

Florida Department of Environmental Protection



Florida Waterfronts Program Managers Meeting
May 24, 2012 - Crystal River, FL

Green Infrastructure and Coastal Community Resilience

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Estuarine Research Reserve





Issues in Southeast

- Lost more forests, farms and open space to sprawl
- Populations are projected to grow 46% in Gulf states
- 34% of all NA endangered or threatened fish species



EPA



USFWS





HOUSING STARTS IN SE

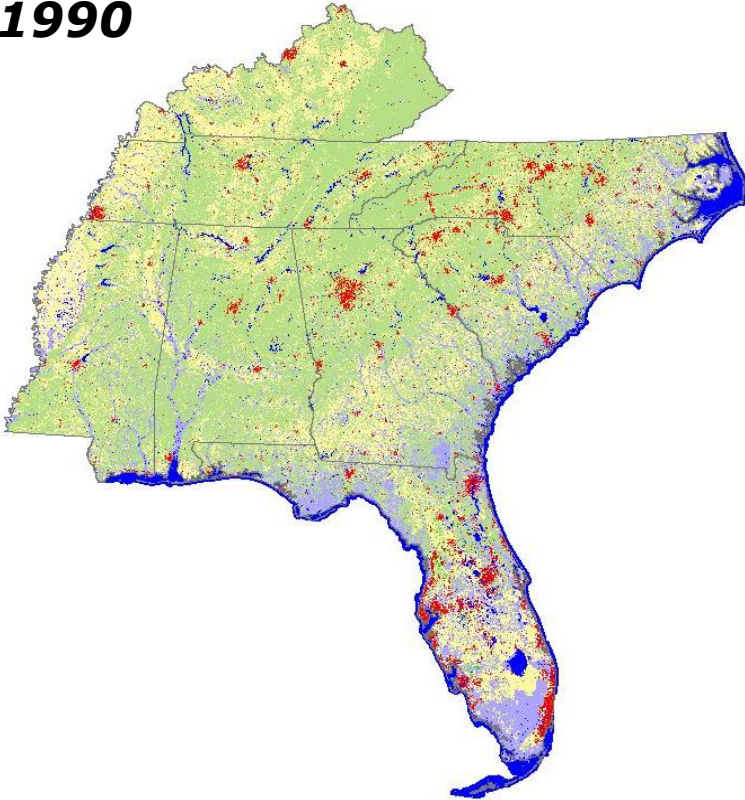
- **Between 1995 and 2004 – Nearly 3.5 million new homes built in EPA Region 4**
- **Between 2005 and 2014 – Nearly 6.7 million additional new homes could be built**

The projected number is a conservative estimate calculated by using the average rate of increase in housing starts between 1995 and 2004.

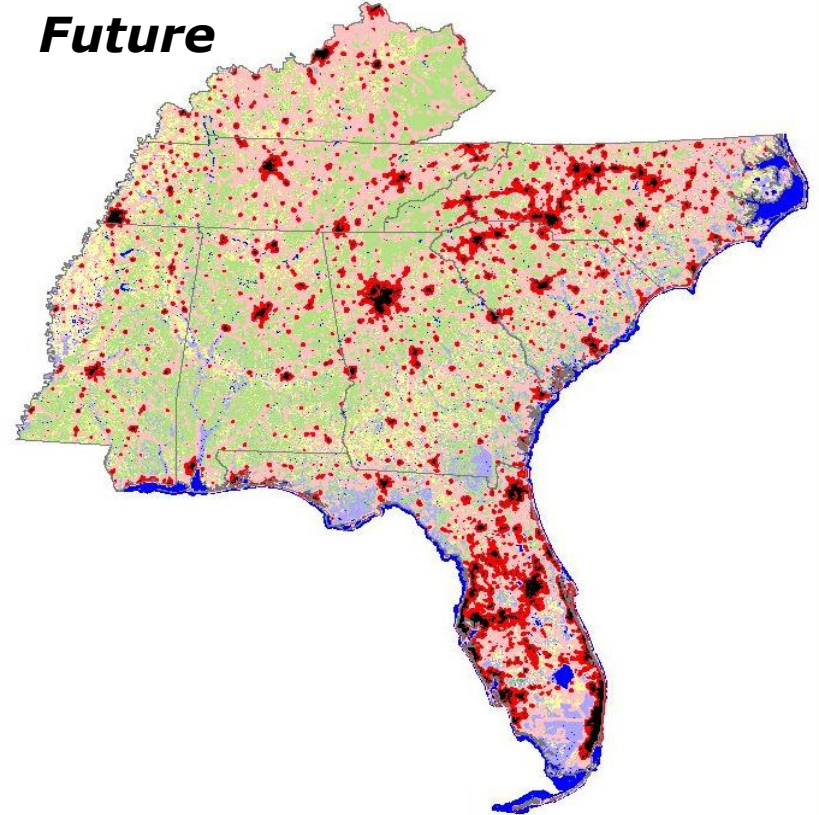


Land Consumption

1990

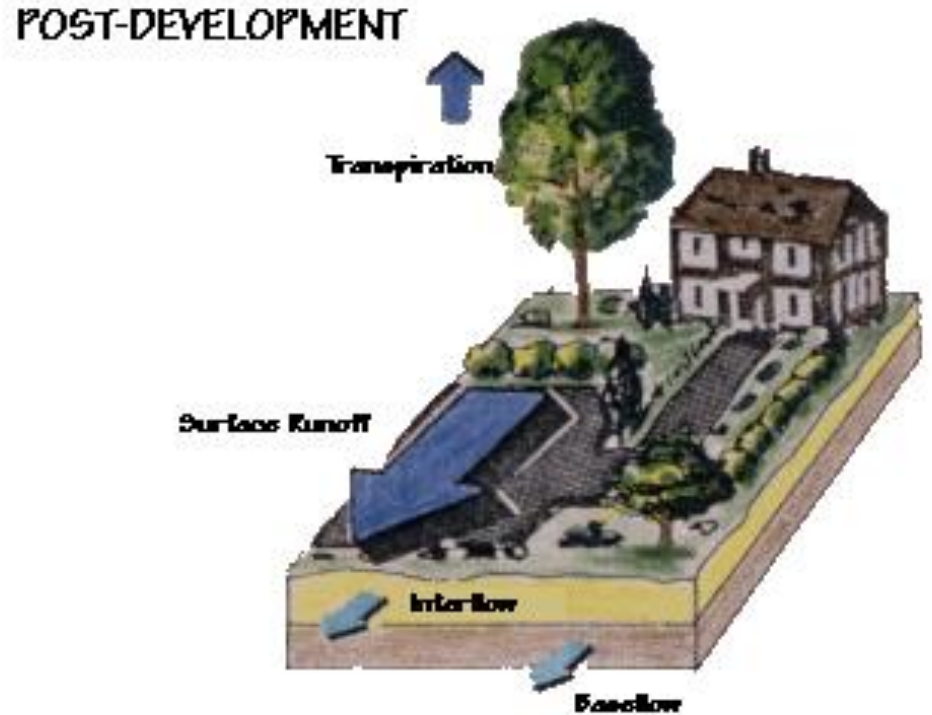


Future





Watershed changes





Development Impacts on the Water Cycle



10%

50%

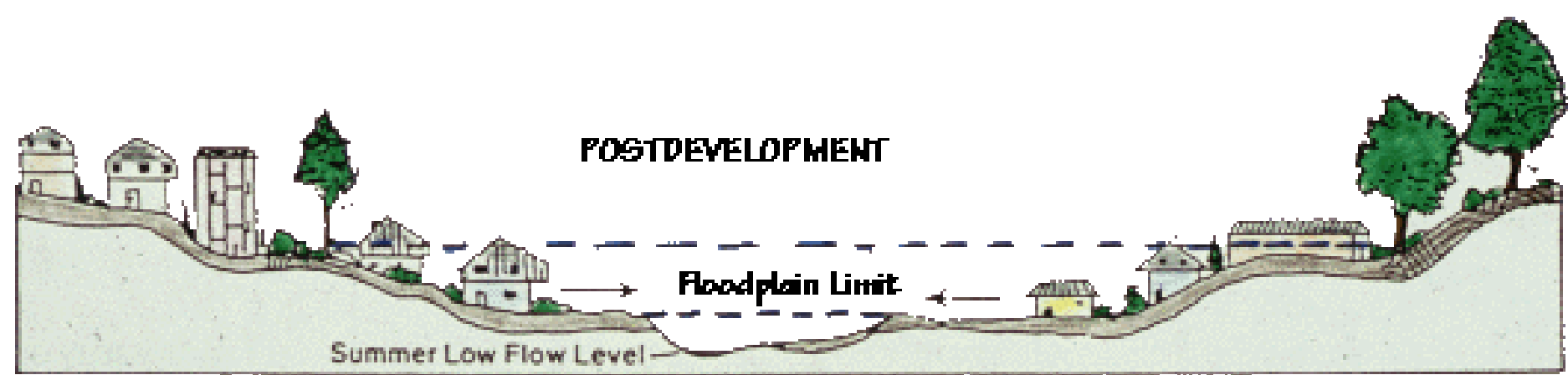
55%

15%





What's going on upstream? Watershed Changes

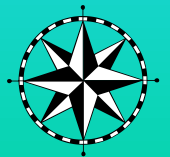




Impervious Surfaces



Materials like cement, asphalt, roofing and compacted soil that prevent percolation of runoff into the ground.



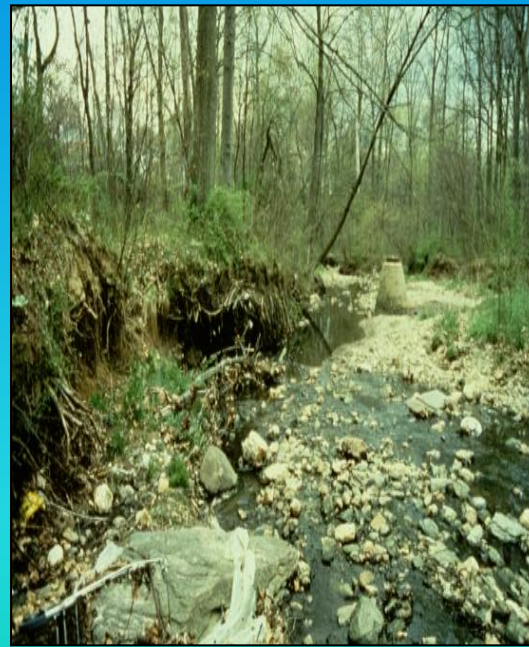


Impervious Cover Influences Habitat Quality

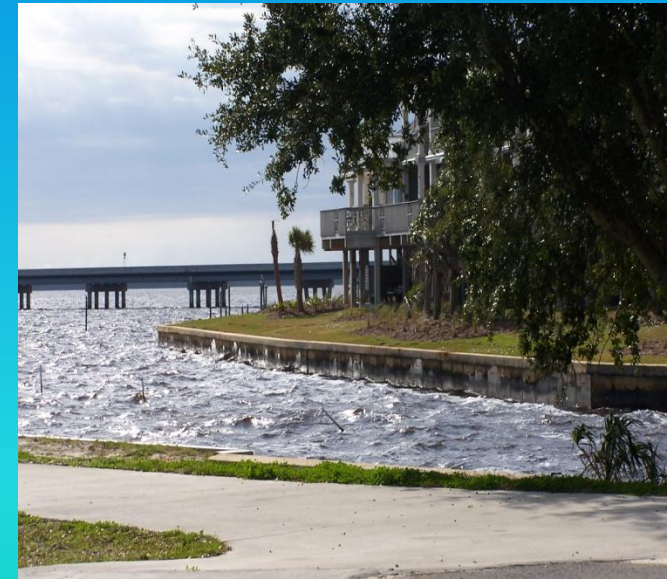
Impervious cover changes the natural
stream environment, resulting in:



**Smothering of Habitat
by Sediment Deposits**



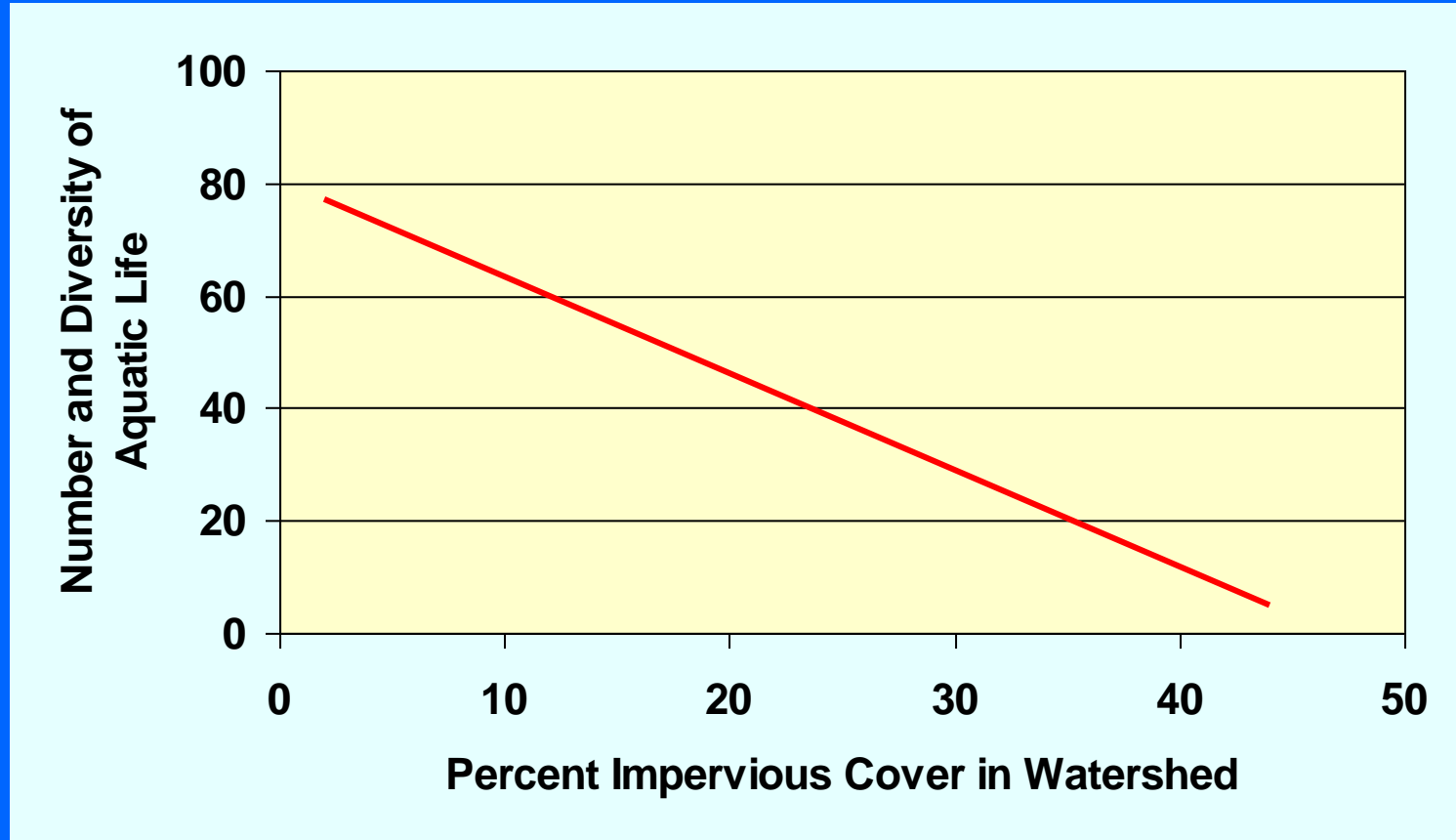
**Loss of Habitat
Variety**



Loss of Stream Buffer



Impervious Cover Influences Aquatic Life



As the amount of impervious cover increases, the number and diversity of aquatic species decreases.



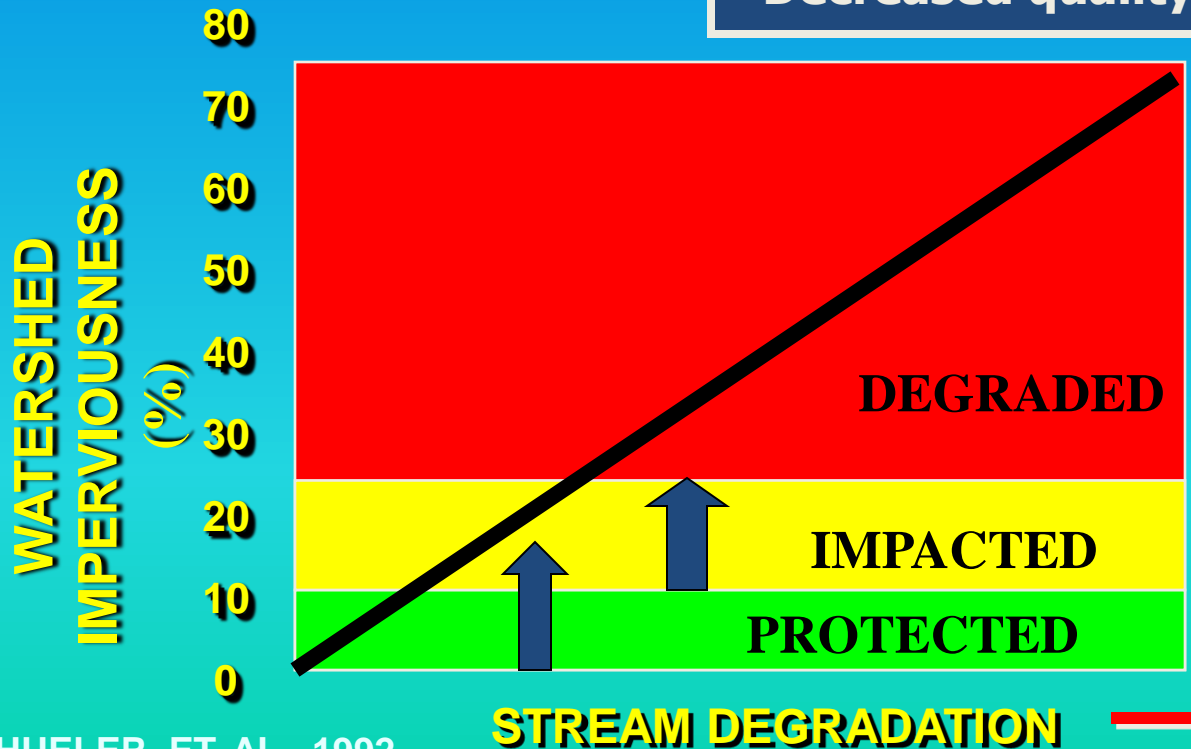


Water Quality & Imperviousness

“More than thirty Scientific studies have documented that stream, lake, and wetland quality declines sharply when impervious cover in watersheds exceeds 10 percent.”

Center for Watershed Protection

Increased quantity
Decreased quality



ADAPTED FROM SCHUELER, ET. AL., 1992



What can your community do?

Plan for Growth:

Steer development to areas that will:

- (1) minimize Operating & Maintenance costs
- (2) protect your natural resources and
- (3) protect local quality of life.





Planning Challenges

1. Integrating floodplain and watershed protection into county, community and site design planning
2. Integrating green infrastructure into all planning processes
3. Making planning truly comprehensive





Planning

- **Develop a vision for the future**
- **Identify land to be conserved**
- **Then determine where and how development should occur**

Most effective if all levels of planning in an area are coordinated and reinforce each other.





Green Infrastructure is a tool to achieve multiple planning objectives

Green infrastructure is an **interconnected network of natural areas and open spaces** that:

- Maintains natural ecosystem values/functions
- Reduces flooding and erosion
- Mitigates storm damage
- Sustains clean air and water
- Provides a wide array of benefits to people & wildlife
- Saves operation & maintenance costs





Green Infrastructure Can Be:

- 1) Natural areas and features (wetlands, forests, floodplains, riparian buffers, habitat)
- 2) Greenways, parks and open space
- 3) Working lands with conservation value
- 4) Protection of sources of drinking water – lakes, rivers, streams, reservoirs, groundwater recharge zones
- 5) Other protected open spaces.





Another Definition of Green Infrastructure *(relates to site specific measures)*

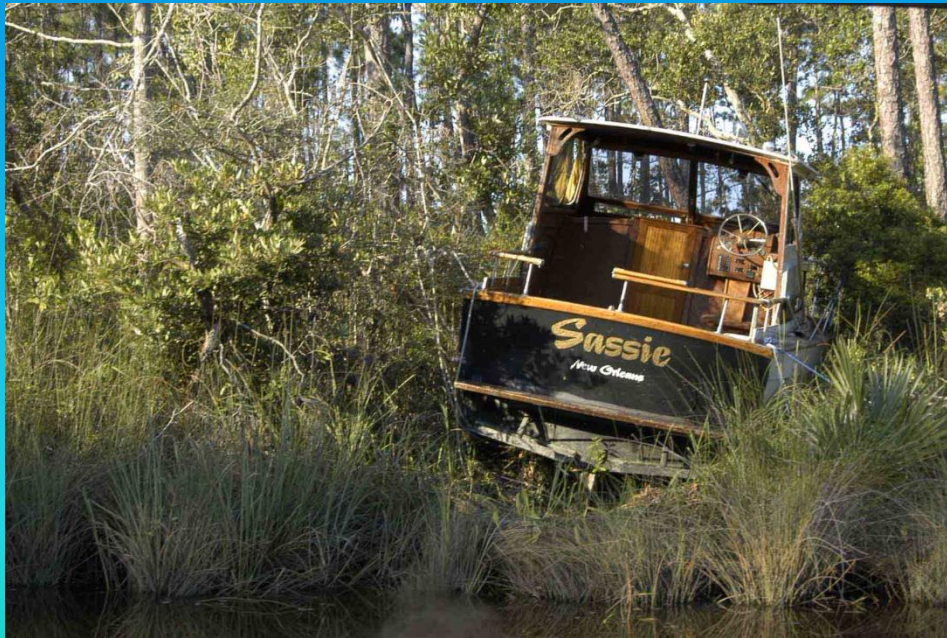
Non-traditional approaches to watershed management and stormwater control, such as vegetated swales, rain gardens, green roofs, porous concrete, and rain barrels.





Green Infrastructure: Floodplains

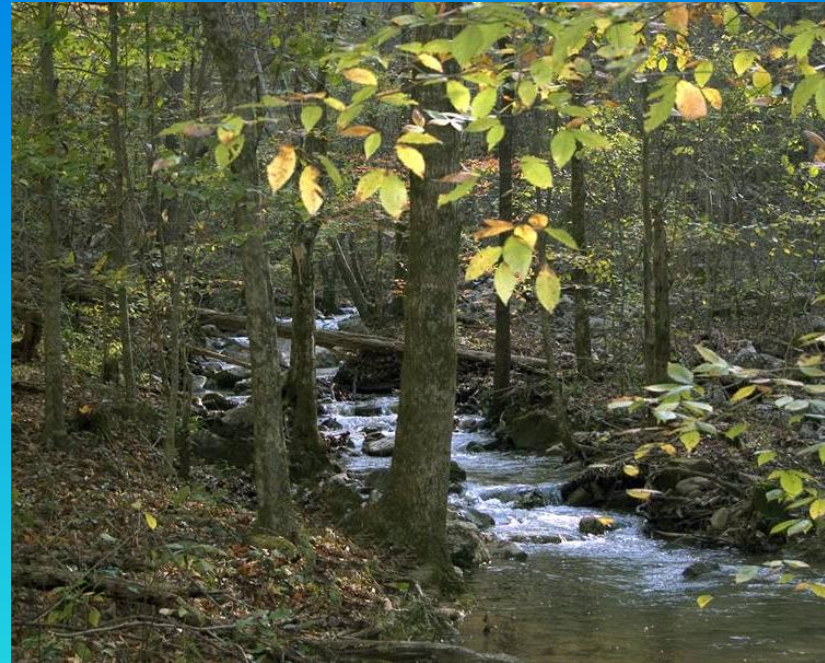
The highest and best use of floodplain land is for the storage of flood waters.





Green Infrastructure: Headwater Streams

- 1st & 2nd order streams
- Most total miles in watershed
- Sensitive to development
- Habitat for more aquatic organisms than large rivers



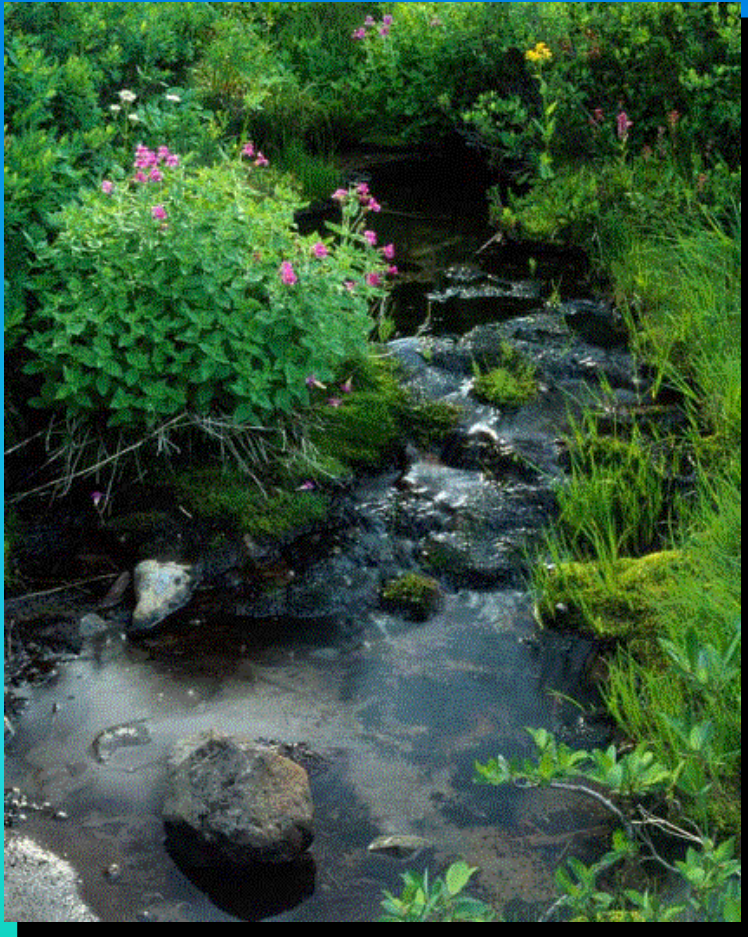
Alabama NRCS

The quality of water in the larger streams and lakes have a close connection to the quality of the water coming from their source -- primary headwater streams. (*EPA-State of Ohio*)





Green Infrastructure: Vegetated Buffers



- Especially important to buffer wetlands and urban waterways
- 1st line of defense against impacts of impervious surfaces

Benefits of Buffers:

- Flood control
- Increase property value
- Habitat for wildlife
- Wetland protection
- Pollutant reduction





Benefits of Riparian Forest Buffers

- Riparian forests can reduce nutrient and sediment inputs to a water body by 30 – 90%.
- Forests can absorb and store runoff 10 to 15 times higher than grass. The wider the buffer, the more effectively it reduces pollution.

(Chesapeake Bay Program)





Value of Fresh Water Wetlands

Value of 1 acre/year at 2005 dollars:

- Flood retention \$594**
- Water quality \$630**
- Recreational fishing \$539**
- Commercial fishing \$1,176**
- Bird watching \$1,832**

(multiple academic studies)





Jordan Cove

Putting it all Together

- alternative surfaces
- “green” design
- mechanical BMPs
- education as a BMP

• Rain gardens

• Engineered swales



• Pervious roadway

• “no mow” zone



• Pervious driveways

• Cluster design



• Bioretention

“circle”

• Naturalistic landscaping

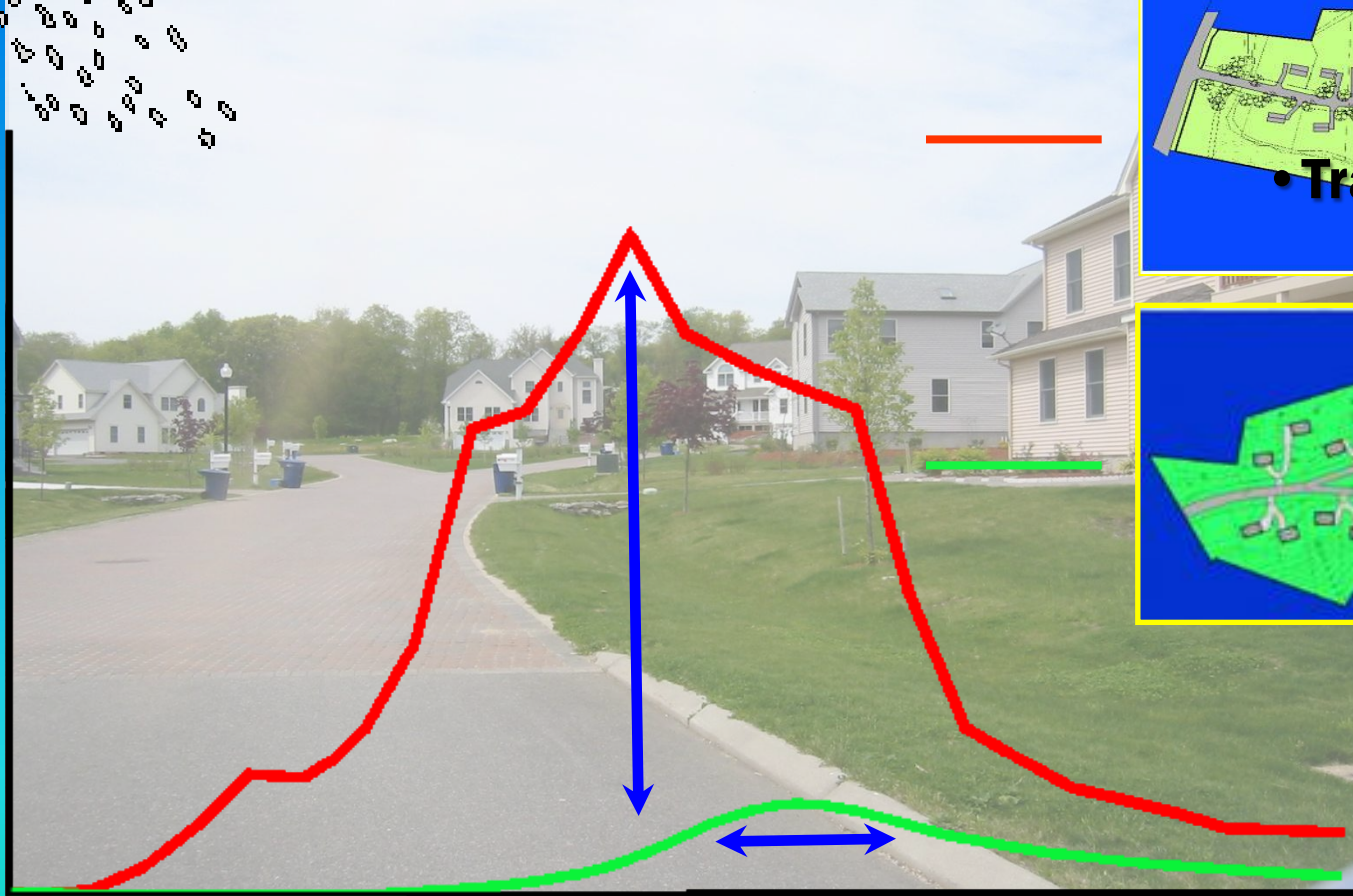




But does it work?



Flow Rate



Time





Open Space Planning

- **promotes infiltration**
- **decreases runoff**
- **provides buffers**
- **filters pollutants**



The Players:

Planning Commission

Land Trust

Conservation Commission



Open Space Developments



- same number of housing units
- 10-50% less impervious surface

- up to 50% open space
- water resources protected



From Randall Arendt



Cost comparison

Developers' Cost Savings

Remlick Farm Development in Virginia

<u>Development Costs</u>	<u>Conventional</u>	<u>Better Site Design</u>
Engineering	\$79,600	\$39,800
Sewage & water	\$25,200	\$13,200
Road construction	\$1,012,500	\$487,500
	(20,250 linear ft)	(9,750 linear ft)

Land use (490 acres total area)

Developed	287 acres (59%)	69 acres (14%)
Undeveloped	203 acres (41%)	421 acres (86%)

(Center for Watershed Protection, Remlick Hall Farm)



Promote Open Space Development

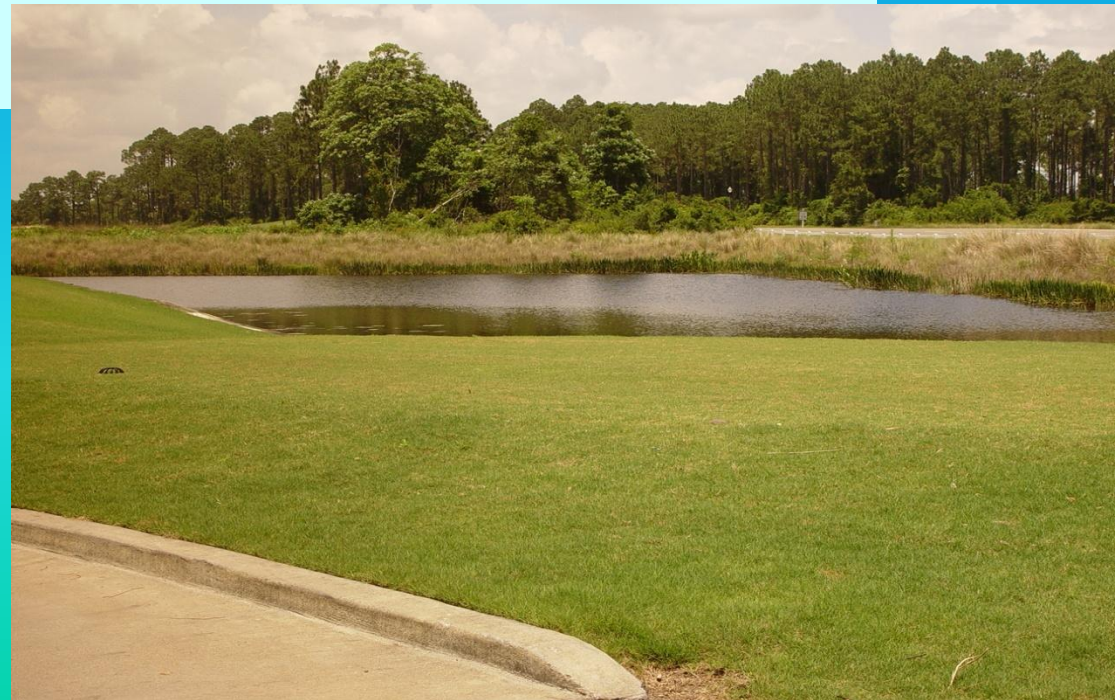
- Smaller lots minimizes impervious areas
- Reduces construction costs
- Conserves natural areas
- Provides community recreational space
- Promotes watershed and floodplain protection
- Provides green infrastructure





The Cost of Open Space Management

Open Space Management Strategy	Annual Maintenance Costs
Natural Open Space Only minimum maintenance, trash/debris cleanup	\$75/acre
Lawns Regular mowing	\$240 to \$270/acre
Passive Recreation Trails, bike paths, etc.	\$200/acre





Green Infrastructure: Recreation

Florida's biggest industry - \$45 billion (1998-99)





Green Infrastructure

Saves Communities \$\$\$\$\$ and Adds to Property values

- Near protected floodplains \$10,400 increase
- If forest conserved on site 6 to 15% increase
- Near restored streams 3 to 13% increase
- Near greenbelt buffer 32% increase
- Near “greenway” park 33% increase





Green Infrastructure: Property Values Increase

- Increased purchase price of single family homes within 100 ft of open space
 - Leon County (Tallahassee) - \$14,400
 - Alachua County (Gainesville) - \$8,200
- **Increased value of vacant land within 100 ft of open space in Leon County - \$31,800**

(Trust for Public Land study, 2004)





Decreased Costs to Government

Fayetteville, Arkansas options:

- Increase tree canopy 27% to 40%
- Reduce storm water runoff by 31%
- Save \$43 million on capital improvement

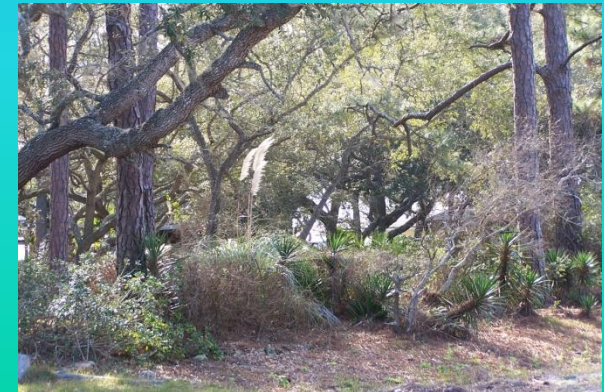
(American Forest Foundation)





Land Acquisition

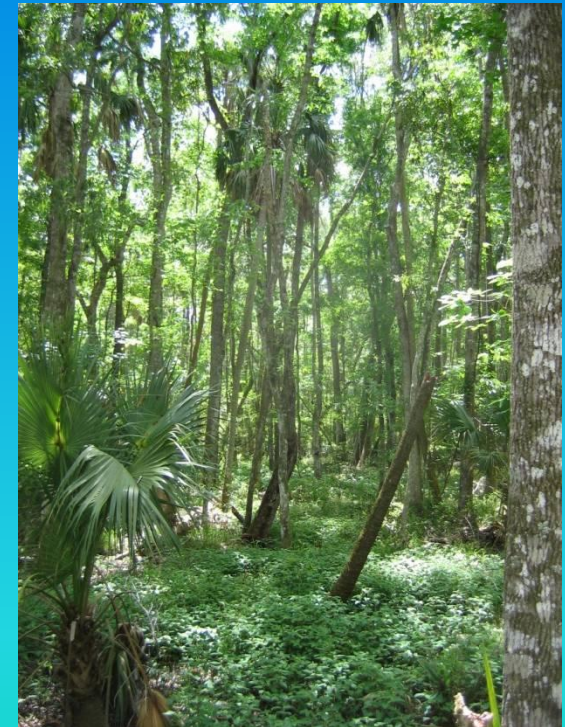
- **Acquire land**
 - Purchase or donation by landowner
 - Managed by local government or by third party
- **Conservation easements**
 - Voluntary agreement between the property owner and a third party permanently restricting the use of the land
 - Donated or purchased





Incentives – Landowners Conservation Easements

- Increased ability to continue to work the land and pass it on to future generations
- Charitable deduction from federal income taxes
- Deduction in estate taxes
- Possible reduction in Florida property tax (if land does not already have an agricultural easement)





Land Acquisition

▪ Transfer of development rights

- Sale by a landowner to a developer of all or part of the development density allowed by zoning
- Sending zone - land retained as open space
- Receiving zone – increased density for development

▪ Purchase of development rights

- Third party purchases development rights from a landowner
- Land retained as open space





TDR in Florida

- **Communities with TDR programs –** Charlotte, Hillsborough, Marion, and Polk counties; Fort Lauderdale and West Palm Beach
- **Example: Collier County**
 - 2004 – TDR program for Rural Fringe Mixed Use District (RFMU) focused on large connected wetland systems and significant areas of habitat for listed species) – to date, 2,327 acres have development rights limited

(www.BeyondTakingsandGivings.com and www.colliergov.net)





Federal Funding for Conservation

Examples:

- Land and Water Conservation Fund
- The Forest Legacy Program
- Wetlands Reserve Program
- National Coastal Wetlands Conservation Grants
- Cooperative Endangered Species Conservation Fund
- Coastal Zone Management Program
- Farmland Protection Program
- Transportation Efficiency Act for the 21st Century (TEA-21)

(Local Greenprinting for Growth Workbook, Trust for Public Land)





Florida Forever

Provides \$ for conservation purposes, with reduced funding for 2012-13 (bonds backed by real-estate transfer tax)

- Succeeded Preservation 2000
- Since July 2001 has acquired more than 682,000 acres of land with \$2.85 billion and over 10 years achieved the preservation of 1.75 million acres of land.
- Provides funds for conservation of such features as
 - Habitat
 - Ecological greenways, priority recreational trails
 - Natural floodplains, fragile coastlines, priority wetlands
 - Significant groundwater recharge areas
- Supported/guided by Florida Natural Areas Inventory





Florida Communities Trust

Program of Florida DEP

Through **Parks and Open Space** and **Stan Mayfield Working Waterfronts** Florida Forever Grant Programs, FCT provides funding to local governments and eligible non-profit organizations to acquire land for parks, open space, greenways and projects supporting Florida's seafood harvesting and aquaculture industries

Since 1991, has awarded nearly \$827 million to help communities with local land acquisition efforts.

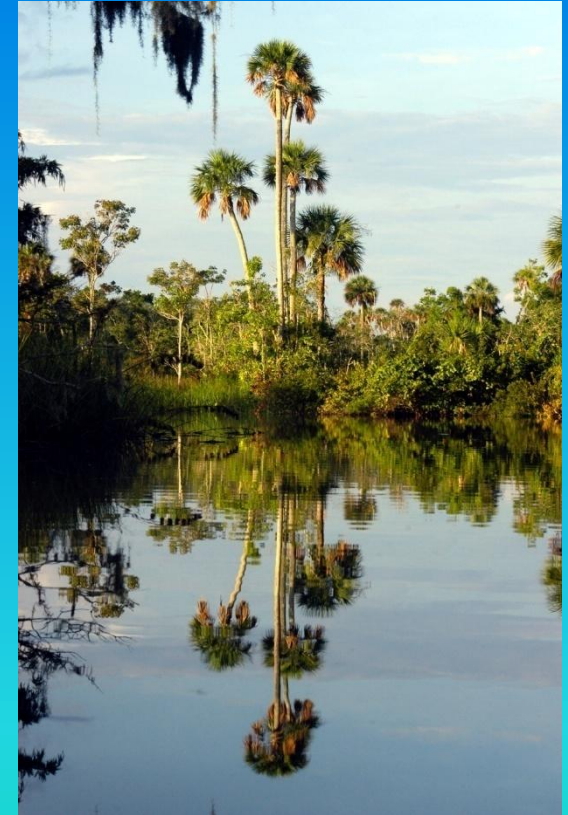




Private Funding for Conservation

- The Conservation Fund
- The Nature Conservancy
- The Trust for Public Land
- Local, regional, and statewide land trusts

- Foundations (examples)
 - National Fish and Wildlife Foundation
 - Knight Foundation





Local Funding Options - Florida

- **Ad valorem or property taxes**
- **Local government sales taxes**
- **Small county sales taxes**
- **Tourist impact fees (designated areas of critical concern)**
- **General obligation bonds**





Examples of Local Funding for Conservation

- Since 1994, 56 of 69 (81%) ballot measures passed in Florida communities creating \$2.3 billion in funding for land conservation.

(Trust for Public Land)

- Examples in 2006

- Charlotte County – bond (\$77 M)

- Collier County – increase cap on property tax - \$123M

- Martin County - .5 cent sales tax increase - \$30 M





Local Development Taxes and Other Incentives

Development Impact Fees

- A charge or assessment imposed by a political subdivision against new development
- Used for cost of growth-related infrastructure and services directly related to the new development such as roads, infrastructure, schools, libraries, and sometimes parks and recreation



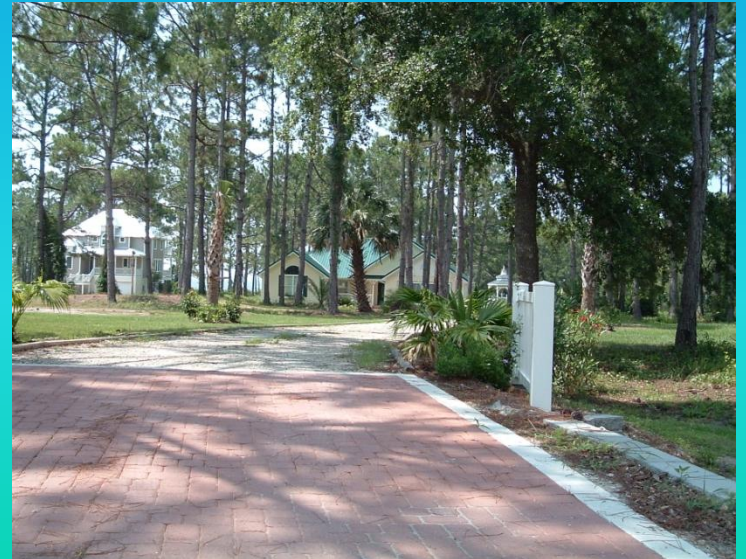
Development Incentives: Offered to developers applying for development permits. Examples include: zoning upgrades, expedited permitting, reduced stormwater requirements and increases in floor area ratios





Other Development Standards

- Exceed statutory minimums
- Tree and vegetation protection
- Wetlands
- Floodplains
- Building codes





Green Infrastructure and Community Resilience

Green and blue infrastructure programs can:

- Reduce flooding
- Improve water quality
- Enable valuable natural processes, such as sequestering carbon
- Expand interconnected resource networks and help protect coastal communities from storm surge and erosion
- Incorporate sea level rise and climate change into strategic land and habitat planning





FEMA Flood Insurance Program Community Rating System

- **Voluntary Program**
- **Reduces Flood Insurance premiums**
- **Reduces Flood losses**
- **Includes BMPs**





CRS Best Practices Include:

- **Open Space Preservation**
- **Higher regulatory standards - protect natural areas**
- **Erosion and Sediment control and water quality requirements for projects affecting stormwater**
- **Floodplain management planning**
- **Outreach and education**
- **Can reduce flood insurance rates up to 45%**





FEMA Community Rating System

- **Gulf Shores, AL pays \$680 per policy. They save \$35 per policy because of CRS for a total savings of \$293,787.**
- **If they went to the highest level (Class 1), they could save \$299/per policy or \$2,547,049.**





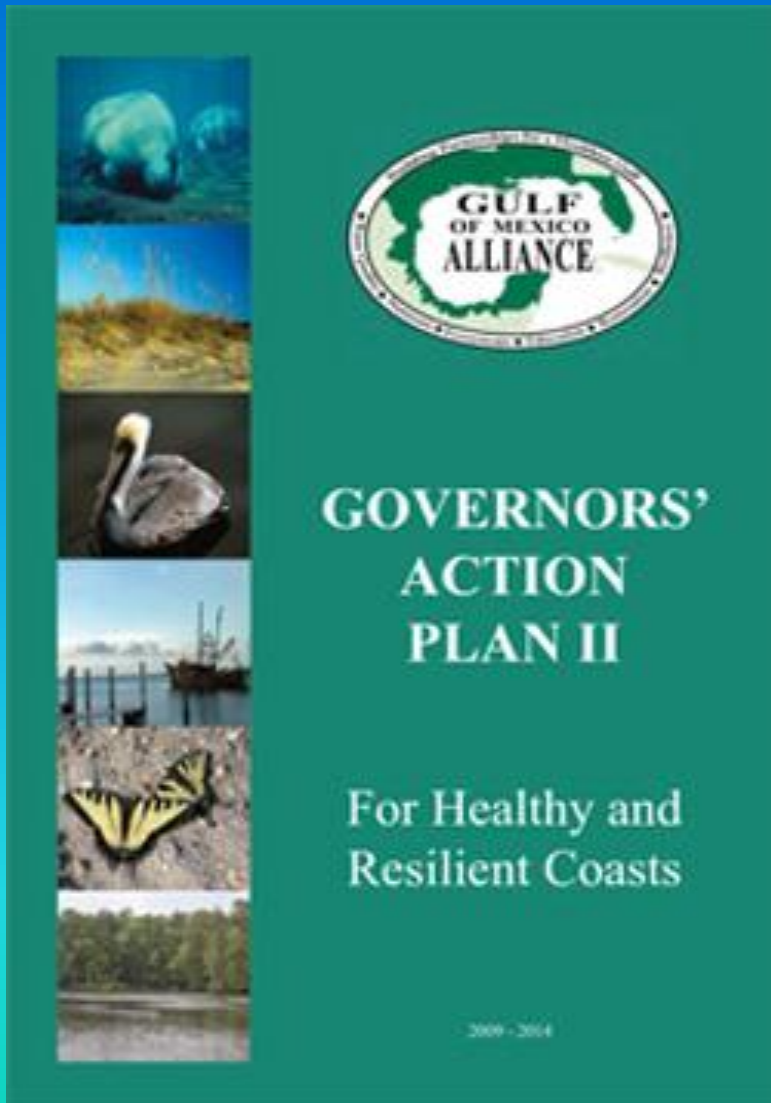
Strengthen Building Codes

Adopt building codes which strengthen requirements for design, including stricter roofing and reinforcement standards (2002 Florida building code an improvement)

Consider

- **LEED certification**
- **Fortified certification**



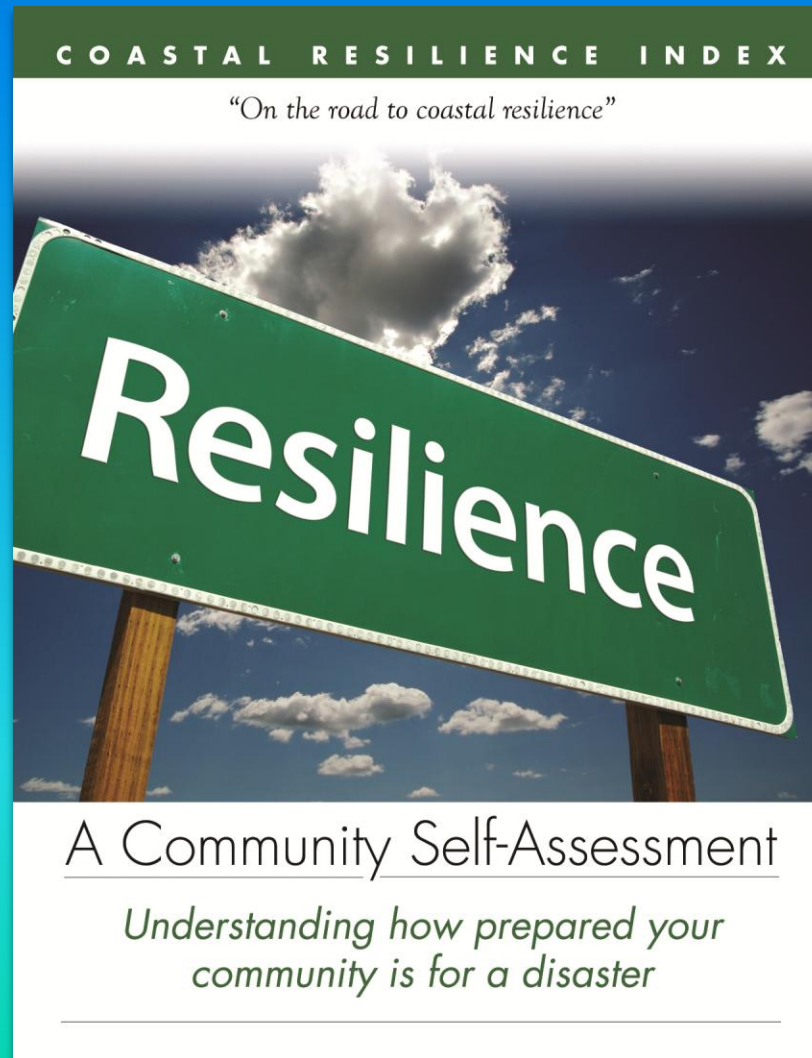


Gulf of Mexico Alliance

Coastal Community Resilience Team



Coastal Resilience Index





Index Details

Community leaders get together and use the tool to guide discussion about their community's resilience to coastal hazards.

- **Self-assessment**
- **Identify community strengths**
- **Identify weaknesses**
- **Generate dialog across the community**
- **Uses information that is readily available**
- **Has eight pages and includes six sections**
- **Asks mainly “yes” or “no” questions**
- **Designed to take less than three hours to complete and is facilitated by a neutral, trained party.**





The Index focuses on 6 areas:

- Critical Infrastructure and facilities
- Transportation issues
- Community plans and agreements
- Mitigation measures
- Business plans
- Social systems





Index Purposes

- A tool for communities to examine how prepared they are for storms and storm recovery.
- Simple, inexpensive method for community leaders to perform a self-assessment of their Community's resilience to coastal hazards
- Identifies weaknesses a community may want to address prior to the next hazard event
- Guides discussion within a community, not intended for comparison between communities



Gulf Coast NERRs CTPs:

- Will use Index to work closely with five coastal communities and bring training and technical assistance to these communities based on needs identified through the Index exercises.
- Continue to use Index as an opener to discussing Climate Communication and Adaptation

www.Gulfalliancetraining.org





Resources and Tools for Resilience and SLR

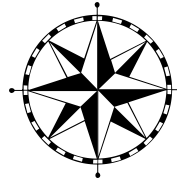
- **Community Risk and Vulnerability Assessment Tool (CRVAT)**
- **CanVis**
- **StormSmart Coasts Network: <http://stormsmartcoasts.org/>**
- **StormSmartConnect.org**
- **Coastal Resilience Index Critical Facilities Tool:**
- **<http://csc-s-web-q.csc.noaa.gov/criticalfacilities/>**
- **Sea-Level Rise Visualization Tool: <http://gom.usgs.gov/slr/slr.html>**
- **[MS-AL Sea Grant http://masgc.org/gulfstorms/index.htm](http://masgc.org/gulfstorms/index.htm)**
- **Gulf Coast CTPs Regional Project: <http://gulfalliancetraining.org>**



Questions?

CREDITS

- **National NEMO Network**
- **Center for Watershed Protection**
- **Southeast Watershed Forum**
- **Apalachicola National Estuarine Research Reserve**
- **Gulf of Mexico Coastal Training**



Apalachicola
National Estuarine
Research Reserve

Gulf of Mexico
**COASTAL
TRAINING**

Some text adapted from material developed by the University of Connecticut, with modifications and additions by Timothy Lawrence and Anne Baird, Ohio State University Extension