



Regional Framework for Coastal Resilience in Southern Connecticut

Town of Fairfield Coordination Meeting



Agenda

- **Presentation of Project**
- **Background**
- **Green infrastructure definition and examples**
- **Risk reduction**
- **Project approach**
- **Project deliverables**
- **Green Infrastructure and Hybrid Ideas**
- **Fairfield Flood and Erosion Control Plan**
- **Additional Ideas from Hazard Mitigation Plan**

Presentation of Project

Hurricane Sandy Coastal Resiliency Competitive Grant Program



- Grant is to “assess, restore, enhance or create wetlands, beaches and other natural systems to help better protect communities and to mitigate the impacts of future storms and naturally occurring events on fish and wildlife species and habitats”
- Opportunities to reduce risks may include beach stabilization, restoring dunes, restoring tidal wetlands, reef creation/enhancement, improving hydrology of coastal areas, improving/removing infrastructure, or combination of green and hardened infrastructure (hybrid approaches)
- Overall, an opportunity to solicit, screen, design, and incorporate natural/green infrastructure projects into a Regional Resilience Plan

Presentation of Project



Green Infrastructure

What's green infrastructure, anyway?

- TNC: “Planned and managed natural and semi-natural systems which can provide more categories of benefits when compared to traditional gray infrastructure. Green infrastructure solutions can enhance or replace a functionality that is traditionally provided by man-made structures.... Green infrastructure solutions aim to build upon the success that nature has had in evolving systems that are inherently sustainable and resilient”



Examples from NOAA

Examples of coastal defenses including natural infrastructure, managed realignment, and hybrid approaches.

Ariana E. Sutton-Grier , Kateryna Wolk , Holly Bamford

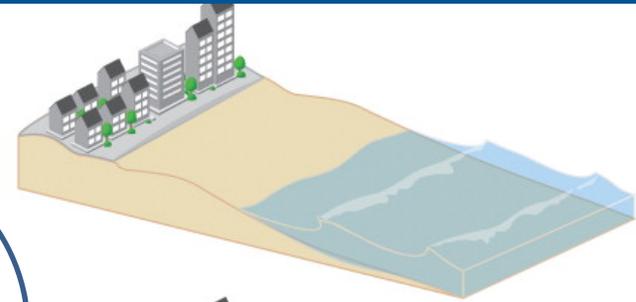
Future of our coasts: The potential for natural and hybrid infrastructure to enhance the resilience of our coastal communities, economies and ecosystems

Environmental Science & Policy, Volume 51, 2015, 137 - 148

<http://dx.doi.org/10.1016/j.envsci.2015.04.006>

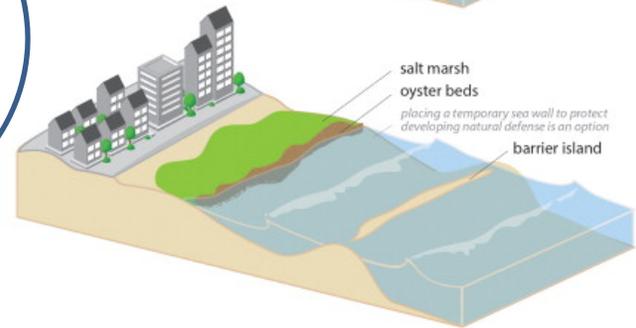
Minimal Defense

Many communities have developed right along the ocean with only minimal natural defenses from a small strip of beach between them and the ocean.



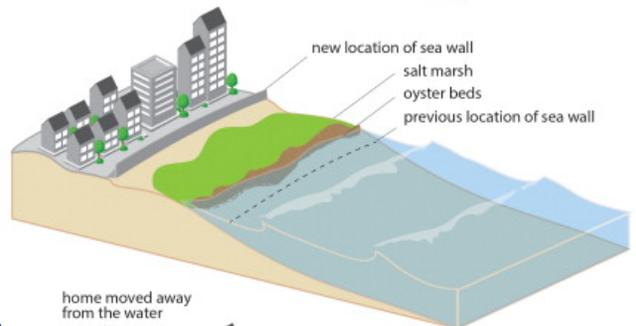
Natural

Natural habitats that can provide storm protection include salt marsh, oyster and coral reefs, mangroves, seagrasses, dunes, and barrier islands. A combination of natural habitats can be used to provide more protection, as seen in this figure. Communities could restore or create a barrier island, followed by oyster reefs and salt marsh. Temporary infrastructure (such as a removable sea wall) can protect natural infrastructure as it gets established.



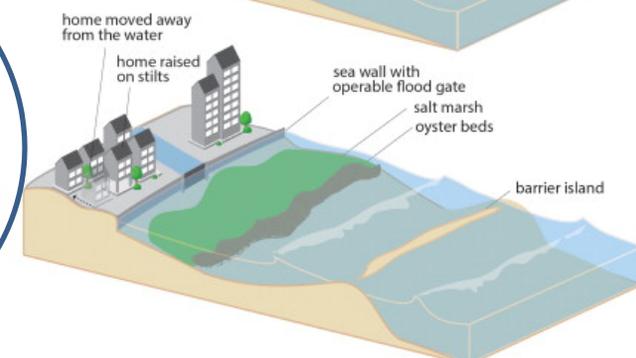
Managed Realignment

Natural infrastructure can be used to protect built infrastructure in order to help the built infrastructure have a longer lifetime and to provide more storm protection benefits. In managed realignment, communities are moving sea walls farther away from the ocean edge, closer to the community and allowing natural infrastructure to recruit between the ocean edge and the sea wall.

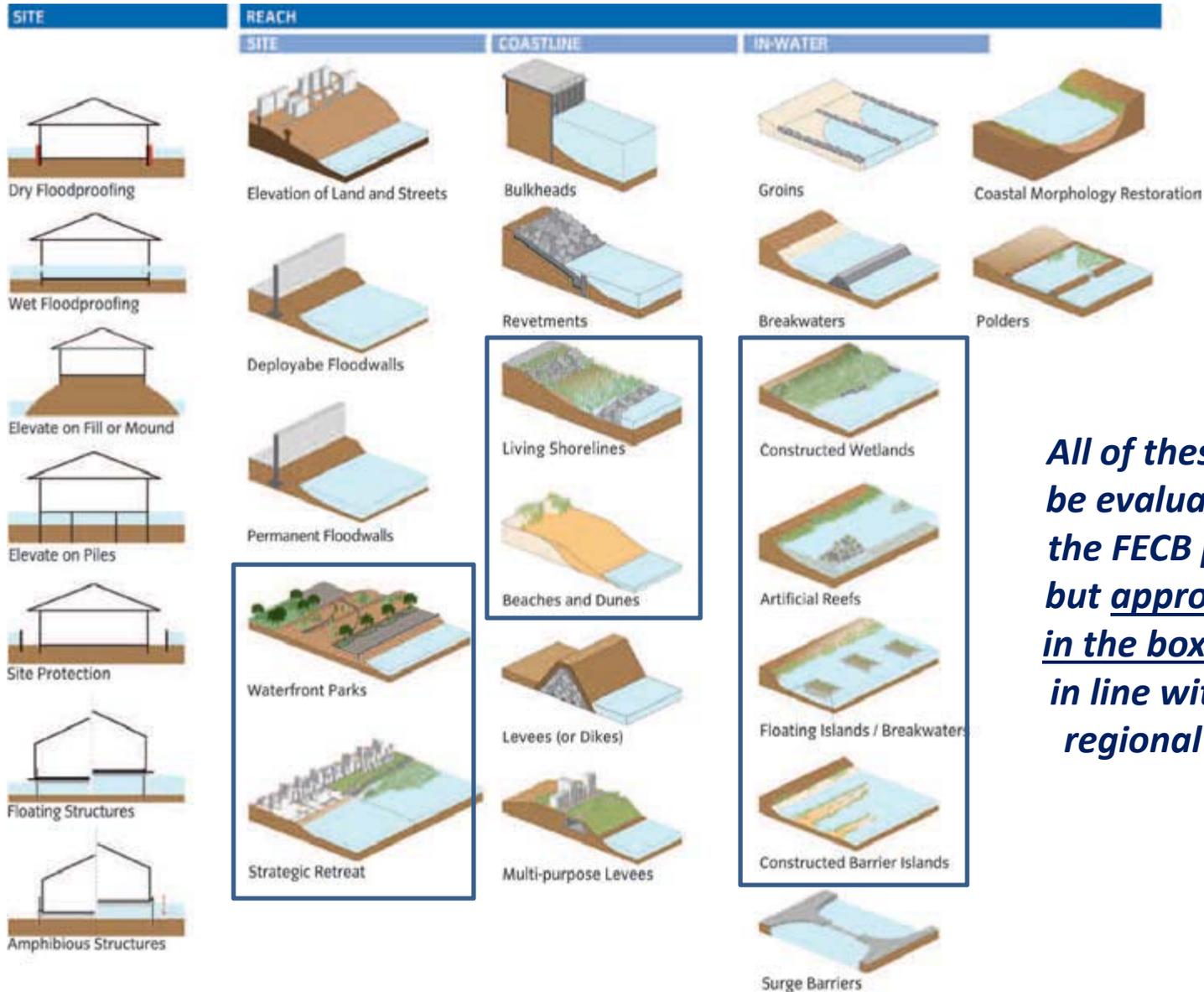


Hybrid

In the hybrid approach, specific built infrastructure, such as removable sea walls or openable flood gates (as shown here) are installed simultaneously with restored or created natural infrastructure, such as salt marsh and oyster reefs. Other options include moving houses away from the water and raising them on stilts. The natural infrastructure provides key storm protection benefits for small to medium storms and then when a large storm is expected, the built infrastructure is used for additional protection.



Examples from NYC Plan



All of these can be evaluated in the FECB plans, but approaches in the boxes are in line with the regional plan

Examples from the Real World

*Hempstead Harbor
Tidal Wetland
Restoration
(before & after)*

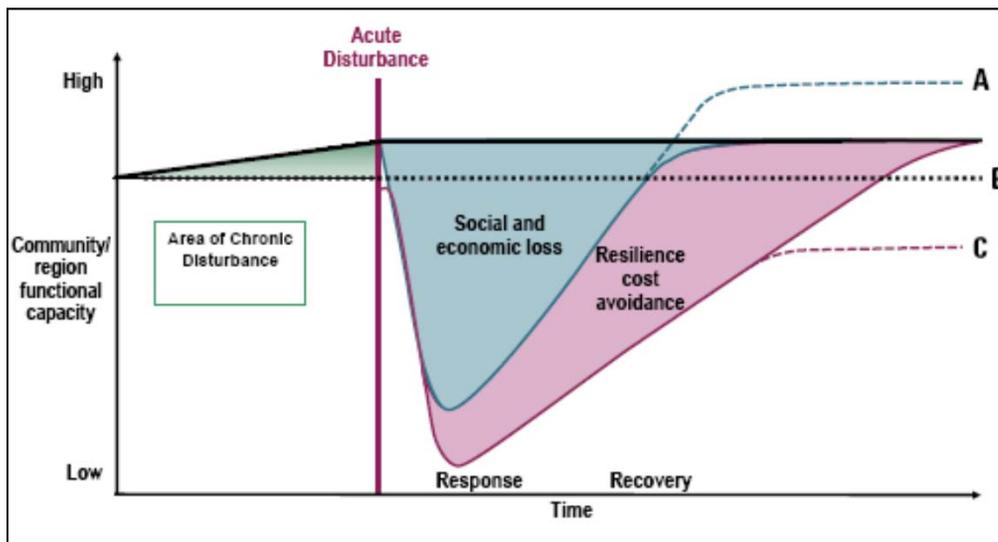


*Sconset Beach
buried sand
revetments,
Nantucket*



Risk Reduction Concepts

- Risk = frequency + vulnerability
- Vulnerabilities can remain static and risks will increase in the face of rising seas and increased coastal storm frequency or magnitude
- Vulnerabilities can be reduced to hold risk at bay
- If vulnerabilities can be reduced even further, then risks could be lowered, leading to increased resilience



Community and Regional Resilience Initiative (CARRI, 2011) “Resilience Loss Recovery Curve”

Project Approach

Four Project Components:

1. **Natural and Green Infrastructure Assessment***
2. **Community Resilience Engagement**
3. **Highest Priority Project Design***
4. **Regional Coastal Resiliency Plan**

***Consultant involvement**

Project Approach

Component #1:

- 1. Initial Inventory of Coastal and Riverine Projects and Plans – May 2015**
- 2. Opportunity Assessment of Coastal and Riverine Projects – June and July 2015**
- 3. Field/On-Site Assessments – June and July 2015**
- 4. Data Development – July and August 2015**
- 5. Regional Natural/Green Infrastructure Assessment – September 2015**

Project Approach

- **Component #2 will encompass community engagement (2015-2016)**
- **Component #3 is design of highest-priority projects (2016):**
 - **One conceptual design**
 - **One 30% design**
 - **One 60% design**
 - **One 90% design**
- **Component #4 will be development of a regional resilience plan that identifies all potential risk reduction projects – not only those four advanced to design stages (2016)**

Green Infrastructure and Hybrid Ideas

- *Must reduce risk to natural systems and/or people and infrastructure*
- Coastal
- Riverine – rivers in Fairfield that lead to tidal waters

Let's Review Existing Plans...

Fairfield Flood and Erosion Control Plan

Plan ID	Table ID	Name	Grant	Status	Potential Green Infrastructure?
1	F	Ash Creek to Jennings Beach	None	NA	Yes
2	G	South Benson pumping station	None	NA	No
3	H	Fairfield Beach Club barrier	None	NA	Maybe
4	N	Penfield Pavilion flood mitigation	CDBG-DR	Underway	No
5	I	Penfield Beach to Reef Road (aka Lalley Blvd to Reef Road barrier)	None	NA	Maybe
6		Perimeter dike for Pine Creek marsh	None	NA	Maybe
7	C	Pine Creek culvert replacement	CDBG-DR	Underway	No
8	D	WPCF hardening	CDBG-DR	Underway	No
9	E	Fairfield Beach Rd sluice gate addition	None	Underway	No
10		Dike at South Pine Creek Road	None	NA	Maybe
11	A	Pine Creek Avenue dike elevation	None	ACOE study	Maybe
12		Old Dam Road dike elevation	None	NA	Maybe
--	J	Fairfield Beach Rd turnaround seawall repair	None	Underway	No
--	K	Fairfield Beach Rd turnaround bulkhead repair	None	Underway	No

Additional Ideas from Hazard Mitigation Plan

- **Develop comprehensive protective infrastructure analysis of the Town's coast and waterways that incorporates natural (salt marsh, beaches, dunes, floodplains) and engineered infrastructure**
- **Protect and restore natural systems (salt marshes, beaches, dunes, floodplains/riparian areas, forested lands) on both watershed and full coastline scales, as well as diked and isolated wetlands to better withstand and absorb storm surges and flooding**
- **Consider increasing beach nourishment**
- **Renourish engineered beaches, Town and private beaches after storm events, including Fairfield Beach, Jennings Beach, Sasco Hill Beach and Southport Beach**
- **Factor sea level rise into all critical infrastructure, development plans, and public amenity improvements**
- **Extend dike in Southport along Harbor Road in the AE flood zone**

Additional Ideas from Hazard Mitigation Plan

- **Encourage green development and rehabilitation of existing impervious structures to reduce runoff generated in urbanized areas**
- **Explore building modifications, use of pervious road materials and green infrastructure designs to improve stormwater retention and reduce stormwater inflows into wastewater treatment system**
- **Install on site detention, relay new storm lines, incorporate bioswales and/or rain gardens in developed areas to help reduce or redirect runoff that contributes to flooding (i.e. in Fairfield Center and Railroad parking lot)**
- **Incorporate drainage improvements and best management practices to Grasmere Brook watershed to reduce flooding**