

What's Your Port Worth?

Tips and Tools for Valuation

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NOAA Office for Coastal Management

Digital Coast

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Our Team



OFFICE FOR COASTAL MANAGEMENT

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION



Kate Quigley



Dr. Lauren Knapp

Warm-Up Question

What sort of economic questions are you asking yourself regarding your port or region?



Economics in Coastal Management

Management Context

- Decisions need to be made
- **Questions arise**
- Grant applications require economic analyses
- Economic analyses help provide answers

What is the **best use** of the money?

Which project **has the highest ROI**?

Do the **costs outweigh the benefits**?

How many jobs will it generate?

Management Context

→ Challenges arise,
specifically with
benefit-cost analysis

*“I can’t estimate all benefits
due to lack of data.”*

*“The **data needed for
my region don’t exist**
and I don’t have time or
money to gather it.”*

*“Benefits are **disparate**
and **uncertain.**”*

*“How do I **incorporate
equity concerns?**”*

Association of Pacific Ports: Examples

PORT OF SAN DIEGO APPROVES AGREEMENT FOR SOUTH SAN DIEGO BAY WETLANDS RESTORATION AND ENHANCEMENT EFFORTS



March 10, 2021 — As part of efforts to protect and enhance San Diego Bay's natural resources, the Port of San Diego Board of Port Commissioners has approved a Memorandum of Understanding (MOU) with the U.S. Fish & Wildlife Service San Diego National Wildlife Refuge Complex and Poseidon Resources to coordinate on wetlands restoration and enhancement in south San Diego Bay.

ELECTRIC STACKING CRANES ENTER SERVICE AT PORT OF LONG BEACH



March 9, 2021 — SSA Marine is now operating the first of nine electric container yard cranes at the Port of Long Beach's Pier J, marking a significant milestone in a goal to transition to zero emissions terminal equipment by 2030.



Types of Economic Analyses

Tell a story about benefits



Case Studies

Focus Groups

Interviews

Literature Review

Surveys

EXAMPLE

Inform people about the benefits of natural infrastructure to decrease flooding



Show benefits of specific project



Case Studies

Benefits Valuation

Benefit-Cost Analysis

Input-Output Analysis

EXAMPLE

Show benefits of making improvements to a beach and adjacent wetland



Compare projects with similar benefits



Cost-Effectiveness Analysis

Benefit-Cost Analysis

Input-Output Analysis

EXAMPLE

Select the least expensive strategy in decreasing erosion in a coastal community



Calculate if benefits exceed costs



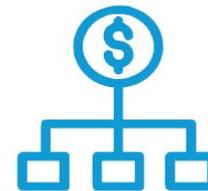
Benefit-Cost Analysis

EXAMPLE

Calculate the return on investment of using living shorelines to decrease storm surge during hurricanes



Estimate how project spending flows thru economy



Input-Output Analysis

EXAMPLE

Estimate how port redevelopment will impact jobs and Gross Domestic Product (GDP) in the coastal economies located nearby



Show value of the coastal and or marine economy



Regional Economic Accounting

Input-Output Analysis

EXAMPLE

Estimate employment and Gross Domestic Product (GDP) in the recreation and tourism sector



Tell a story about benefits	Show benefits of specific project	Compare projects with similar benefits	Calculate if benefits exceed costs	Estimate how project spending flows thru economy	Show value of the coastal and or marine economy
					
<p>Case Studies</p> <p>Focus Groups</p> <p>Interviews</p> <p>Literature Review</p> <p>Surveys</p>	<p>Case Studies</p> <p>Benefits Valuation</p> <p>Benefit-Cost Analysis</p> <p>Input-Output Analysis</p>	<p>Cost-Effectiveness Analysis</p> <p>Benefit-Cost Analysis</p> <p>Input-Output Analysis</p>	<p>Benefit-Cost Analysis</p>	<p>Input-Output Analysis</p>	<p>Regional Economic Accounting</p> <p>Input-Output Analysis</p>
<p>EXAMPLE</p> <p>Inform people about the benefits of natural infrastructure to decrease flooding</p>	<p>EXAMPLE</p> <p>Show benefits of making improvements to a beach and adjacent wetland</p>	<p>EXAMPLE</p> <p>Select the least expensive strategy in decreasing erosion in a coastal community</p>	<p>EXAMPLE</p> <p>Calculate the return on investment of using living shorelines to decrease storm surge during hurricanes</p>	<p>EXAMPLE</p> <p>Estimate how port redevelopment will impact jobs and Gross Domestic Product (GDP) in the coastal economies located nearby</p>	<p>EXAMPLE</p> <p>Estimate employment and Gross Domestic Product (GDP) in the recreation and tourism sector</p>
					

Tell a story about benefits



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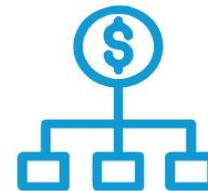


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A WORD ABOUT TERMINOLOGY



- “Economic Impact”
- “Return on Investment”
- “Cost effectiveness”

Regional Economic Accounting

Provides economic indicators of value by industry code (NAICS)

OUTPUTS

→ Establishments, gross domestic product, wages, jobs



ENOW: Economics National Ocean Watch (incl. the Great Lakes)

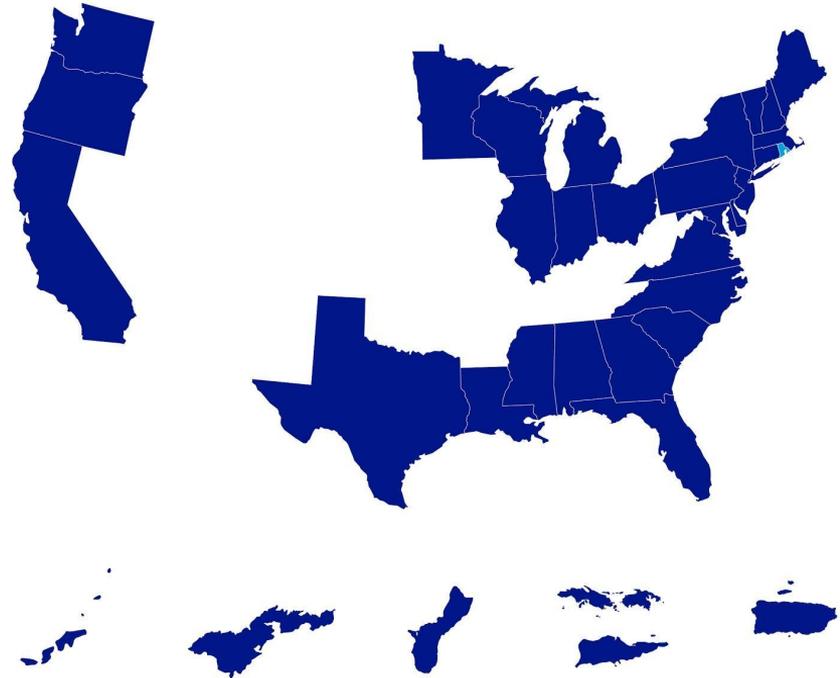


- Employment statistics for jobs dependent on marine resources
- Comparable across time and geography
- Baseline information for what may be at risk
- Companion statistics for self-employed workers

coast.noaa.gov/digitalcoast/data/enow.html

Areas included

- 30 coastal states & their counties
- All five U.S. territories (over the next three years)



for these sectors.



Living resources
(includes commercial fishing, aquaculture)



Government, research and education, and energy
(coming soon)



Marine Construction



Oil and natural Gas extraction



Marine Transportation



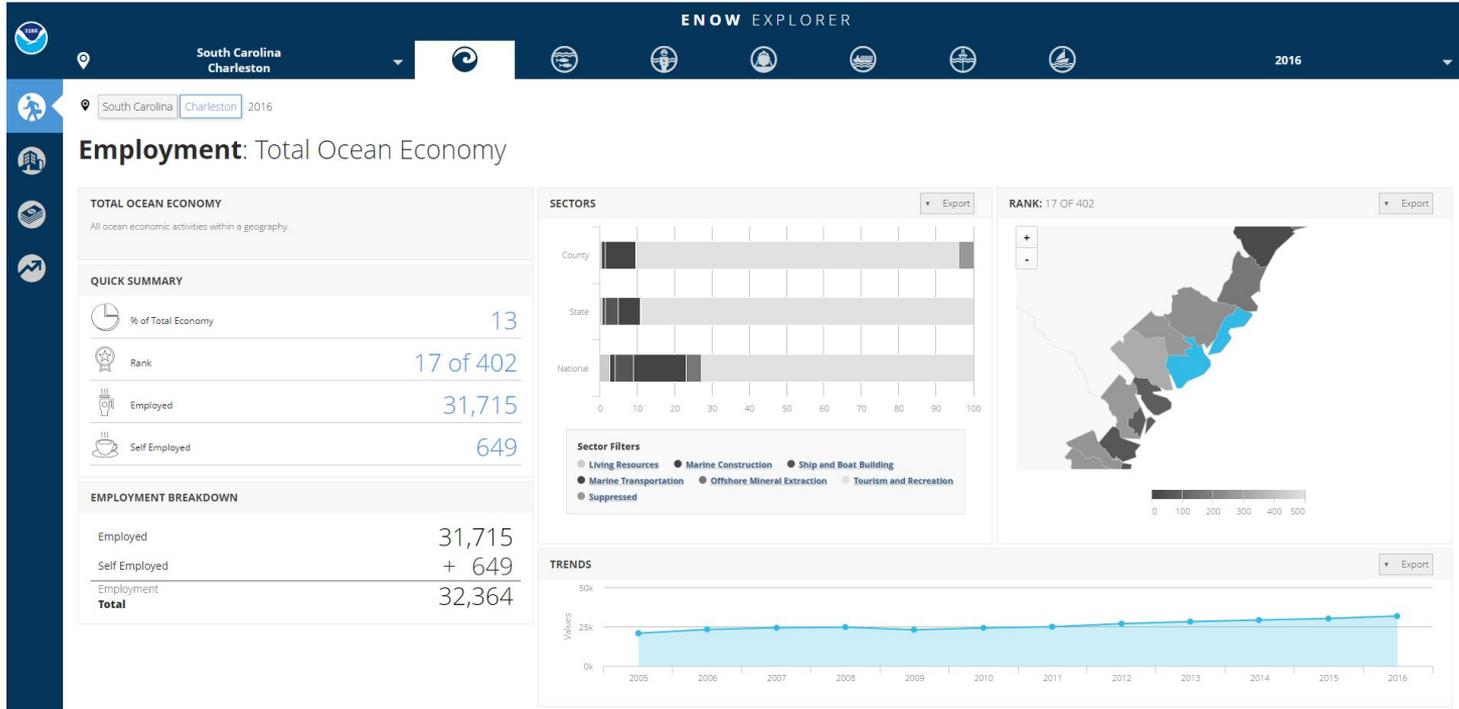
Ship and boat building
(includes repairs)



Tourism and recreation

ESTABLISHMENTS | JOBS | WAGES | GROSS DOMESTIC PRODUCT

ENOW Explorer



Quick Report Tool for Socioeconomic Data



Quick Report Tool for Socioeconomic Data

1

Coastal Economy (Employment Data) ?

Coastal Shoreline Counties ?

2

Select a Region ?

Select a State ?

Apply

Select a County ?

Anchorage Municipality, AK

3

Select Year ?

Apply

Reset Filters

GeoName	Year	Sector	Establishments	Employment	Wages	GDP
Anchorage, AK	2015	Manufacturing	161	2,026	\$93,728,953.00	\$299,204,592.00
Anchorage, AK	2015	Financial Activities	678	7,106	\$424,286,349.00	\$4,119,023,514.00
Anchorage, AK	2015	Other Services	782	5,433	\$211,664,666.00	\$499,280,967.00
Anchorage, AK	2015	Professional and Business Services	1,777	20,048	\$1,319,437,068.00	\$2,490,476,442.00
Anchorage, AK	2015	Construction	917	8,304	\$684,911,631.00	\$1,123,721,241.00
Anchorage, AK	2015	Leisure and Hospitality	828	17,521	\$416,697,468.00	\$856,669,536.00
Anchorage, AK	2015	Information	152	4,050	\$288,119,096.00	\$1,005,996,148.00
Anchorage, AK	2015	Education and Health Services	1,132	25,091	\$1,260,887,467.00	\$1,883,138,518.00
Anchorage, AK	2015	Public Administration	121	12,803	\$898,539,823.00	\$4,517,427,405.00
Anchorage, AK	2015	Natural Resources and Mining	96	3,927	\$720,046,515.00	\$3,623,547,450.00
Anchorage, AK	2015	Total, all industries	8,369	153,811	\$8,782,782,910.00	\$25,977,478,367.00
Anchorage, AK	2015	Trade, Transportation, and Utilities	1,548	34,999	\$1,716,970,774.00	\$5,829,709,304.00
Anchorage, AK	2014	Financial Activities	671	7,181	\$409,959,427.00	\$4,104,721,996.00
Anchorage, AK	2014	Education and Health Services	1,101	24,666	\$1,190,327,456.00	\$1,771,040,643.00
Anchorage, AK	2014	Public Administration	118	12,896	\$891,485,093.00	\$4,278,052,690.00
Anchorage, AK	2014	Trade, Transportation, and Utilities	1,546	34,539	\$1,675,140,350.00	\$5,978,419,131.00
Anchorage, AK	2014	Manufacturing	162	2,076	\$97,902,392.00	\$288,333,286.00
Anchorage, AK	2014	Professional and Business Services	1,770	20,110	\$1,310,210,197.00	\$2,575,578,871.00
Anchorage, AK	2014	Information	146	3,988	\$271,912,543.00	\$1,005,421,555.00
Anchorage, AK	2014	Construction	902	8,264	\$664,826,448.00	\$1,231,685,437.00
Anchorage, AK	2014	Other Services	761	5,490	\$208,212,573.00	\$482,045,841.00
Anchorage, AK	2014	Natural Resources and Mining	99	3,770	\$660,186,032.00	\$4,862,822,778.00
Anchorage, AK	2014	Leisure and Hospitality	800	17,256	\$395,351,043.00	\$786,779,335.00
Anchorage, AK	2014	Total, all industries	8,338	153,814	\$8,552,677,193.00	\$28,232,417,682.00
Download CSV						\$778,194,467.00

coast.noaa.gov/quickreport

Coastal County Snapshots

Flood Exposure Snapshot

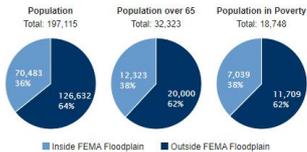
Saint Johns County, Florida

COASTAL COUNTY SNAPSHOTS
coast.noaa.gov/snapshots/

**People + Floodplains = Not Good
High-Risk Populations + Floodplains =
Even Worse**

The more homes and people located in a floodplain, the greater the potential for harm from flooding. Impacts are likely to be even greater when additional risk factors (age, income, capabilities) are involved, since people at greatest flood risk may have difficulty evacuating or taking action to reduce potential damage.

Based on [2009-2013 American Community Survey 5-year Summary File data](#).

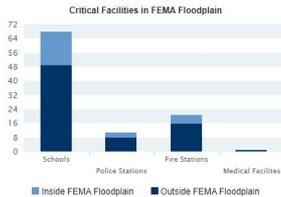


Community Infrastructure + Floodplains = Bad News

27% of critical facilities in Saint Johns County, Florida, are within the floodplain.

Hospitals, Roads, Schools, Shelters. These facilities play a central role in disaster response and recovery. Understanding which facilities are exposed, and the degree of that exposure, can help reduce or eliminate service interruptions and costly redevelopment. Incorporating this information into development planning helps communities get back on their feet faster.

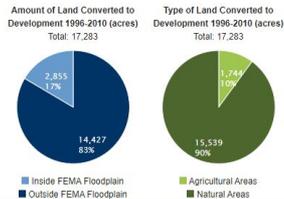
Based on [USGS Structures Database](#).



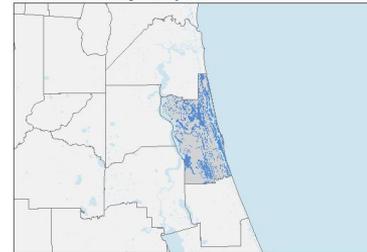
**Increasing Development in Floodplains = More People in Harm's Way
Loss of Natural Buffers = Less Protection**

A county with more natural areas (wetlands, forests, etc.) and less development within floodplains typically has lower exposure to flooding. A county that monitors land cover changes within the floodplain will detect important trends that indicate whether flood exposure is increasing or decreasing. Armed with this information, local leaders can take steps to improve their safety and resilience.

Based on [NOAA Land Cover Data](#).



Saint Johns County Floodplain



Legend:
■ Outside FEMA Floodplain
■ Inside FEMA Floodplain
■ Water
 Note: This map may not represent the county's entire floodplain.

Next Steps

Through adaptation planning, all communities can be better prepared to face coastal hazards. While each community is different, there are some basic steps that all communities can follow to become more resilient.

- 1. Know your risks** – If your county has a hazard mitigation plan, get a copy of it from your county emergency management office or the [Federal Emergency Management Agency \(FEMA\)](#). Having county information about potential hazards, vulnerabilities, and priority hazard mitigation projects is important. Use the [Coastal Flood Exposure Mapper](#) to create maps showing exposure to coastal flood hazards in your community. The [Using Flood Exposure Maps](#) webinar can help you get started.
- 2. Develop a team** – To see the issues and opportunities from as many perspectives as possible, engaging a diverse group of stakeholders is always a good idea. The [County Snapshots](#) are used to help people visualize the issues.
- 3. Know what resources are available** – Federal and state agencies have funds available for risk reduction activities. See the funding opportunities listed below to learn more. There are also data and tools available to help people visualize the issues and solutions. For information on creating inundation maps for your community, visit the Visualization section of the [Coastal Inundation Toolkit](#).
 Funding Sources
 - FEMA
 - NOAA Coastal Management Program
- 4. Discover what others are doing** – See how other communities are addressing these issues. Visit the discover section of the [Coastal Inundation Toolkit](#). You may also contribute a story about your community efforts.

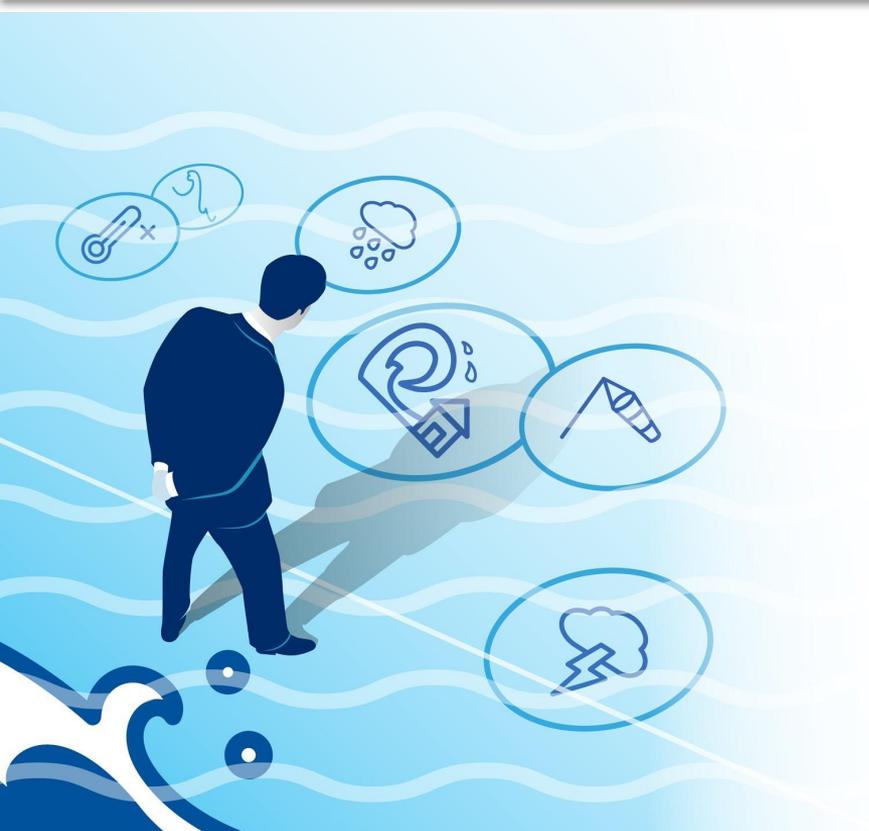
Additional information and resources can be found within the Digital Coast's [Coastal Inundation Toolkit](#).

[Frequently Asked Questions](#)

Data Sources for This Snapshot

- [Flood Zones](#) – Based on FEMA 1% annual chance flood zones
- [Critical Facilities](#) – USGS Structures Database
- [Demographic Data](#) – NOAA
- [Land Cover Data](#) – NOAA

How Do People Use ENOW?



- Coastal resilience planning
- Economic impact assessments from sea level rise & storms
- Industry advocacy
- Economic and job development

The Value of Rhode Island's Blue Economy

Executive Summary

March 2020

Rhode Island's blue economy: the industries with a connection to our coasts and ocean, higher education and research institutions, marine-focused advocacy and civic groups, and government agencies that contribute to building a workforce, invest in sustainable growth and innovation, while planning for the protection of our coasts and oceans.

Rhode Island makes significant contributions to the blue economy here, nationally, and globally. In fact, about 6-9% of Rhode Islanders work within the state's ocean economy, a sector with a direct impact of more than \$5 billion.

THE UNIVERSITY
OF RHODE ISLAND
GRADUATE SCHOOL
OF OCEANOGRAPHY



Sea Grant
Rhode Island

ASSESSING SOUTH CAROLINA'S OCEAN ECONOMY

2020 REPORT BY THE S.C. SEA GRANT CONSORTIUM

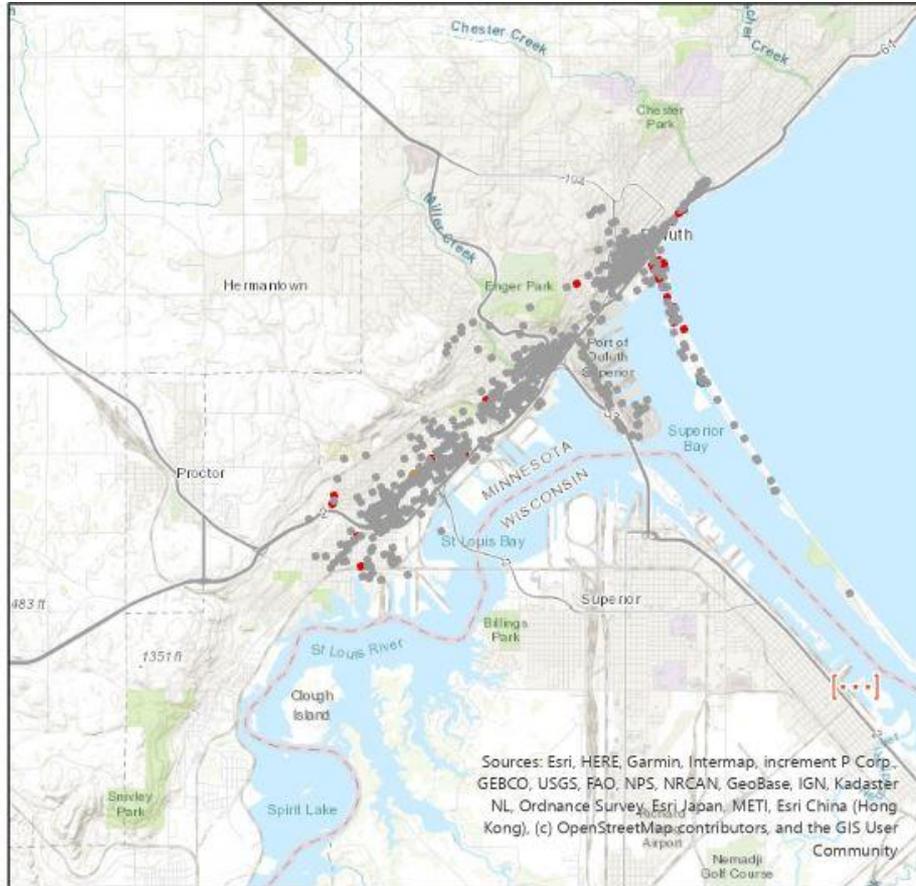


Sea Grant

S.C. SEA GRANT CONSORTIUM
Coastal Science Serving South Carolina

Prepared by Matt Gorstein,
Coastal Economics Program Specialist

ESRI Business Analyst



- Marine Construction
- Marine Transportation
- Offshore Mineral Resources
- Ship and Boat Building
- Tourism and Recreation
- Non-ENOW



Estimating Benefits

Tell a story about benefits



Case Studies

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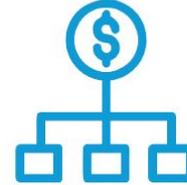


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Estimating Benefits

Market valuation

Traditional benefit estimates

- When consumers spend \$ they express monetary preferences
- *Example:* People pay fees to visit a beach, ex-vessel value of commercial fishing



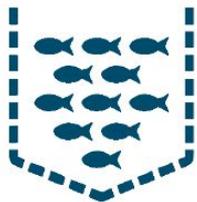
Estimating Benefits



Non-market valuation

- “Co-benefits”** (ecosystem goods and services) not captured in existing markets
- Parsed from markets when consumers spend money or make decisions
 - Stated via surveys
 - *Example:* Amount of flood protection dunes provide

Aquaculture, increase in fish populations



Benefit Transfer

Market Price

EXAMPLE

Wetland restoration provides nursery habitat, helping to increase commercial fish populations

Coastal flood protection, hazard mitigation



Benefit Transfer

Damages Avoided

Replacement Cost

Hedonic Valuation

EXAMPLE

Coastal nature infrastructure projects result in avoided structural damages during disasters

Regulation of water flow and quality



Benefit Transfer

Replacement Cost

EXAMPLE

Wetland restoration results in increased water filtration, alleviating some need to provide that through man-made systems

Recreation, experiences



Benefit Transfer

Willingness to Pay

Travel Cost

Opportunity Cost

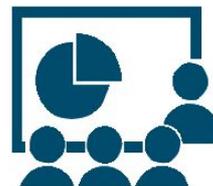
Market Price

Hedonic Valuation

EXAMPLE

Coastal beaches provide various recreation opportunities of value to society

Science, training, education



Benefit Transfer

Travel Cost

Opportunity Cost

EXAMPLE

People expend time and resources of value to attend educational coastal management seminars; in turn, these seminars also can be tied to improved management decisions and healthier wetlands

Damages Avoided

What is it?

Coastal project → damages avoided

Fundamental goal

Paying **less money** to provide a public service is counted as a **benefit** in an economic analysis of natural infrastructure



Opportunity Cost or Travel Cost

What is it?

Estimate benefits of attending workshops, stakeholder meetings, or volunteer opportunities

Fundamental goal

Estimate approximate **value of time spent** doing unpaid activities



Benefit Transfer

What is it?

Estimates economic values for “co-benefits”

Fundamental goal

Estimate benefits for one area of interest by **adapting** an estimate of benefits from other studies with similar context and characteristics



TAKEAWAYS



- Lots of ways to capture benefits
- Many categories of benefits — underselling the project by not bringing these “back into the ledger”
- Be aware of double counting!
- If conducting your own primary study isn’t an option, consider benefit transfer



Partner Examples

Cordova, AK



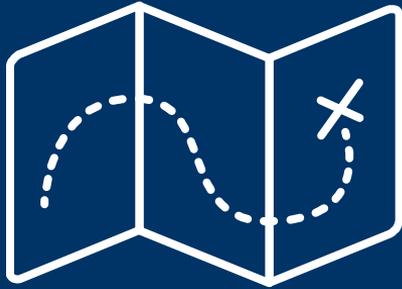
Padanaram Harbor (South Dartmouth), MA



Virginia Space Agency, VA



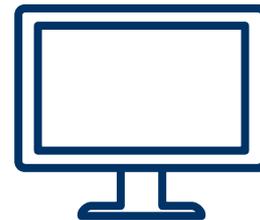
What now?



- Self-guided economic guidance module
- Economic resources
- Project consultation
- Talking with a consultant

Self-guided Economic Guidance Module

Helps get your economic analysis started



1. Self-assessment
2. Consider economic objective for your project
3. Dive into approaches
 - a. What is it?
 - b. Data needed
 - c. Steps
 - d. Guidance documents**

NOAA's OFFICE FOR COASTAL MANAGEMENT

ESTIMATING ECONOMIC VALUE
to
INFORM DECISIONS

Economic Resources

Tips to Get Started Quick Reference



Assessing the Costs and Benefits of Nature-Based Solutions Tips for the Non-Economist

Project decision-making greatly benefits from economic information. But where to start?

Economists usually determine whether a quantitative or qualitative approach is needed, and then select from a range of possible methods that describe costs and benefits to inform decision-making. This handout summarizes three common types (two quantitative and one qualitative) and provides information about when to consider using each. The methods require varying degrees of time, economic expertise, and data inputs. Each can yield information helpful for deciding when, whether, or how to use natural infrastructure. Community values, desired co-benefits, and equity concerns should also be considered.

COST-BENEFIT ANALYSIS

What is it? Cost-benefit analysis compares a project's costs and benefits, allowing an assessment of whether the benefits outweigh the costs. With this approach, costs and benefits are expressed in dollars, or monetized, to the greatest extent possible. But you don't necessarily need to monetize all costs and benefits to successfully perform this type of analysis. Costs and benefits that cannot be monetized may be described qualitatively to inform the decision-making process.

When should I use it? Expressing costs and benefits in dollars provides the most robust and comprehensive economic information. Use this approach if you have, or can derive, cost and benefit estimates, and need to know net benefits. A cost-benefit analysis is required for some projects that use federal funding sources. The approach can be used to compare the costs and benefits of a natural infrastructure project, and to compare alternative projects. For example, do the avoided costs of flood damage exceed the cost of a bioswale installation? Do green roofs or street trees have a better cost-benefit ratio?

What should I be cautious about? While a cost-benefit analysis offers the most detailed result, it also often requires the most effort and expertise. Also, when monetizing some benefits, it may be difficult to keep sight of the qualitative benefits that were not monetized.

Literature and Data “Green Infrastructure Effectiveness Database”



Green Infrastructure Effectiveness Database

This database is a compilation of literature resources documenting the effectiveness of using green infrastructure to reduce impacts from coastal hazards.

[Want to filter on specific items? Show advanced search](#)

RECENTLY ADDED

Nature-Based Solutions for Coastal Highway Resilience: An ...

Author(s): Webb, Bret; Dix, Brenda; Douglass, Scott; Asam, Susan; Cherry ...

Green Infrastructure: Mangroves, Beach nourishment, Coral reef, Dune ...

Region(s): National

Economic Resources

Literature and Data **Bluevalue.org**

Harte Research Institute for Gulf of Mexico Studies at Texas A&M University –
Corpus Christi's ecosystem service value database

One Ecosystem. Connecting the World.

From inland watersheds to our coastal communities to the deep ocean, human well-being is tightly connected to our natural environment. BlueValue illuminates the importance that we place on these ecosystems — their value — by sharing the latest science and information.

To begin, select or search our database.

 You can select more than one service or type.

Choose Ecosystem Service

Choose Habitat

71 Valuations

Country/Region

Any

State/Province

Any

Method

Any

Submit

Search the database

Storm Surge Protection

Coastal wetlands

 You can select more than one option.

Reset Search

PDF

CSV

ID	Type of habitat	Service	Adjusted Values US\$ 2019	Units	Country	State	Method	Author	Link to source
1	Coastal wetlands	Storm Surge Protection	\$242.76	per ha /per year	Australia	Victoria	BT	ACF. (2010)	
2	Coastal wetlands	Storm Surge Protection	\$824.67	per ha /per year	United States of America	Louisiana	DCA	Barbier, E., Acreman, M., Knowler, I. B. (1997)	ISBN: 2-940073-21-X
3	Coastal wetlands	Storm Surge	\$17,612.00	per ha /per year	United Kingdom		DCA	Beaumont, N.J., Austen, M.C., Mangi, S.C., Townsend, M.	https://doi.org/10.1016/j.marpolbul.2016.01.016

Questions to Ask Consultants

Understand what they are proposing. What kind of analysis specifically do they suggest? What is it called? Does it have other names? Can they share studies done using this method?

Know what to expect. Can they describe what form the final results will take? Will we be able to aggregate, or sum up, all of the benefits at the end? Why not?

The point is... ask lots of questions and get answers in plain language!

Project Research Consultation

Economics guidance help with different types of coastal projects

- Brainstorming project ideas and methods
- Useful questions to ask if hiring economic consultant
- Some common pitfalls and tips to consider
- Finding and using data

Free—call or email us - **econguidance@noaa.gov**



Questions?

Kate.Quigley@noaa.gov

Lauren.Knapp@noaa.gov