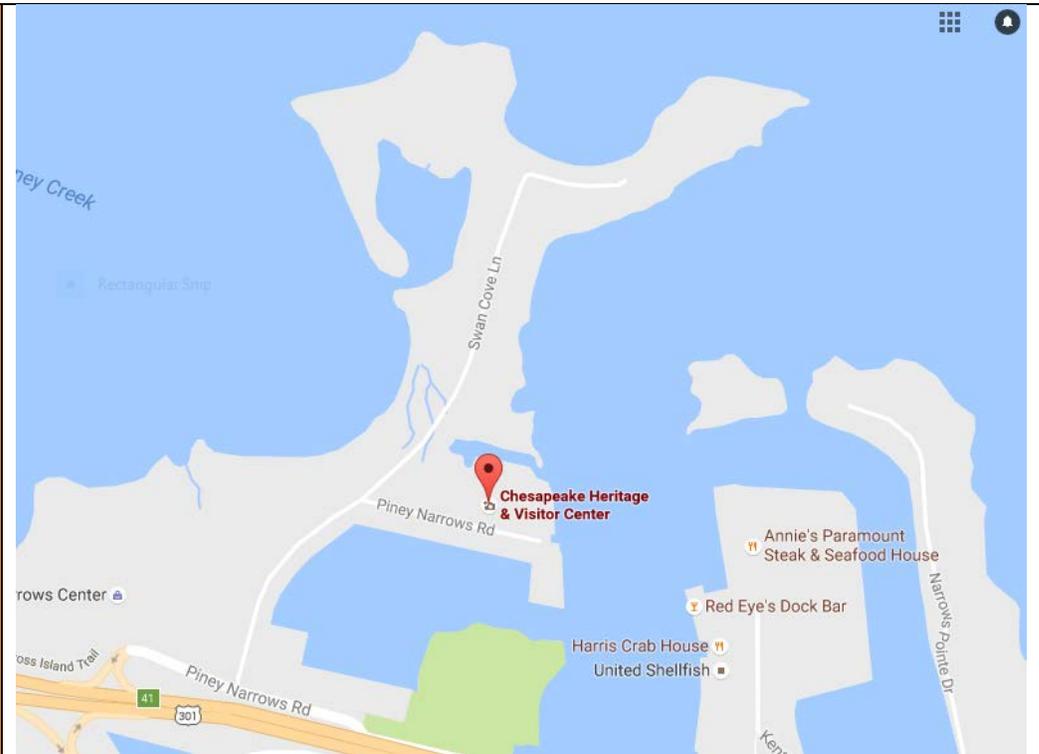


Prepared by:	Beatrice O'Connor	Organization:	University of Maryland
Supervisor:	Dr. Melissa Kenney		
Case Name:	Ferry Point Park Living Shorelines Project		
Address:	425 Piney Narrows Rd Chester, MD 21619		
Community:	Queen Anne's County		
Contact Person / People:	Dr. Melissa Kenney	Organization:	University of Maryland
Editor	Dr. Elisabeth Hamin	Organization:	UMass Amherst
Editor	Erica Roper MS	Organization:	UMass Amherst
Please contact researcher or supervisor for permission to contact	Phone:	Email:	

Executive Summary	
Research Question:	What federal, state and local policies affected the implementation of the Ferry Point Park and Harlem River Living Shorelines? What collaborative efforts led to the success of these shorelines?
Site Summary:	Ferry Point Park's living shoreline is a 41-acre area of marshland that is located in the Northern section of the park called the Kent Narrows in Chester Maryland. The shoreline is located within the Park, but is surrounded by a bridge, marina, houses, businesses and a transportation route. Prior to intervention, the site had suffered considerable erosion and wave destruction from the impact of tropical storms over the past two decades. Rate of erosion was 5-10 feet per year, with certain areas reaching 27 feet of erosion. (2) There are approximately 2600 linear acres of necessary vegetation restoration, and the shoreline fetch is approximately 19 miles NW with an 8-10 foot drop off the shore. (1)
Intervention Summary:	The Ferry Point Park Living Shoreline project was implemented to decrease erosion along the coast of the Northern Kent Island Narrows, through a collaborative effort of federal and state organizations. (2) Collaboration efforts for this project included the Army Corps of Engineers who provided consulting, the Maryland Department of Natural Resources' Program Open Space who created an innovative dredging technique to use sand from the Park, the National Oceanic and Atmospheric Administration's Coastal and Estuarine Land Conservation Program, Queen Anne's County, and volunteers through the Chesapeake Bay Foundation involved in vegetation planting The \$822,000 project received grant funding and the state of Maryland allocated the funds to Queen Anne's County to complete the shoreline. (1), (2) This project sought to combat erosion through the installation of profile stone sills, headland breakwaters, low marsh edging, stone dune spines, dredged sandy materials, and vegetation restoration. This natural infrastructure combats the high rate of erosion, to protect a major transportation route as well as businesses, marinas and private housing. Additional benefits of the living shoreline are to safeguard land and sea habitat, and improve the educational and recreational benefits of the park. (2)
Project Status Summary:	After almost six years of planning, the project was completed and opened to the public in June of 2014. (2)The process involved years of meetings between stakeholders to convince the involved parties that this was an adaptation project rather than a mitigation project, and to finalize grant funding. In 2015, the

	shoreline was revisited and adjusted to improve the effectiveness of the infrastructure by adding cobblestones to the breakwater structures.(1)
Case Study Status and Next Steps:	The case study was completed in August of 2016, through the use of secondary sources and personal interviews by an undergraduate student at the University of Maryland.

Site Overview	
Category/ Questions	Summary/Details
Site Summary (conditions prior to intervention):	Prior to intervention, the shoreline had suffered considerable erosion and wave destruction from the impact of tropical storms over the past two decades, endangering important transportation routes, tourist attractions, private properties, and marinas .
Climate Protection Infrastructure (prior to intervention):	
Image (if accessible):	 <p>Shoreline before restoration. (2)</p>

<p>Map(s):</p>	 <p>(6)</p>
<p>Case Area Scale (Site, neighborhood, community, city, region):</p>	<p>The area is a low-lying coastal plain, where the shoreline is within a park that is surrounded by an urban community. (4) This community includes marinas with a large number of boats, a nearby bridge, private housing, and tourist attractions such as restaurants and shops. (1)</p>
<p>Type of Region (Ecosystem/natural, rural/agricultural, suburban, urban):</p>	<p>The regions is an urban, coastal community located on a peninsula in Kent Island. (4)</p>
<p>Land/Cityscape Character (Estimate of percent of surrounding area that is permeable):</p>	<p>While the shoreline is located within a natural park, it is surrounded by an urbanized community. The Park is considerably smaller than the surrounding, built up area.</p>
<p>Median Income:</p>	<p>The median income of this community is \$91,691. (5)</p>
<p>Type of Climate:</p>	<p>Temperate with four seasons.</p>
<p>Assessed 1% Chance Flood Risk:</p>	
<p>Assessed 0.2% Chance Flood Risk:</p>	
<p>Assessed Sea Level Rise Risk:</p>	<p>If sea level rise continues to rapidly occur, it will further endanger the transportation routes, businesses, marinas and private homes in the surrounding area.</p>
<p>Implications if No Action is Taken:</p>	<p>The primary implication if no action is taken, is that the transportation routes, businesses, marinas and private houses in the surrounding community will become more vulnerable to extreme weather events. Other implications include that the Park will suffer considerable damage, and the land and sea habitat of local species will be harmed.</p>

Intervention Overview

Category/ Questions	Summary/Details
<p>Type of Intervention:</p>	<p>The Ferry Point Park Living Shoreline used a natural infrastructure approach for storm protection along the Kent Island Narrows. The shoreline was restored in a U shape to protect the area surrounding the shoreline, including restoration techniques such as:</p> <ul style="list-style-type: none"> • 3 Low profile stone sills • 2 sections of low marsh edging • 3 headland breakwaters • 2 sections of stone dune spines • Dredged approximately 18,000 cubic yards of sandy material • Beach nourishment, marsh and dune habitat creation from suitable dredged material <p>(1)</p>
<p>Intervention Summary:</p>	<p>The project was successfully implemented through the collaborative efforts of federal and state organizations. Collaboration efforts for this project included the Army Corps of Engineers who provided consulting, the Maryland Department of Natural Resources' Program Open Space who created an innovative dredging technique to use sand from the Park, saving \$146,000, the National Oceanic and Atmospheric Administration's Coastal and Estuarine Land Conservation Program, Queen Anne's County, and volunteers through the Chesapeake Bay Foundation involved in vegetation planting. (1), (2)</p>
<p>Project Catalyst:</p>	<p>The project catalyst was a push from various sectors of the community such as local industry and private houses within the community who wanted increased storm protection measures. This protection was the primary goal, as transportation routes, businesses, marinas and private households became vulnerable to climate threats. (1) Similarly, a secondary goal was highlighted from residents in the community to improve the recreational and educational benefits of the shoreline by limiting erosion on the shore to protect the beach, and educate on living shorelines. There was also involvement from environmental groups who wanted to safeguard the habitat of local species along the coast who were losing habitat from erosion. (2)</p>
<p>Project Goals:</p>	<p>The primary goal of the project was to combat erosion of the shoreline through restoration efforts in order to protect millions of dollars worth of economic activity including</p> <ul style="list-style-type: none"> • Marinas • Houses • Restaurants • Bridges <p>Additional goals included improving the park's shoreline for educational and recreational activities by preserving the beach from erosion, and safeguarding land and sea habitat that houses species such as bald eagles, horseshoe crabs, ospreys and terrapins. (2)</p>
<p>What was it that resulted in green infrastructure inclusion in the project?</p>	<p>Though Ferry Point Park qualified to use built infrastructure under the 2008 Living Shoreline Protection Act, (7) the Maryland Department of Natural Resources wanted to use the this living shoreline as a demonstration of the benefits of natural infrastructure. These benefits included demonstrating their economic efficiency, ability for community involvement, and increased</p>

	<p>ecosystem services to improve the coast. Collaboration efforts for this project included the Army Corps of Engineers who provided consulting, the Maryland Department of Natural Resources' Program Open Space who created an innovative dredging technique to use sand from the Park, saving \$146,000, the National Oceanic and Atmospheric Administration's Coastal and Estuarine Land Conservation Program, Queen Anne's County, and volunteers through the Chesapeake Bay Foundation involved in vegetation planting. (1)</p>
<p>Intervention Lead /Scenario:</p>	<p>The Ferry Point Living Shoreline Project was led by the Department of Natural Resource's Open Space program, and was designed by Sustainable Science LLC and constructed by Shoreline Design LLC. (1)</p>
<p>Cost of Intervention:</p>	<p>The project grant was for \$1,000,000, but the project was under budget, only costing \$822,200. (1)</p>
<p>Funding for Intervention:</p>	<p>Funding was provided by a Maryland state government grant and allocated to Queen Anne's county to use for the project. (1)</p>
<p>Image (if accessible):</p>	
<p>Stage of Intervention and construction start and end dates:</p>	<p>Construction took five year of planning and five months of construction, and additional adaptive monitoring. The planning process was slow, due to a lack of grant funding and the perception that this was a mitigation, rather than an adaptive project. The living shoreline was finally constructed in late 2013, and opened to the public in June 2014. A year after its implementation, the shoreline was adjusted because it was not as successful as anticipated. Cobblestone was added to the three headland breakwaters, creating a dual system that built up the structure and provided more protection. (1)</p>



Data for Gradients

Exposure Reduction	
Definition: Performance of project in reducing risks to human, ecological, social and economic resources.	
Category/ Questions	Summary/Details
Summary:	The Ferry Point project utilized natural infrastructure in the form of a living shoreline, which has shown to become stronger over time.
Details:	<p>The project shoreline was completed and opened to the public in June of 2014. As stated above, adjustments were made to the headland breakwaters in 2015 by adding cobblestone to the structure, and the shoreline has shifted from natural causes.</p> <p>See Site Summary for space availability. Through the combination of restoration techniques, erosion is estimated to decrease. There does not appear to be negative impacts on surrounding vegetation, and no structures had been obstructed.</p>

Institutional Capacity	
Definition: Project match to and uplift for governmental or non-governmental strengths, attributes, and resources that reduce impacts, mitigate harm, and ensure future resilience. Congruity between project costs, available funds, and ability of responsible agency to support costs over time.	
Category/ Questions	Summary/Details
Summary:	Because funding came from the state government and was allocated to the county government, the county was actively involved in the process. (1) Similarly, the shoreline is located within Ferry Point Park, and will be maintained in the same fashion as the Park.
Details:	The Maryland Living Shoreline’s Protection Act of 2008 mandates that communities must use natural infrastructure in place of built infrastructure whenever feasible. (7)

	The planning process was slow, due to a lack of grant funding and the perception that this was a mitigation, rather than an adaptive project.
--	---

Cost Efficiency	
Definition: Positive cost-benefit outcomes, least-cost or low cost solutions.	
Category/ Questions	Summary/Details
Summary:	This living shoreline project was completed under-budget, primarily based from the Department of Natural Resources dredging techniques.
Details:	The project was allocated \$1,000,000 but only used \$822,000. (1) There does not appear to be additional information on who will perform maintenance of the shoreline, so it is assumed the duty will be given to those who maintain Ferry Point Park in the county.

Ecological Enhancement	
Definition: Project preserves and supports long-standing natural processes or creates/mimics/replaces such systems.	
Category/ Questions	Summary/Details
Summary:	The ecological benefits of the shoreline are decreased erosion, safe guarding the habitat of local species, and vegetation restoration through the use of native plants. There were little impacts on surrounding vegetation during construction. (1)
Details:	Though the Ferry Point Park project qualified for a waiver to use built infrastructure, a living shoreline was still employed. This demonstrates the state of Maryland’s support of using living shorelines, and making the permitting process accessible. (1)

Adaptation Over Time	
Definition: Expected ability to respond to a changing climate as well as other social, economic and ecological variation over time, either as a function of design or through anticipated monitoring and assessment.	
Category/ Questions	Summary/Details
Summary:	The cobblestones have been successful in strengthening the function of the shoreline, and this shows that monitoring after the completion of the project did occur. (1)
Details:	If sea level rise continues to rapidly occur, it would have further endangered the transportation routes, businesses, marinas and private homes in the surrounding area. This project helps protect those assets from future damage.

Greenhouse Gas Reduction	
Definition: Anticipated ability of project to minimize current or future greenhouse gases, either through low embodied energy or long-term efficiencies.	
Category/ Questions	Summary/Details
Summary:	Projects that protect existing vegetation while utilizing living shoreline techniques are ideal for reducing greenhouse gases. It can be assumed that the vegetation restoration will benefit the surrounding area.

Details:	No additional information available.
----------	--------------------------------------

Participatory Process	
Definition: Community involvement and public transparency in planning, design, and implementation of the project.	
Category/ Questions	Summary/Details
Summary:	The park was a collaborative effort between Queen Anne’s County and the state of Maryland.
Details:	The project catalyst was a push from various sectors of the community such as local industry and private houses within the community who wanted increased storm protection measures.

Equitable Outcomes	
Definition: Whether the distribution of costs, benefits, and impacts achieves justice goals as defined by stakeholders and provides co-benefits to local communities such as jobs, public health, or other locally desired outcomes.	
Category/ Questions	Summary/Details
Summary:	The community is predominately wealthy, with the median income hovering around \$90,000, with the majority of the population having adequate housing and facilities. (5) Due to the park’s location, the protection of the park applies to an array of public and private land.
Details:	By protecting important transportation routes, different communities along the coast will also benefit from the shorelines implementation.

Story of The Intervention	
Who did what, why, using what process, and how did it work out? (In this section we will provide more of a narrative of the project based on interviews with stakeholders)	

Appendix 1: Profile of Site Conditions		
Site Conditions (relate to Site Overview Section)	Prior to Intervention	After Intervention
Site Size		
Type of Site		
Shape of Site		
Existing Climate Protection Infrastructure		
Regional Characteristics (relate to Site Overview Section)		
Census Spatial Reference		
Type of Region		
Census Tract Land Area		
Population		5716 (5, S0101)
Population Change Since 2001		
Population Density		

Median Age		41.8 (5, S0101)
Median Income		\$91,691 (5, S1901)
Type of Coastline		
Type of Climate		
Transportation Infrastructure (relate to Fit to Site and Off-Site Impacts within Technical and Ecological Fitness Section)		
Relationship to Airport		
Port/Dock Infrastructure		
Public Transportation		
Key Road Infrastructure		
Lighthouse		
Fishing Landing Sites		
Urban Conditions (relate to Fit to Site and Off-Site Impacts within Technical and Ecological Fitness Section)		
Occupied Housing Units		2,109 (5, S2504)
Percent of Housing Units Built before 1960		7.3% (5, S2504)
Predominant Type of Housing		Single family detached (5, S2504)
Percent of Predominant type of housing		69.6% (5, S2504)
Protected Areas or Sites		
Public Bathing Beaches		
Ratio of Permeability		
Utilities and Services (relate to Fit to Site and Off-Site Impacts within Technical and Ecological Fitness Section)		
Combined Sewer Overflow Outfall		
Broadband/ Wi-Fi		
Electric/ Gas Service		
Health Centers		
Fire Stations		
Police Precincts		
Supermarkets		
Emergency Shelters		
Ecological Conditions (relate to Ecological Cost & Benefit within Technical and Ecological Fitness Section)		
Water Quality		
Landuse		
Wave Height		
Peak Wave Period		
Salt Concentration		
Circulation Patters		
Soil Type/ Conditions		
Native Vegetation		
Sea Level		
Social Conditions (relate to Environmental / Justice Distributional Equity within Ethical and Policy Fitness Section)		

People Living in Poverty		3.2% (5, S2201)
Percent Immigrant		127 (5, S2201)
Percent of Population Without Health Insurance		
Percent of Limited English Speaking Households		0% (5, S1602)
Percent with Less than a High School Education		168 (5, S2701)
Percent with Bachelor’s Degree or Higher		1635 (5, S2701)
Percent of Population Older than 65 Years Old		12.7% (5, S0101)
Primary Resident Race		White (5, S2201)
Percent of Primary Race		98.3% (5, S2201)
Federal Empowerment Zone		
Households with One or More People on Disability		17.5% (5, S2201)
Urban Conditions (relate to Environmental / Justice Distributional Equity within Ethical and Policy Fitness Section)		
Percent of Housing Units Rental Units		22.5% (5, B25036)
Housing Units with Complete Plumbing Facilities		99.2% (5, S2504)
Housing Units with Complete Kitchen Facilities		100% (5, S2504)
Housing Facilities with No Utility Provided Heating Fuel		.5% (5, S2504)
Housing Units with Telephone Service Available		97.7% (5, S2504)
Housing Units with No Vehicle Available		1.4% (5, S2504)
Political Conditions (relate to Political & Regulatory Feasibility within Ethical and Policy Fitness Section)		
Policy Features		
Political Capacity		
Political Structure		
Regulatory Capacity		
Community Conditions (relate to Social Capacity of Institutions within Social and Community Fitness Section)		
Community Concerns		
Community Organization Capacity		
Requests for Community Services		
Risk Conditions		
Assessed 1% Chance Flood Risk		
Maximum 1% Annual Wave Crest		
Assessed 0.2% Chance Flood Risk		
Assessed Sea Level Rise Risk		
Implications if No Action is Taken		
Hurricane Evacuation Zone		

Appendix 2: Interview Transcript	
Introductory Questions	
At what point did you become involved in the _____ project and what is your role?	
Why Chosen - Enabling Factors (Why here? Why then? Why this design?)	

In your opinion what was the catalyst for this project?	
What specifically enabled green infrastructure inclusion in this project?	
Are there any specific people or organization that were pivotal in enabling creative solutions?	
Who are the primary beneficiaries (distribution of costs and benefits)?	
Were there factors that made GI difficult?	
How well is it working out	
How well has the infrastructure performed in major climate events?	
Is infrastructure being monitored and benchmarked? What criteria are being monitored?	
What outcomes have you seen from the project?	
Has there been dramatic change in the neighborhood since the project, and do you think it was because of this?	
Story	
Do you see this project as influential on future projects?	
Can you tell me the story of _____ as you understand it? (Follow up if necessary.)	

Sources:

- (1) Dr. Subramabian, Bhaskar. Program Manager at the Maryland Department of Natural Resources. Personal Interview. 21 July 2016
- (2) "DNR and Partners Restores Shoreline at Ferry Point Park." Natural Resources News. N.p. 30 Jan. 2014. Web. 27 July 2016
- (3) Shaum, Jack, "Ferry Point Park Dedicated." *My Eastern shore MD*. N.p. , 19 Nov. 2009. Web. 27 July 2006.
- (4) "Development of Maryland Shoreline Inventory Methods and Guidelines for Talbot County". Comprehensive Coastal Inventory Program, Center for Coastal Resources Management
- (5) U.S. Census Bureau, 2010-2014 American Community Survey 5-Year Estimates
- (6) <https://www.google.com/maps/place/Chesapeake+Heritage+%26+Visitor+Center/@38.9761113,-76.2535478,16z/data=!4m5!3m4!1s0x89b8106a6d34b5dd:0x26cfa1a2db25d070!8m2!3d38.9748811!4d-76.2492992>
- (7) "Maryland's Living Shoreline Protection Act of 2008 (HB 973)." *Maryland Living Shoreline Protection Act 2008*. Adaptation Clearinghouse, 22 Apr. 2008. Web. 11 Aug. 2016.