



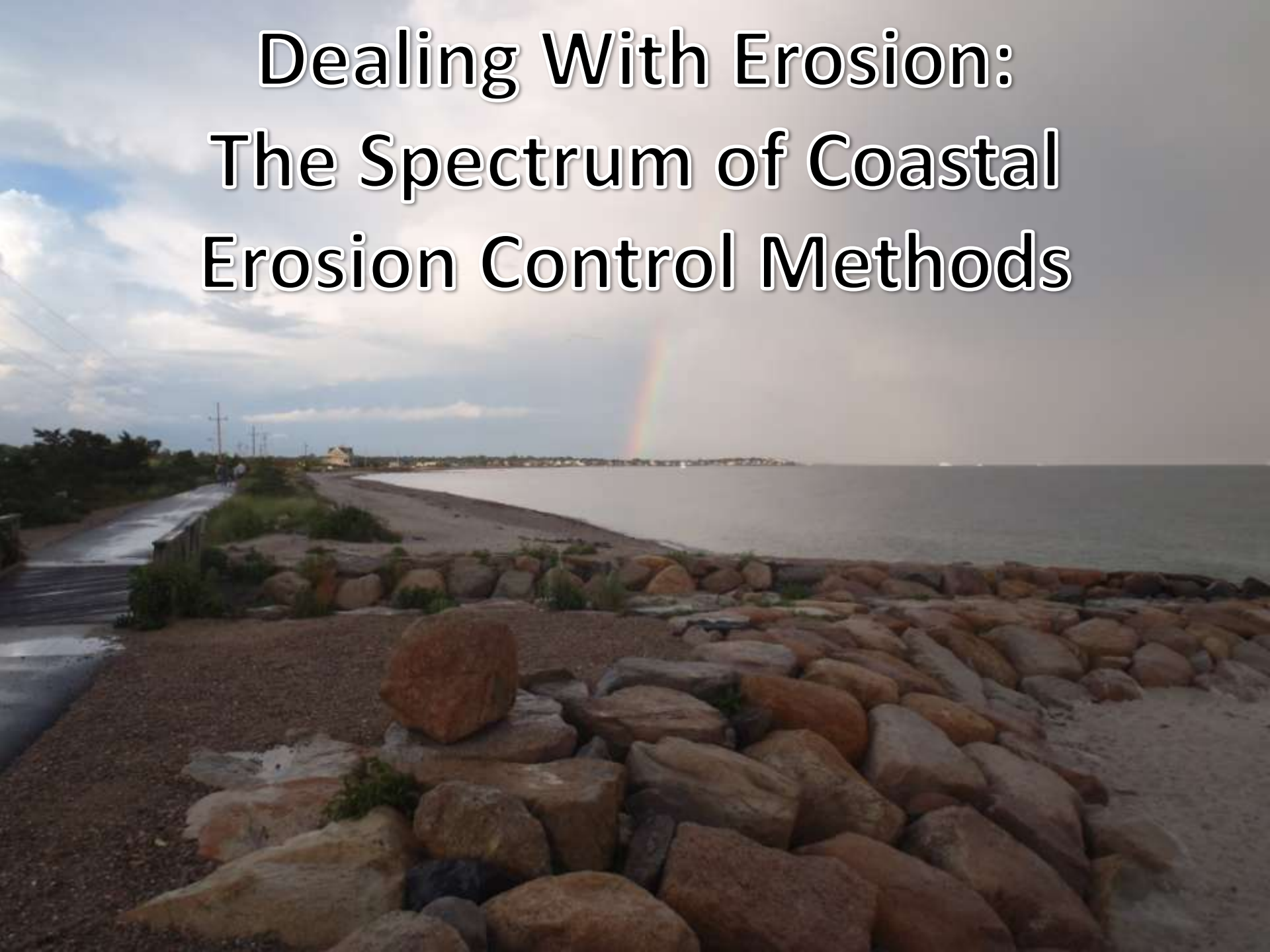
Linking Science with Local Solutions and Decision-Making

Dealing With Erosion: The Spectrum of Coastal Erosion Control Methods

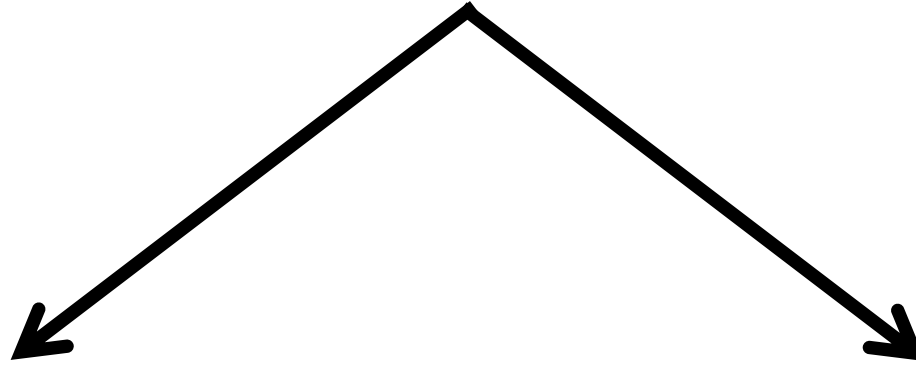
Greg Berman

(Woods Hole Sea Grant & Cape Cod Cooperative Extension)

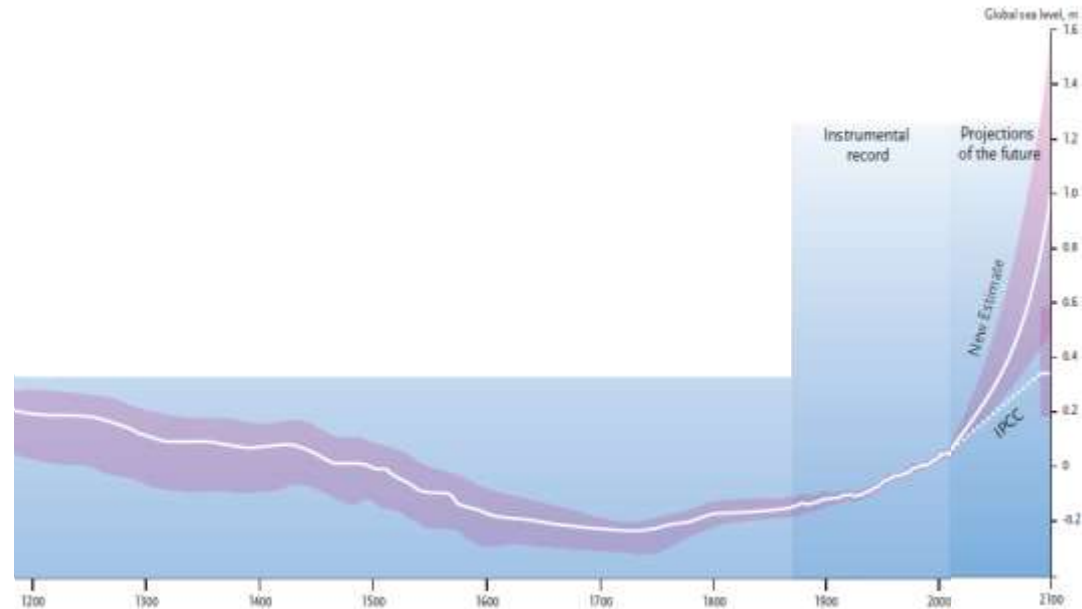
Dealing With Erosion: The Spectrum of Coastal Erosion Control Methods



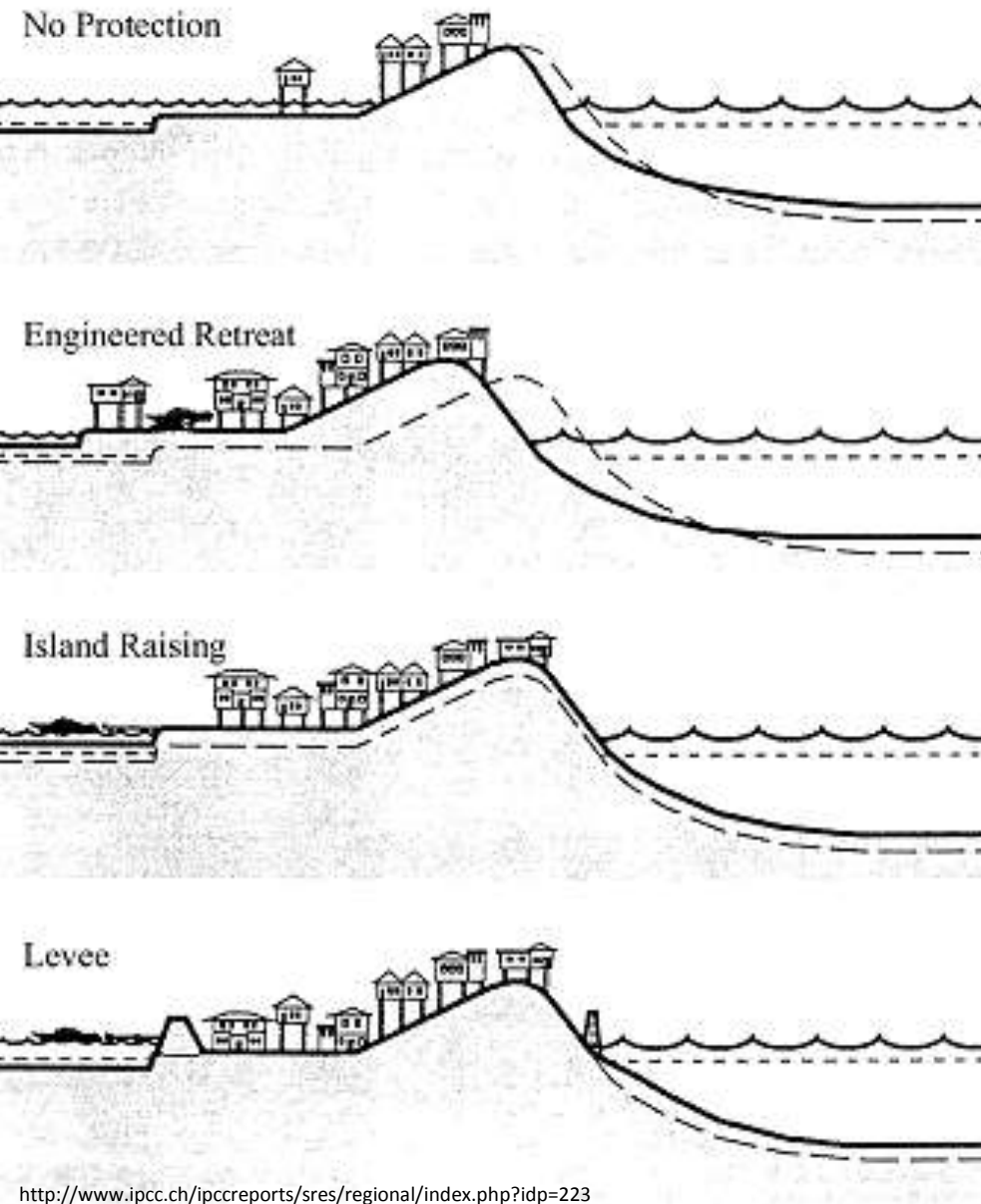
Climate Change Impacts In Coastal Environments



5



**On Cape Cod we
manage at parcel scale**



Why protect properties.....?

Town of Brewster example



The Facts

Value = \$333,000,000

Only ~1% of properties
~3% of town area

but they make ~10% of the real estate taxes

The Implications

(don't want takings)

To keep the same revenue,
the tax rate would go from 8.18 to 9.06
or ~\$300 per household

- Do nothing

1. Will system recover by itself?
2. How far is the structure from the water?
3. Grandfathering protects structures (not lawn) before August 10, 1978

March 2013



May 2013



Photo Credit: Ann McNichol

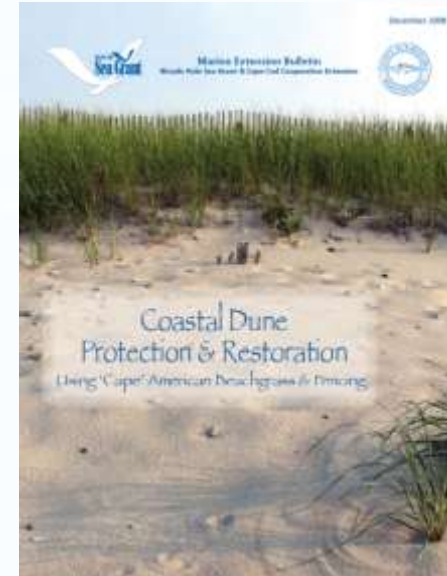
The Spectrum of Coastal Erosion Control Methods

- Do nothing
- Vegetation



Plant Natives:
Root systems stabilize.
Take up water.
Break the impact of
raindrops or wave-splash.
Slow down runoff

Remove Invasive



- Do nothing
- Vegetation
- **Re-grade**



- Do nothing
- Vegetation
- Re-grade
- **Managed retreat**



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- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- **Beach nourishment = Fill of a CRA**



Photo Credit: Ted Keon

Sacrificial



Cobble (Mixed)

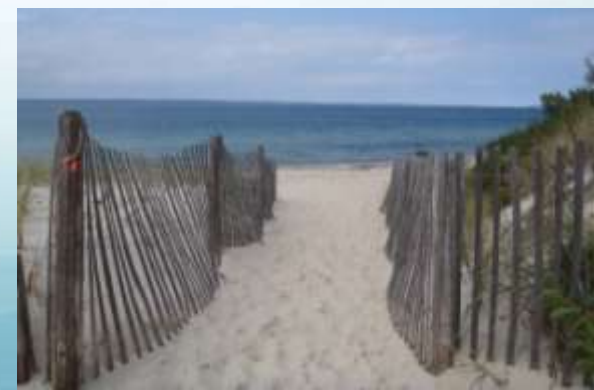


Photo Credit: CZM

- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- **Beach nourishment**



- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourishment
- **Sand fencing**



- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourishment
- **Sand fencing**



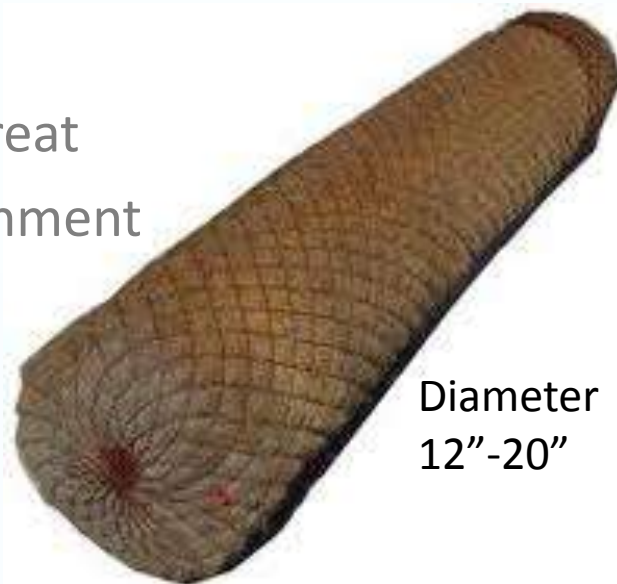
- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourishment
- **Sand fencing**



- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourishment
- **Sand fencing**



- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourishment
- Sand fencing
- **Fiber rolls**



Diameter
12"-20"



- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourishment
- Sand fencing
- **Fiber rolls**



- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourishment
- Sand fencing
- Fiber rolls
- **Coir Envelopes**



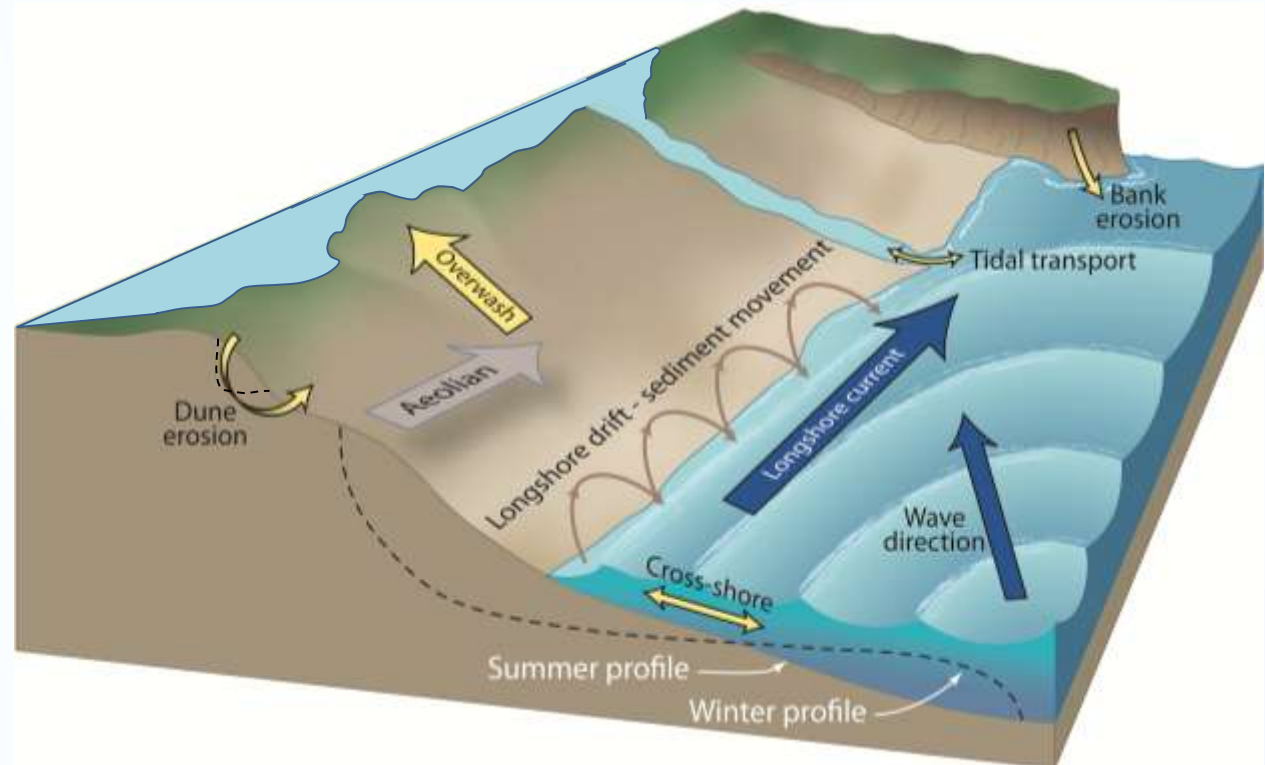
- Do nothing
- Vegetation
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- Managed retreat
- Beach nourishment
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- Fiber rolls
- **Coir Envelopes**



- Do nothing
- Vegetation
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- Do nothing
- Vegetation
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- Coir Envelopes

C E S

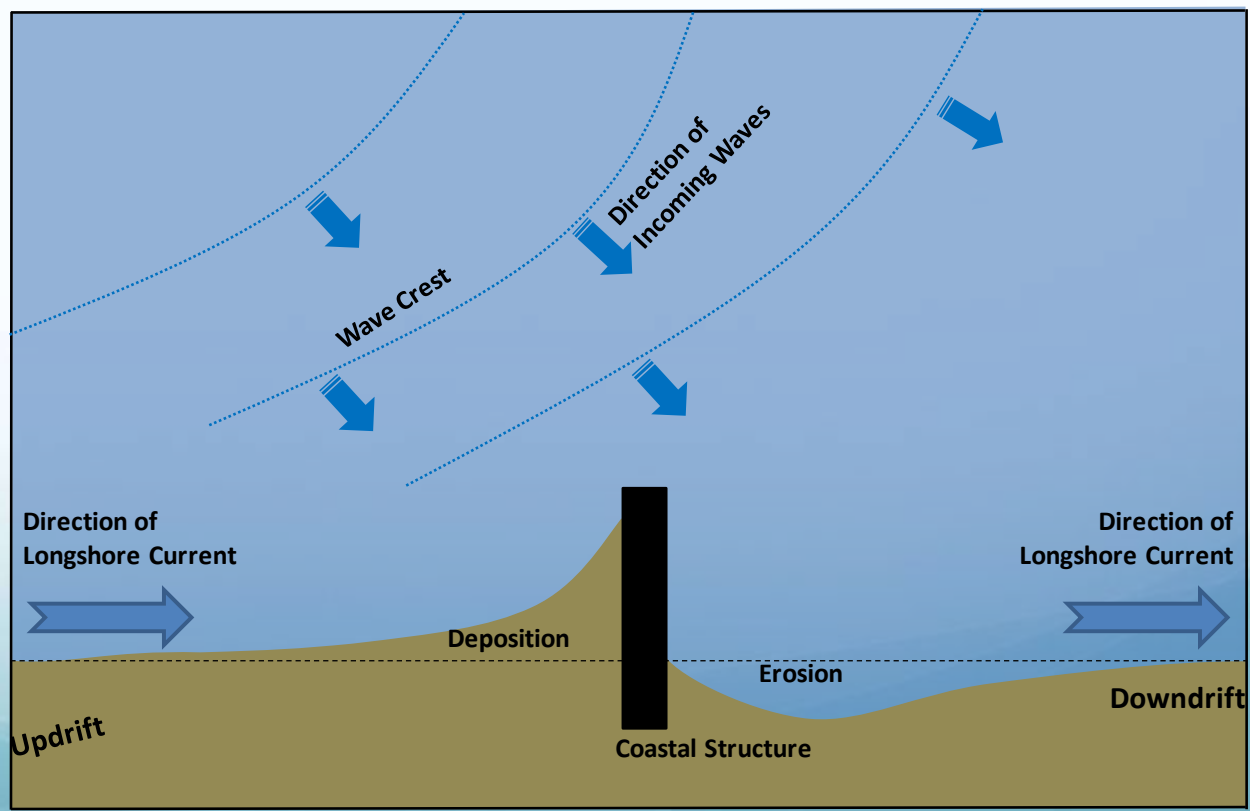
WPA: Coastal engineering structure means, but is not limited to, any breakwater, bulkhead, groin, jetty, revetment, seawall, weir, riprap or any other structure that is designed to **alter wave, tidal or sediment transport processes** in order to protect inland or upland structures from the effects of such processes.

- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourishment
- Sand fencing
- Fiber rolls
- Coir Envelopes



C E S

Groin



- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourishment
- Sand fencing
- Fiber rolls
- Coir Envelopes



C E S

- Groin



- Jetty

- Do nothing
- Vegetation
- Re-grade
- Managed retreat
- Beach nourishment
- Sand fencing
- Fiber rolls
- Coir Envelopes



C E S

- Groin
- Jetty

Sand Bags



- Do nothing
- Vegetation
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- Fiber rolls
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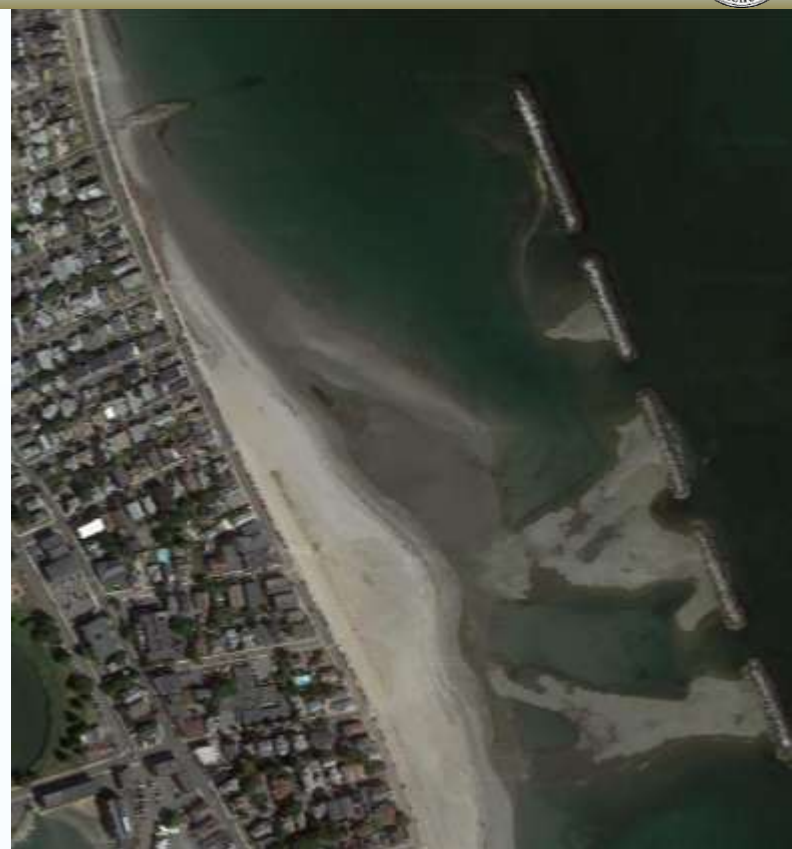
Gabion (10-20 yrs)

C E S

- Groin
- Sand Bags
- **Gabion**
- Jetty



- Do nothing
- Vegetation
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- Fiber rolls
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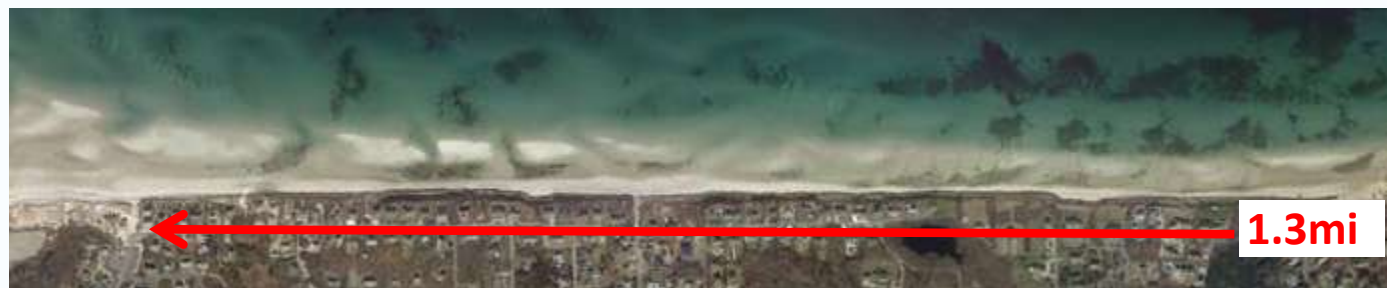


C E S

- Groin
- Sand Bags
- Gabion
- **Breakwater / Sill**
- Jetty



- Do nothing
- Vegetation
- Re-grade
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- Fiber rolls
- Coir Envelopes



C E S

- Groin
- Sand Bags
- Gabion
- Breakwater / Sill
- **Revetment**
- Jetty



- Do nothing
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C E S

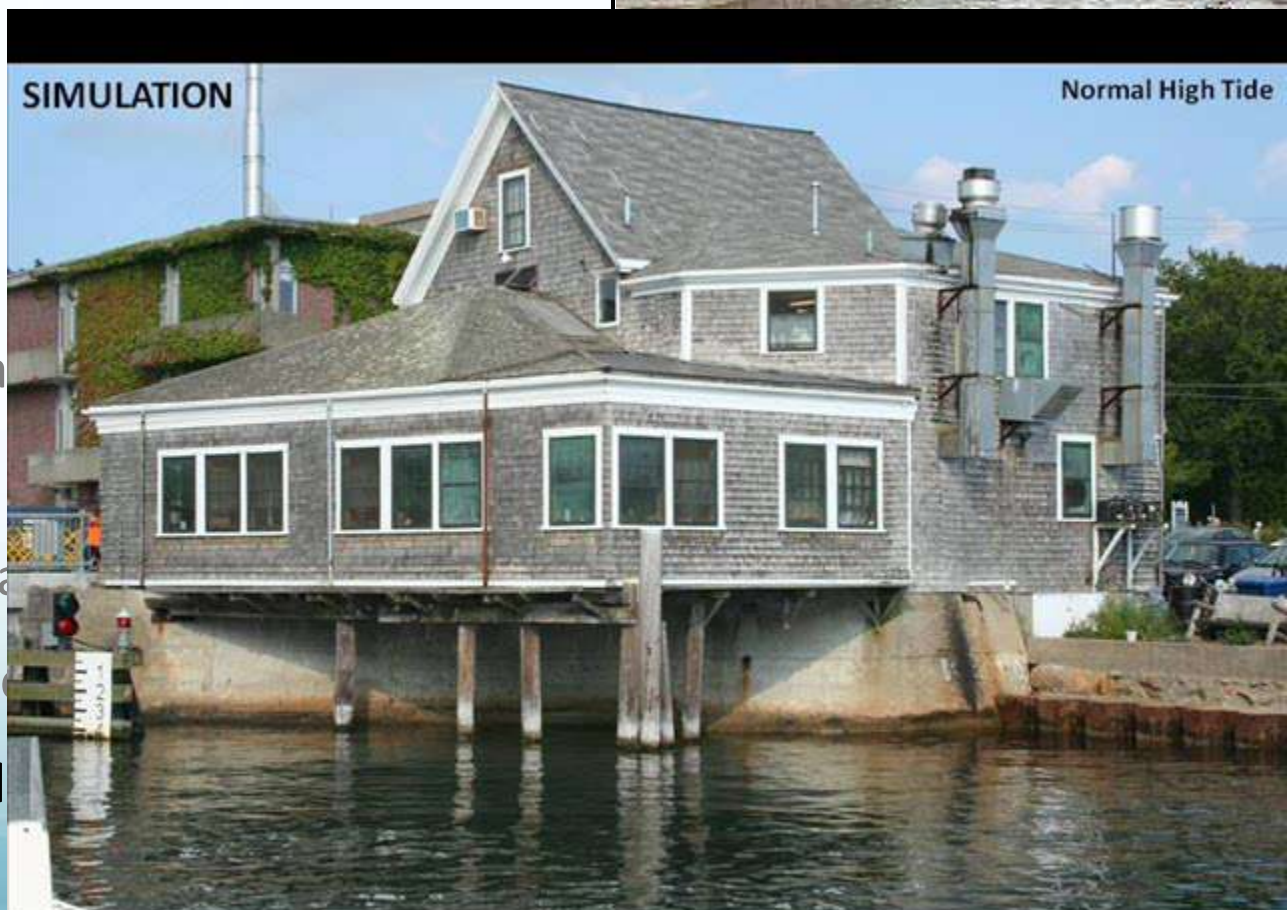
- Groin
- Sand Bags
- Gabion
- Breakwater / Sill
- **Revetment**
- Jetty

- Do nothing
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C E S

- Groin
- Sand Bar
- Gabion
- Breakwater
- Revetment
- Jetty
- Seawall




- Do nothing
- Vegetation
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C E S

- | | |
|---------|---------------------|
| • Groin | • Sand Bags |
| | • Gabion |
| | • Breakwater / Sill |
| | • Revetment |
| • Jetty | • Seawall |
| | • Bulkhead |



- ~~Do nothing~~
- ~~Vegetation~~
- ~~Re-grade~~
- ~~Managed retreat~~
- ~~Beach nourishment~~
- Sand fencing 
- Fiber rolls
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How the “Spectrum” could be used:

Notice of Intent (NOI) →→→→ Alternative Analysis

...start at top and move down,
explaining why each one isn't suitable.

C E S

- Groin
- Sand Bags
- Gabion
- Breakwater / Sill
- Revetment
- Jetty
- Seawall
- Bulkhead

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 3 - Notice of Intent
MASSACHUSETTS WETLANDS PROTECTION ACT 91A G. L. c. 127, §40

A. General Information

1. Project Location: (Include address, file or map location, or other project info.)
 A. Street address: _____ B. City/Town: _____
 C. Latitude and Longitude: _____ D. UTM Zone: _____
 E. Nearest US Highway: _____ F. Nearest US Route: _____

2. Applicant:
 A. Name: _____ B. Title: _____
 C. Organization: _____ D. Address: _____
 E. City/Town: _____ F. State: _____
 G. Zip: _____ H. Phone: _____
 I. Fax: _____ J. E-mail: _____

3. Property Owner:
 A. Name: _____ B. Title: _____
 C. Address: _____ D. City/Town: _____
 E. State: _____ F. Zip: _____
 G. Phone: _____ H. Fax: _____
 I. E-mail: _____

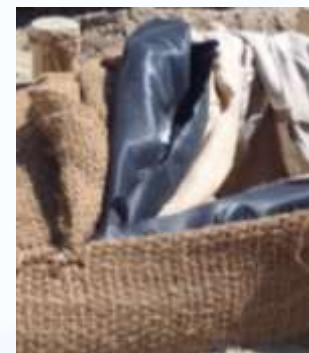
4. Representative of project:
 A. Name: _____ B. Title: _____
 C. Address: _____ D. City/Town: _____
 E. State: _____ F. Zip: _____
 G. Phone: _____ H. Fax: _____
 I. E-mail: _____

5. Total project area (from 100' inland to 100' seaward):
 A. Total Area: _____ B. Wetland Area: _____
 C. Non-Wetland Area: _____

MASS-00000000-0000-0000-0000-000000000000 Page 1 of 2

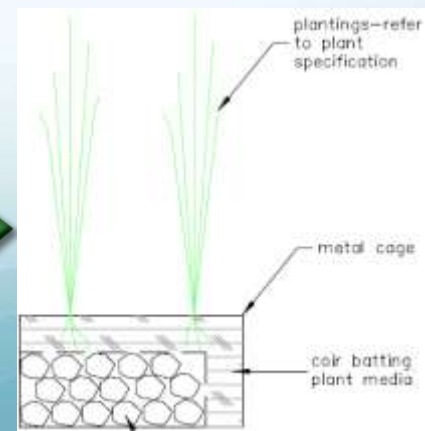
- Do nothing
- Vegetation
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- **Not a complete list**
(and methods are being invented/modified)



C E S

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|---------|---------------------|
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- **With revetments...if neighbors don't do the same
then you'll have to keep extending return.**

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- **Not a complete list
(and methods are being invented/modified)**
- **With revetments...if neighbors don't do the same
then you'll have to keep extending return.**
- **Very few projects only employ 1 method, and when
we are determining if it's a CES we need to use the
"hardest" aspect of the project.**

C E S

- | | |
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Combination



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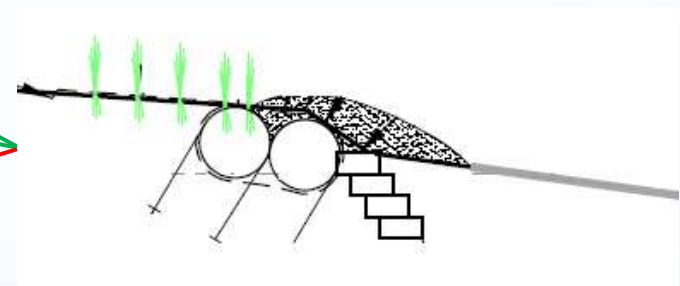


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Combination



↑ Resilience \neq ↓ Natural Systems

Questions ?

