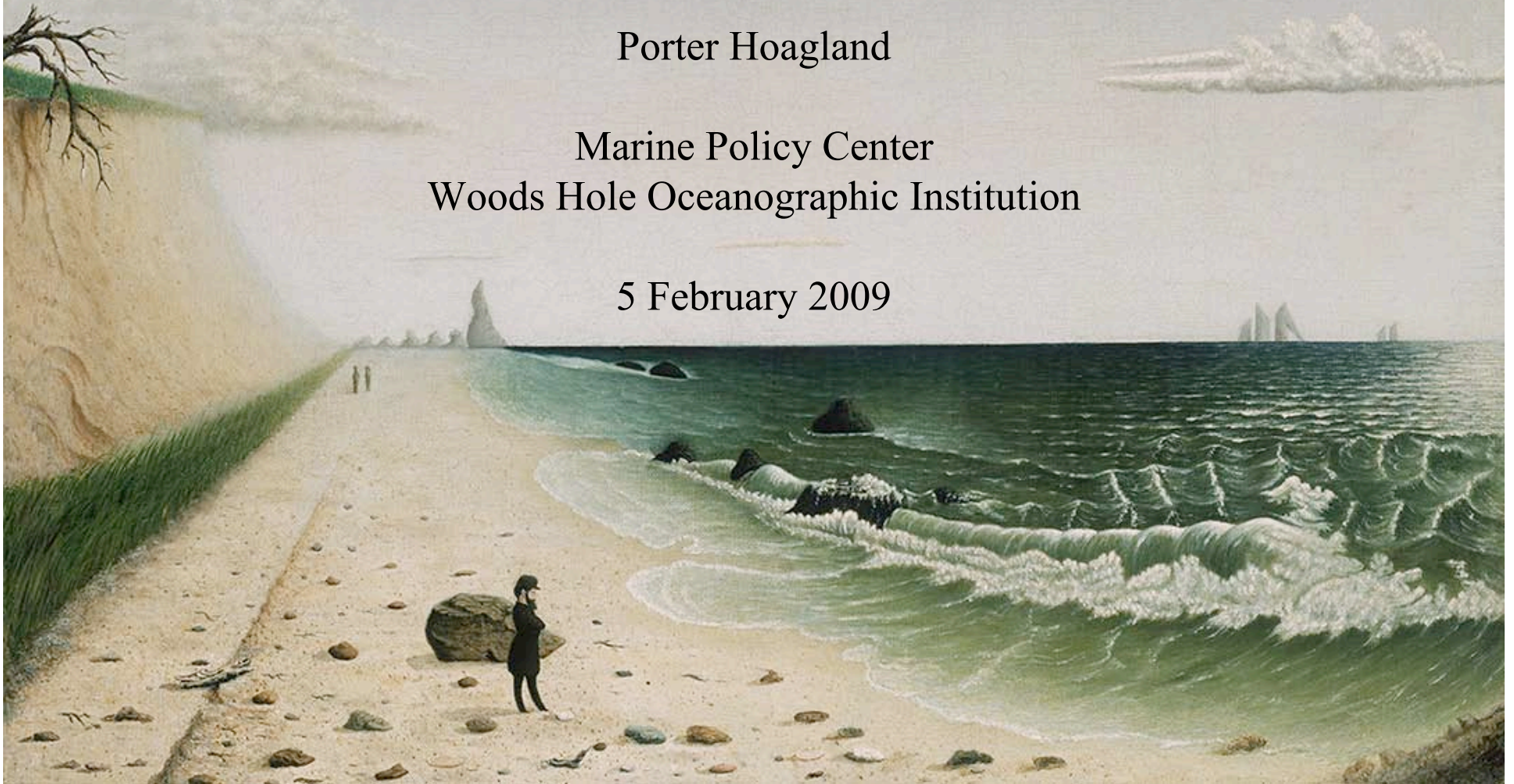


Changing Climate, Changing Coasts: Some Economic Considerations

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Woods Hole Oceanographic Institution

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Meditation by the Sea, Unknown Artist, early 1860s

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Potential Impacts of Climate Change on Massachusetts

Climate Change Effects	Resources			Ecosystem Services		Human Uses			
	Finfish	Shellfish	Protected Species	Wetland Habitat	Marine Ecosystem	Coastal Property	Commercial Fisheries	Shipping	Recreation
Sea Level Rise				√	?	√		√	√
More Precipitation	?	?		?	√		?		
Frequency / Intensity of Storms		√		√	?	√	√	√	√
Ocean Acidification	?	√	√	?	√		√		√
Ocean Warming	√	√	?	?	√		√		
Changed Acoustic Environment	√		√		√		√	√	?
Changed Circulation	?	?	?	?	√		√	√	?
Disease	?	?	?	?	√		√		√

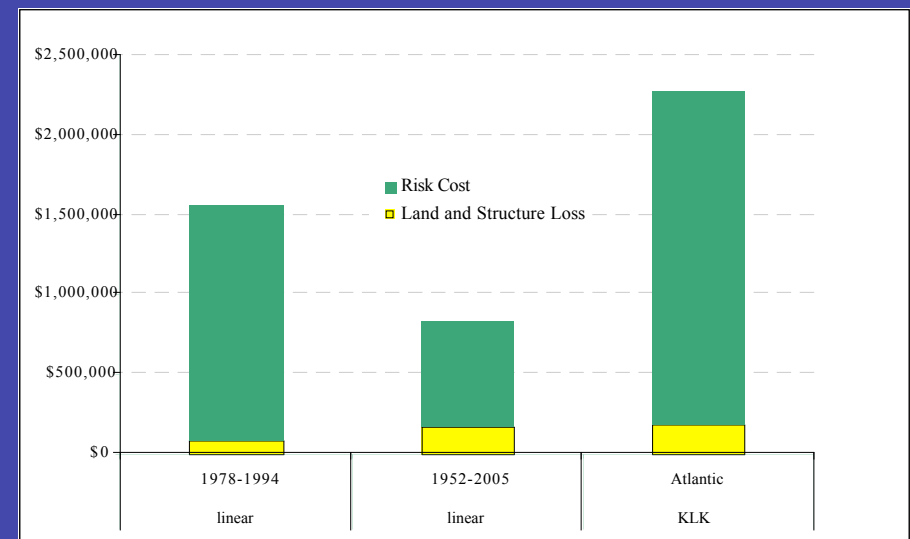
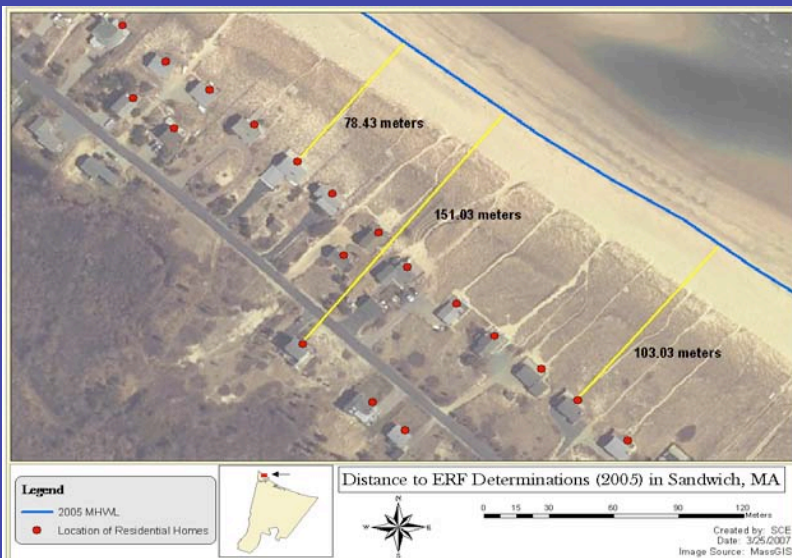
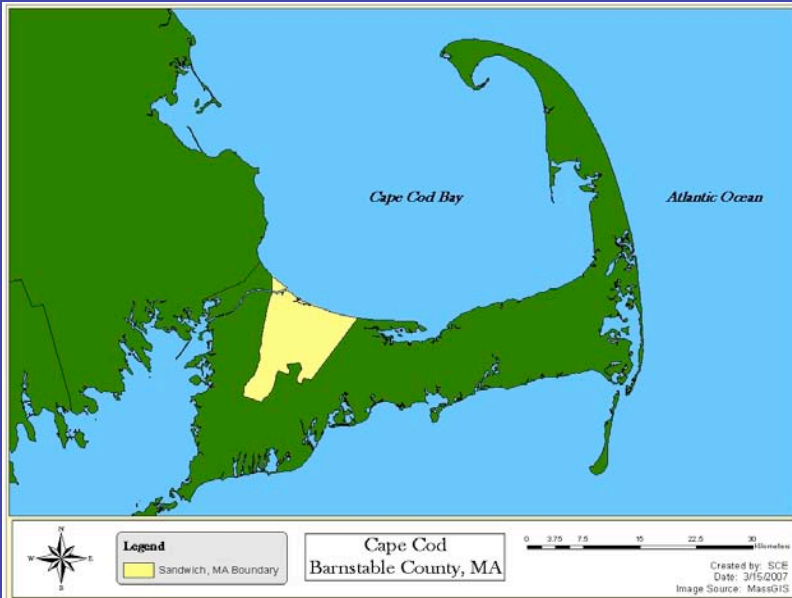
Policy Analysis Process

- Identify impacts
- Evaluate economic damages
- Identify feasible policy responses (includes “adaptation”)
- Evaluate costs of response
- Model relationship between response and mitigation of impact

Shoreline Change Hazard*

- Coastal erosion, transport, accretion is natural
- Intense development of the coastal zone is subject to risks of flooding and erosion (esp. due to SLR)
- Risks include:
 - Diminished value and physical loss of property;
 - Collapsed buildings;
 - Losses of building materials;
 - Exposing of septic systems and sewer pipes;
 - Releases of fuels, other toxins;
 - Contaminated water supplies.
- Protective structures can slow/stop down-drift accretion, increasing potential for shoreline change losses
- Barrier beaches, dunes, salt marshes, estuaries may be lost
- Can we site coastal development to allow natural erosion?
- Best management techniques for existing development?

Costs of Sea Level Rise on Cape Cod



Some Coastal Management Hindrances and Helps

Hindrances:

- Pre-1978 construction
- Variances
- ACoE subsidies
- NFIP subsidies
- MA legally responsible for maintaining older protection structures
- Political sway
- Threats of litigation
- Compensation for “takings” is problematic

Helps:

- No adverse impact (NAI)
 - Prevention of harm to others
- Chatham conservancy districts
 - Regulation, not taking
- StormSmart coasts program
- Encourage freeboarding, setbacks, vegetating dunes and banks
- Non-structural protection

Data and Modeling Needs

- Identification of physical impacts
 - Geographic distribution
 - Changed ecological processes
- Estimates of the economic scale of impacts
 - Does Massachusetts Oceans Act help?
- Policy responses
 - Shoreline change: protect or retreat
 - Broader implications of local protection
 - Relative roles of government, public?