

Getting the most out of the course . . .

- Materials
- Participation
- Tools and resources

Tools and Resources

 Icons for tools and resources: a hammer and wrench, a toolbox, and a folded map.

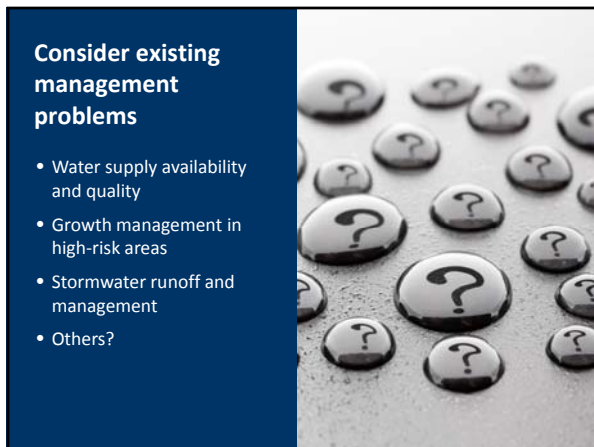
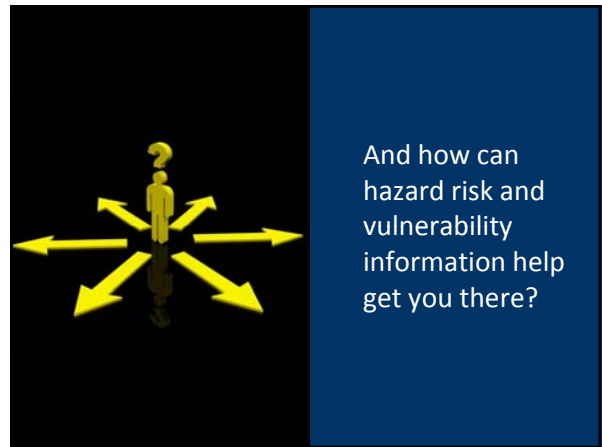
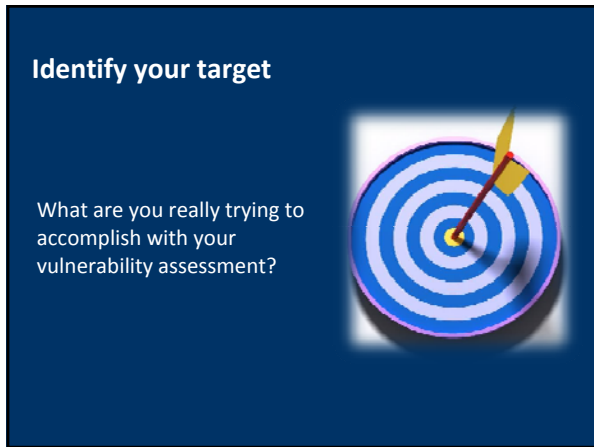
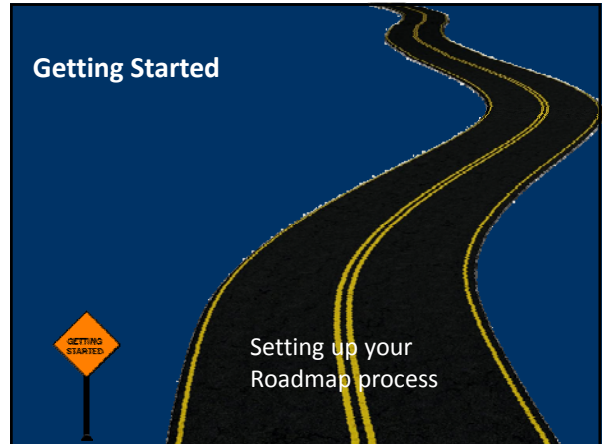
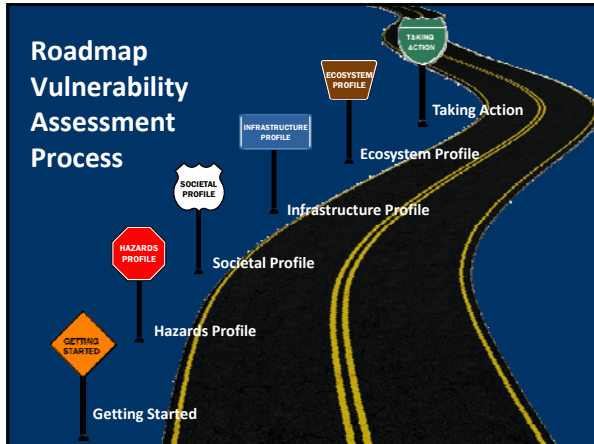
Vulnerability Assessment

<p>Exposure</p> <ul style="list-style-type: none"> Exposure to key hazards or threats <ul style="list-style-type: none"> flooding sea level rise Exposure of: <ul style="list-style-type: none"> infrastructure in high risk areas people in harm's way 	<p>Sensitivity</p> <ul style="list-style-type: none"> Sensitivity to effects of hazards <ul style="list-style-type: none"> increased flood frequency Sensitivity of resources <ul style="list-style-type: none"> infrastructure condition & codes 	<p>Adaptive Capacity</p> <ul style="list-style-type: none"> Adaptive capacity to respond to changing hazards or threats <ul style="list-style-type: none"> risks probabilities impacts Adaptive capacity of populations & resources <ul style="list-style-type: none"> plans, policies, strategies in place flexible strategies
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What the heck is the Roadmap?


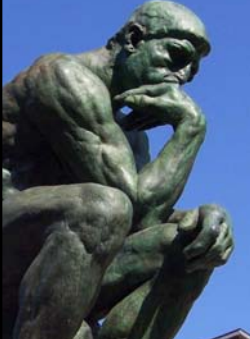
Participatory vulnerability assessment process that incorporates hazard and climate impacts into local planning and decision-making activities.

 A portrait of a woman with short dark hair, wearing a red top and a necklace, looking slightly to the side.



Thinking of your community...

How can impacts from hazards or climate change exacerbate existing community problems?



How much effort is this going to take?

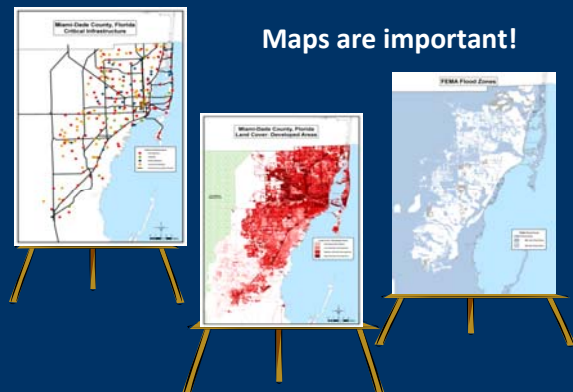
Consider your capabilities and resources



Start with good existing information sources



Maps are important!



Context is critical too!




Month	Consumption (Million Gallons)
July	0.94
August	0.92
September	0.9
October	0.88
November	0.86
December	0.84
January	0.82
February	0.8
March	0.78
April	0.76
May	0.74
June	0.72
July	0.7
August	0.68
September	0.66
October	0.64
November	0.62
December	0.6

You will end up with far more information than you can use!



Some information can do more harm than good . . .

choose wisely!


 A black and white photograph of the Statue of Liberty standing in the ocean. The sky is dark and stormy, with a bright lightning bolt striking down behind her. The sea is turbulent with white-capped waves.

Information doesn't provide solutions –

People do!


 A hand holding a CD-ROM. The surface of the CD is a colorful map of the Earth, showing continents and oceans. The hand is lit with a warm, orange glow.

Collaboration will determine success


 A group of colorful 3D human figures sitting around a circular table. They are interacting with a large puzzle that is partially assembled on the table.

Participatory approaches are the key!

People who make key decisions

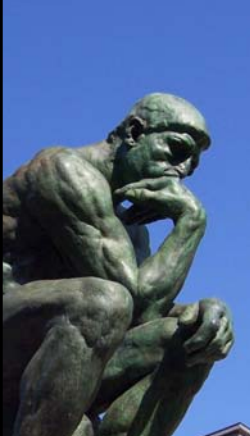


 A collage of several small images: a family in a front yard, a classical building, a road construction site, a highway interchange, a large pipe being installed, and a group of men in suits standing together.

and represent key stakeholders


 A central circular graphic showing silhouettes of people holding hands. Surrounding this are various stakeholder groups listed in a circular arrangement: Elected Officials, Utilities, Planning, Public Safety, Businesses, Infrastructure, Homeowners, Natural Resources, Realtors, Recreation, Social Services, Conservation, Public Works, and Developers.

Thinking of your community...

Who should be involved in your Roadmap assessment?


 A bronze statue of a man in a deep state of thought, resting his chin on his hand.
 
 A yellow diamond-shaped sign on a black post with the words "GETTING STARTED" written on it.

Learning from others

Planning for Hazards and Climate Change Impacts: One County's Approach

Sea Level Rise Response Strategy Worcester County, Maryland

Comprehensive Strategy for Reducing Maryland's Vulnerability to Climate Change Phase I: Sea level rise and coastal storms

Stakeholder Engagement

INTRODUCTION TO STAKEHOLDER PARTICIPATION

STAKEHOLDER ENGAGEMENT STRATEGIES FOR PARTICIPATORY MAPPING

Hazards Profile

Understand your relevant hazards

Video – Rising Waters in Connecticut

Watch this video and think about how this story might relate to your community.

Be Comprehensive

Think big *and* small

Think current *and* future

Explore hazards history and impacts . . .



Local Mitigation Strategy
Community Rating System

... starting with existing plans, reports, and assessments





Include risk maps and information to help with prioritization

Find stories (examples, anecdotes, and photos) to supplement other data sources



Consider hazard impacts on a full range of operations

Public safety	Water quality
Public health	Water availability
Infrastructure	Energy
Transportation	Social services
Land use planning	Agriculture
Coastal permitting	Port operations
Development standards	Tourism & recreation
Public works	Insurance availability
Economic development	Public housing
Building codes	Natural resources
Engineering	Education



Explore climate trends and issues





Heat-Related Health Issues ↑

Precipitation Issues ↑ and ↓

Hurricane and Storm Impacts ↔

Coastal Land Loss Impacts ↑ and ↑




You will face uncertainty.

Avoid Analysis Paralysis

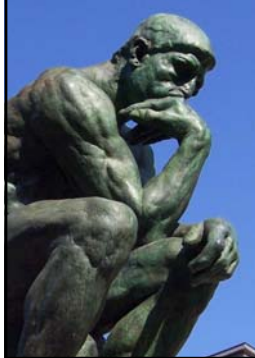
Pursue No Regrets Strategies

Strategic Adaptation




Long term implementation process

Adaptation "Sweet Spot" = Opportunities + Incremental Actions



Thinking of your community... Local Hazards


What are the hazards and climate change issues that need to be considered for your community?



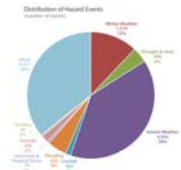
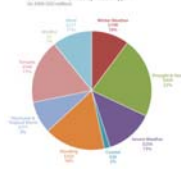
Tools and Resources




Tools and resources for assessing hazard risks



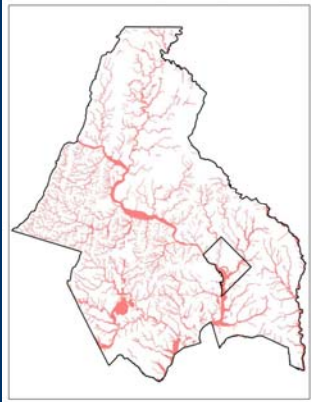
Spatial Hazard Events and Losses Database for the United States (SHEDUS)

Date	Injuries	Fatalities	Property Damage	Crop Damage	Total Damage
2/18/1960	0	0	2083.33	0	2083.33
2/18/1960	0	0	2083.33	0	2083.33
2/18/1960	0	0	2083.33	0	2083.33
1/18/1961	0	0.22	2179.13	0	2179.13
12/24/1961	0	0	2083.33	0	2083.33
3/5/1962	0	0	3125	312.5	3437.5
7/21/1962	0	0	2083.33	208.33	2291.66
12/23/1963	0	0.06	2083.33	0	2083.33
4/1/1964	4.17	0.13	208.33	0	208.33
1/12/1964	0	0.29	208.33	0	208.33
2/10/1964	0	0	208.33	0	208.33
2/18/1964	0	0	33.33	0	33.33
1/29/1966	0	0.51	0	0	0
1/29/1966	0	0.48	0	0	0
12/10/1967	0	0	555.56	0	555.56
6/27/1968	0	0	4166.67	0	4166.67
11/11/1968	0	0	2083.33	0	2083.33
1/8/1969	0	0	277.78	0	277.78
1/28/1969	28.17	0	2083.33	0	2083.33
1/8/1970	0	0	4041.67	0	4041.67
1/20/1970	0	0	7142.86	0	7142.86
2/2/1970	0	0	263.16	0	263.16

HVRI HAZARDS & VULNERABILITY RESEARCH INSTITUTE

Digital Flood Data



- FEMA website
- State Flood Plain Manager

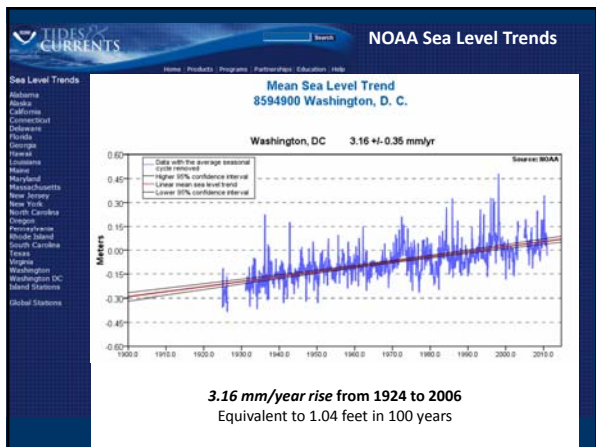
SLOSH Model Sea, Lake, and Overland Surges from Hurricanes

Modeling storm surge for hurricane preparedness

AREAS OF POSSIBLE FLOODING
 CATEGORY 1 HURRICANES
 CATEGORY 2 HURRICANES
 CATEGORY 3 HURRICANES
 CATEGORY 4 HURRICANES

Mapping Coastal Inundation

Step-wise framework for creating inundation maps



Regional Highlights from Global Climate Change Impacts in the United States

U.S. Global Change Research Program Regional Fact Sheets

Southeast

The record average temperature in the Southeast has risen 2.7° since 1976, with the greatest annual increase in the winter months. There has been a 56 percent increase in 100 precipitation over most of the region. The percentage of the Southeast in moderate to severe drought increased from 30 percent in 1998 to 40 percent in 2007. The percentage of the Southeast in severe drought increased from 10 percent in 1998 to 15 percent in 2007. The percentage of the Southeast in extreme drought increased from 0 percent in 1998 to 10 percent in 2007.

- Science and impacts of climate change now and in the future
- Authoritative
- Scientific
- Plain language

Coastal Climate Adaptation SharePoint Site

Community of practice for accessing and sharing climate adaptation-related resources

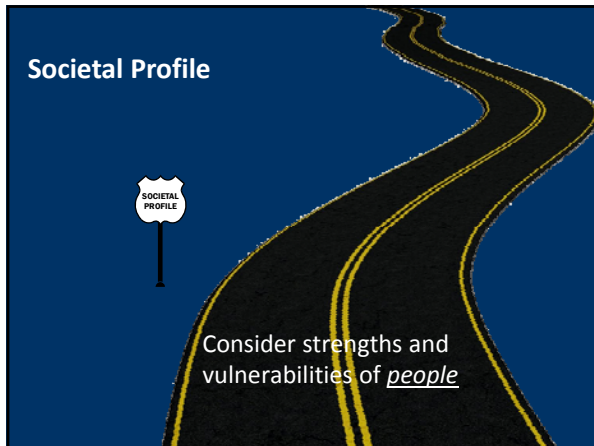
Exercise: Hazards Profile

Get in your small group.

Focus upon the list of hazards/climate change issues we have created.

Prioritize the hazards and determine what information is needed (per hazard) to build a hazard profile.

Societal Profile



Consider strengths and vulnerabilities of *people*

Consider potential social vulnerability factors

- Poverty and resources
- Elderly populations
- Children
- Health and disabilities
- Transportation access
- Exposure in high hazard areas



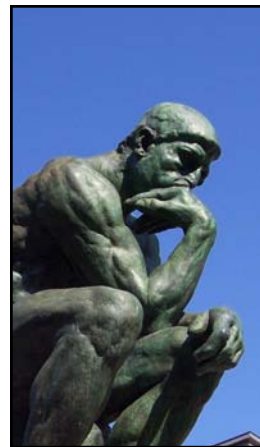

Consider community resilience factors

- Community engagement
- Cultural cohesion
- Social networks
- Sense of place
- Community identity



Thinking of your community... Vulnerability and Resilience

What are some specific factors of vulnerability and resilience that exist within your community?

Consider the effects of current and projected trends on vulnerability and resilience

- Language and culture
- Aging populations
- Economic conditions
- Family structure
- Community structure



Nashville Flood Recovery



The volunteer spirit fueled a rapid recovery

Hands On Nashville

- 21,300 volunteers
- 88,000 hours

Tools and Resources

Tools and resources for assessing social vulnerability and resilience

Social Vulnerability Index (SoVI)
42 socioeconomic and built environment variables

Examples

- Socioeconomic status
- Gender
- Race and ethnicity
- Age
- Employment loss
- Renters
- Occupation
- Family structure
- Education

Social Vulnerability to Environmental Hazards, 2000

Social Vulnerability to Environmental Hazards, 2000
State of Virginia

County Comparison Within the Nation

County Comparison Within the State

From Social Vulnerability Index website

Maps downloadable for all states down to county level

POPULATION DENSITY
Miami-Dade County, Florida

PERCENT OF POPULATION IN POVERTY
Miami-Dade County, Florida

Mapping Census Data

MAPPING SOCIO-ECONOMIC VARIABLES USING 2000 CENSUS DATA

Step-by-step guide for mapping economic and social data

Exercise: Societal Profile

Get in your small group.

Use the maps provided.

Answer these questions:



What do these maps tell you?

What other information would you need to further assess this vulnerability?

Infrastructure Profile

INFRASTRUCTURE PROFILE

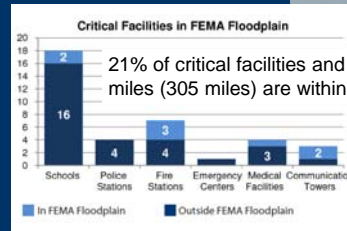
Consider strengths and vulnerabilities of the built environment

Consider vulnerabilities for all types of infrastructure

- Transportation
- Utilities
- Water and wastewater
- Housing
- Business and commerce



Consider infrastructure exposed to hazards



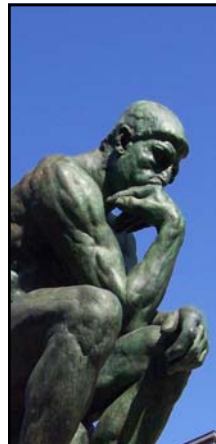
Consider potential factors that contribute to infrastructure vulnerability

- Construction codes and practices
- Age and condition
- Susceptibility to damages (repetitive losses)
- Criticality of function




Thinking of your community...

1. How have hazards impacted infrastructure?
2. What associated impacts can result from damaged infrastructure?
3. What effects will climate change have on infrastructure?



Consider how existing policies will affect the future vulnerability of infrastructure

- Development standards
- Planning and decision processes
- Economic drivers
- Incentives and disincentives for growth in high risk areas

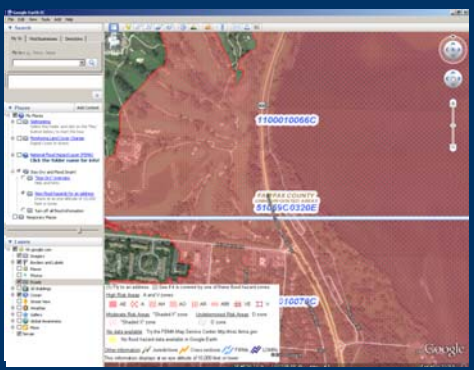


Tools and Resources



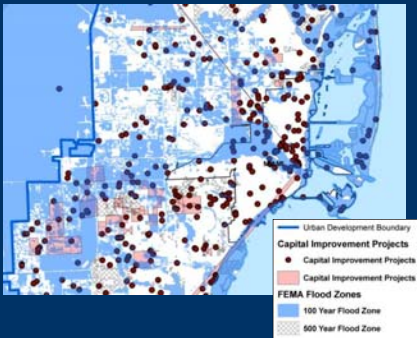
Tools and resources for assessing infrastructure vulnerability and resilience

Infrastructure in the floodplain?



FEMA's "Stay Dry" - Search by location or address

Using local data to inform your assessment



Urban Development Boundary
 Capital Improvement Projects
 FEMA Flood Zones
 100 Year Flood Zone
 500 Year Flood Zone

Estimate damages from floods & hurricane winds

HAZUS-MH

- Structure & content damaged
- Losses in \$\$
- Total losses

Property Damage Due to Wind in Millions of Dollars					
County	Structure Damage	Contents Damage	Inventory Damage	Total Property Damage	Total Percent Losses Due to Wind Damage
Collins	11	8	0	11	0.10%
Glades	185	80	0	265	42.60%
Hendry	500	245	3	748	35.40%
Lee	107	11	0	115	0.70%
Martin	229	180	3	412	4.70%
Miami-Dade	80,608	45,104	848	126,560	63.90%
Monroe	11	1	0	12	0.10%
Glades	480	710	7	673	28.50%
Palm Beach	63,019	33,112	371	96,543	72.00%
Total	733,457	176,981	1,961	912,400	93.10%

Is your community growing safely? Take the Safe Growth Audit



Analyze impacts of current policies, ordinances, plans on community safety from hazard risks

Smart growth for coastal and waterfront communities



Provides guidance on how to manage growth and development while balancing environmental, economic, and quality of life issues

Using smart growth to support and build resilient communities




Zoning for Areas of Low Resiliency
The most difficult issue a community is likely to face in managing coastal growth will be limiting development in low-resiliency areas. To effectively do this there must be a concerted effort by the community to coordinate all of the growth management tools at their disposal. Policies addressing zoning as well as targeting investment in infrastructure and public services toward areas of high resiliency must work together to make this a successful strategy. In some cases the cost of transfer of development rights might be a viable option to quiet opposition or challenges to any perceived downzoning.


HOW DO WE BUILD?
Once a community has answered the questions where to build (e.g., in high-resiliency areas) and what to build (e.g., compact, mixed-use, vibrant places), it must finally address the question of how to build. Clearly, the answer is structures that are built to the best and latest building codes with local amendments that consider the caliber of storm events in your community. Buildings in hazardous coastal areas should be able to withstand stronger winds than buildings further inland. In most coastal areas concrete houses are going to be better at withstanding surges and occasional flooding than stick-built houses. See the discussion above about how compact form could enable more investment in better buildings.

Developing to avoid flood impacts to others

- Takings and other legal issues
- Case studies
- Model regulations
- Preparing for future conditions




Ecosystem Profile



Consider strengths and vulnerabilities of natural resources

Video 2 – Greenseams



- Please mute your phone!!
- Minimize (don't close) your WebEx window
- Return to WebEx and *raise your hand* so we know when everyone is back


Consider the protective functions of key natural resources

- Storm buffering
- Flood protection
- Stormwater management
- Erosion control
- Climate regulation



Consider additional benefits of key natural resources

- Clean air and water
- Healthy fisheries and wildlife habitat
- Recreation and tourism opportunities
- Sense of place



Consider potential stressors to key natural resources

- Development patterns
- Unsustainable uses
- Pollution
- Hazardous materials



Consider current policies affects on the future vulnerability of natural resources

- Continued development in floodplain
- Site specific planning
- Altering the natural landscape



Tools and Resources


Tools and resources for assessing ecosystem vulnerability and resiliency



Ecosystem-based Adaptation

Approaches

Conserving Coastal Wetlands for Sea Level Rise Adaptation

<p>Understand Why are coastal wetlands valuable for coping with sea level rise?</p>	<p>Identify What spatial techniques help identify coastal resource strengths and vulnerabilities?</p>	<p>Prioritize What spatial data, tools, and techniques can help prioritize existing or potential future wetland areas for protection?</p>
<p>Engage How can you build stakeholder support for your strategies?</p>	<p>Discover How are others prioritizing conservation efforts to account for and cope with sea level rise?</p>	

About This Site
The Digital Coast resource provides spatial techniques, resources, and examples to help communities identify coastal wetland and other vulnerabilities in the face of sea level rise—and to prioritize wetland conservation efforts that incorporate sea level rise considerations.

www.csc.noaa.gov/digitalcoast/wetlands

Green Infrastructure

- Multi-objective planning
- Identify landscapes that provide community benefits
- Use as a dataset in the Roadmap process



Trainings available through the Digital Coast.....

- Introducing Green Infrastructure for Coastal Resilience
- GIS Tools for Strategic Conservation Planning

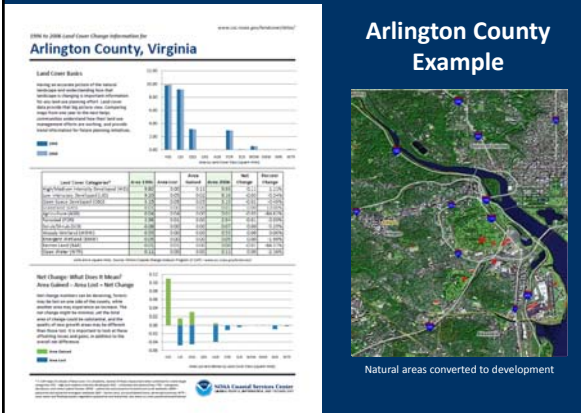
C-CAP Land Cover Atlas

Land cover and land change information for coastal regions



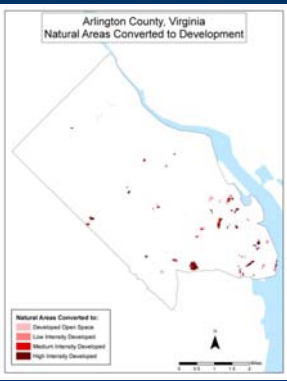
- Available through the Digital Coast
- Provides useful county-level summaries
- Data are available for download and use in GIS
- Produces printable PDF reports

Arlington County Example

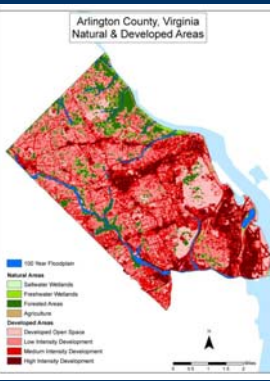


Natural areas converted to development


Arlington County, Virginia Natural Areas Converted to Development




Arlington County, Virginia Natural & Developed Areas




CanVis Tool



Visualisation

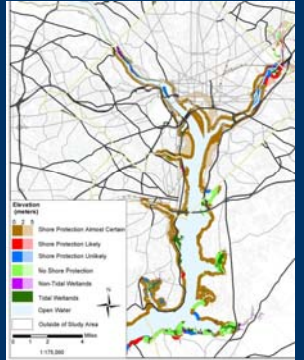


Alternatives




Communication

Sea Level Rise Planning Map



- Maps for Atlantic Coast
- County-by-county discussions
- Shoreline protection methods
- Downloadable data

Exercise: Ecosystem Profile



Get into your small group.

Use the maps and data sheet provided.

Answer these questions:

What are key areas you would want to conserve?

Why should those areas be conserved?



How you develop and use the Roadmap depends on where you are in the assessment process!

- Problem and issue identification
- Planning and prioritization
- Design, development, and implementation

What to expect from your Roadmap experience

- Priorities
- Risk-informed decisions
- Stakeholder engagement
- Hazards data and information that can inform your plans and policies

There will be obstacles

- Economic concerns and costs
- Lack of public interest
- Politicization of climate change issues
- Lack of understanding of threats

Becoming Roadmap Ready

First steps...

- Form a planning team
- Identify plans or policies that need to be informed by risk and vulnerability data
- Define community issues that are exacerbated by hazards
- Define what you want to accomplish with vulnerability assessment results

Roadmap ready

Here's what you do next...

- Investigate status of risk and vulnerability assessment data
- Discuss with your planning team stakeholder engagement opportunities
- Begin the assessment process (visit the Roadmap site for resources)



Everything has some element of risk

Remember...

You are looking to support better decisions while still moving forward!



What's your next step?



Your community is experiencing sea level rise and projections are showing a 2 foot rise in the next 50 years...

How would your community respond to this scenario?



Almost there...but one last thing



Please fill out the [Evaluation & Participant Information Sheet](#)

Call or e-mail us – really!



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