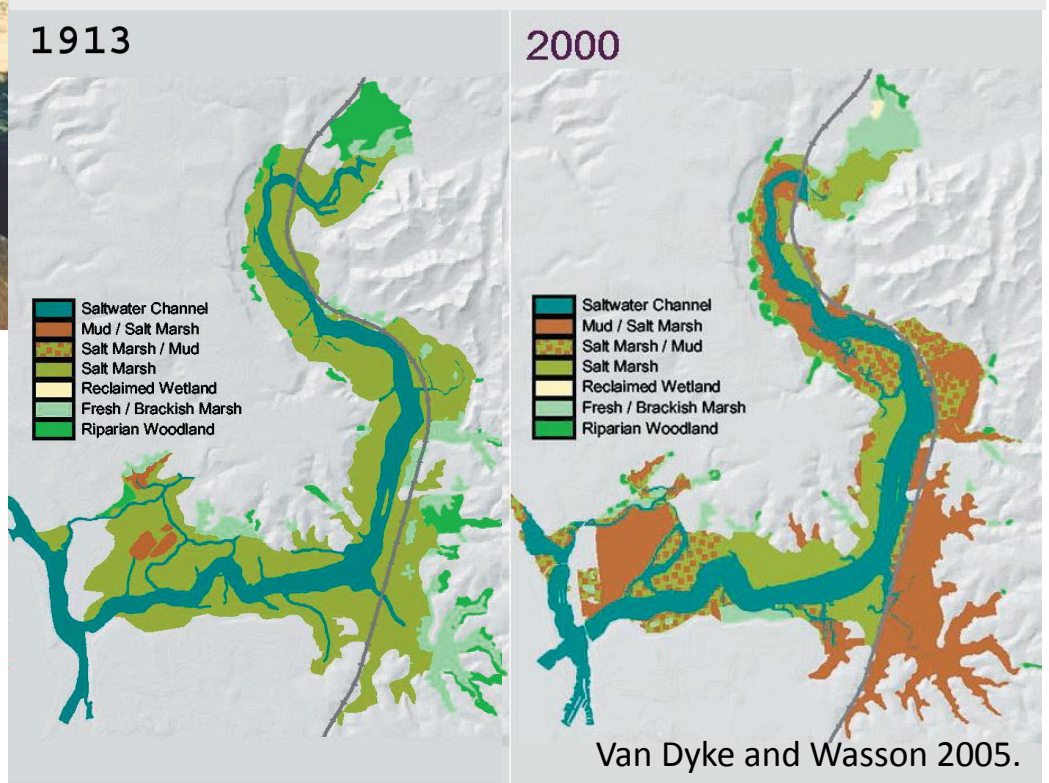
- Could lead to a trade-off between carbon sequestration and other ecological values (e.g., endangered species) or ecosystem services in a wetland.
- Could alter decisions about systems with different resiliencies
  - Do we put resources into the sensitive system, which we are likely to lose (but has high current value)?
  - Example: Salinas River (resilient) vs. Elkhorn Slough (sensitive)

Resiliency due to sediment supply

Salinas River in Flood

- **Marshes in high sediment areas more resilient to sea level rise**
- **Restoration more successful in high sediment systems**
- **Wetlands in low sediment systems will be lost if space is not available for transgression**

Elkhorn Slough: Tidal Marshes Converting to Mudflat



Van Dyke and Wasson 2005.

Planning for carbon can support good conservation policies

- Conserving wetlands is more effective than restoring them
  - Large carbon stores in existing wetlands
  - Restoration can be expensive, and it takes time to sequester carbon
- Need to focus on policies to protect wetlands
  - Already the policy in U.S., Europe and Australia
  - Extension of REDD framework
  - Promote sustainable use of coastal habitats to reduce destruction of existing habitats
    - E.g., policies to import only sustainably farmed shrimp

Conclusions

- Coastal managers will need to incorporate carbon management projects in their planning
- Carbon management does not fit into project-specific, relatively short-term planning
  - Carbon management projects (especially sequestration) may introduce new conflicts with other uses and new trade-offs
- On the other hand, carbon management will reinforce modern coastal planning approaches (Ecosystem-Based Management, Coastal and Marine Spatial Planning)

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