Living Shorelines and Coastal Resilience: Green is the New Black

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Leveraging Ecosystem Services through Nature-Based Strategies to Increase Resilience

Science is a key part of the equation

We need a multi-disciplinary approach to building resilience and reducing risk from storms and environmental change

Decision makers are needed at the table
Today’s Most Vulnerable Populations

SOVI available at:
http://coast.noaa.gov/dataregistry/search/collection/info/sovi
Risk exposure of the U.S. coastal population to storms and sea-level rise in 2100

Arkema et al. 2013
Many Factors Influence the Amount of Coastal Protection Provided by Natural infrastructure

U.S. coastal wetlands provide $23.2 billion storm protection benefits annually (Constanza et al. 2008)

Analysis of 34 hurricanes → loss of 1 hectare of wetland in the model corresponded with increased average storm damages of $33,000 per storm
Benefits of Natural Infrastructure:
• Can strengthen with time
• Can be self-maintaining and has the potential for self-repair after storms
• Can grow and keep pace with sea level rise
• Can be more cost-effective
• Provides benefits all the time
Additional Coastal Ecosystem Services

1. Fisheries (recreational and commercial)
2. Recreation & tourism
3. Water filtration
4. Cultural services
5. Habitat for other species
6. Carbon sequestration & storage
Dow Chemical: Wetlands vs. Wastewater Treatment Plant

Natural Capital Case Study

Seadrift, TX

Construct Wetland Cells (110 acres)

Union Carbide Seadrift Operations Manufacturing Site

Existing Wastewater Treatment Ponds

Seadrift, TX

$200M in net present value!
Hybrid Approach

Hybrid Infrastructure (green + gray):
- Can combine strengths of green and gray
- Can use gray to protect green as it establishes
- Can use green to protect gray to limit degradation and reduce construction costs
Rebuild By Design: “Big U” Project Provides Climate Adaptation, Some Storm Surge Protection and Recreational Opportunities

• Goal is to provide storm and climate adaptation with improved recreational access

• Combines hard (flood walls, berms, removable walls) and soft (knolls, gardens) infrastructure

• Nature-as-buffer approach
Green and Hybrid Research Needs to Support Policy

- Natural and hybrid options for best protection?
- Value of storm protection benefits and co-benefits?
- Risk of NOT employing green/hybrid approaches?
- Best practices for design?
- Implementation and regulation?

Sutton-Grier et al. Future of Our Coasts. 2015
Sandy was a Turning Point
We know enough to implement these alternatives now. The choice is up to society: How do we want our future coasts to look?
Thank you!

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Sutton-Grier et al. 2015. Future of our coasts: The potential for natural and hybrid infrastructure to enhance the resilience of our coastal communities, economies and ecosystems. Environmental Science & Policy.