

Climate Change Adaptation Tools for Addressing Water Issues

Watershed Academy Webcast



Thursday, December 2, 2010

1:00–3:00 Eastern

Instructors:

John Whittler, USEPA Office of Ground Water and Drinking Water

Rebecca West, Spartanburg Water

Lisa Beever, Charlotte Harbor National Estuary Program

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Topics for Today's Webcast

- Climate Ready Water Utilities and Climate Ready Estuaries
- Spartanburg Water, NC: A Utility Case Study
- Charlotte Harbor NEP, FL: Local Government Adaptation Tools

Climate Ready Water Utilities And Climate Ready Estuaries



John Whitler
Water Security Division, US EPA



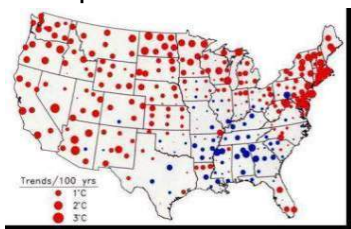
Presentation Overview

- Climate Change and the Water Sector
- Climate Ready Water Utilities (CRWU)
- Climate Ready Estuaries (CRE)

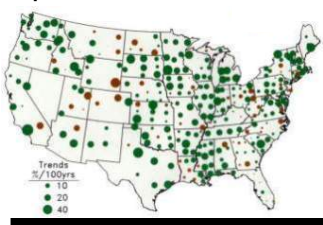


The Climate is Changing

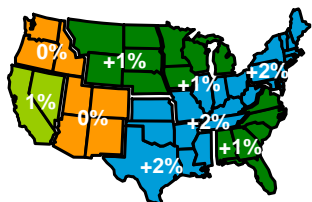
Temperature Trends: 1901 to 1998



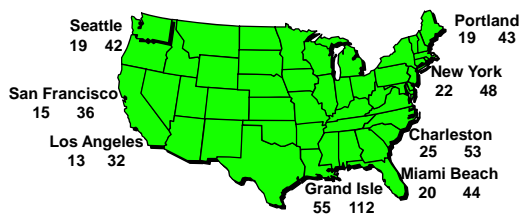
Precipitation Trends: 1901 to 1998

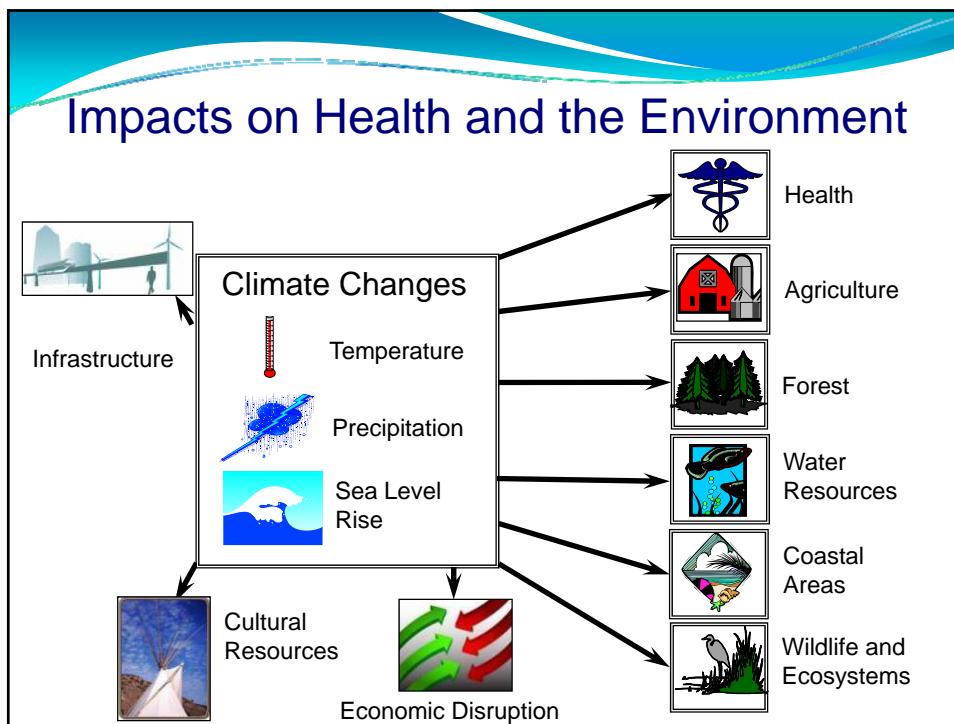


More Rainfall Occurring in Intense Downpours



Regional 50% Probability Estimates of Sea Level Rise in 2100 and 2200 (in inches)





Impacts on the Water Sector

- Water Quantity/Quality Issues
- Extreme Weather Events
- Operational and Regulatory Issues

CLIMATE READY
WATER UTILITIES
SEPA

Taking Action on Climate Change



“Climate change will affect other parts of our core mission... and we must include those considerations in our future plans.”

Lisa P. Jackson,
Administrator, U.S. EPA



Building Resilience in the Water Sector

Climate Ready Water Utilities



Climate Ready Water Utilities Working Group

In May 2009, the National Drinking Water Advisory Council (NDWAC) voted on and approved the formation of a working group to evaluate "Climate Ready Water Utilities".

The charge included:

1. Developing attributes of climate ready water utilities;
2. Identifying climate change-related tools, training and products to address utilities' short- and long-term needs; and
3. Identifying mechanisms that would facilitate the adoption of climate change adaptation and mitigation strategies by the water sector.



Working Group Members

- Twenty members of CRWU Working Group
 - 12 from water utilities
 - 3 from state and local governments
 - 5 from academic, environmental, and other organizations
- Federal partners including US Army Corps of Engineers, Centers for Disease Control and Prevention, and Federal Emergency Management Agency



Working Group Status

- During five meetings, finalized and reached full consensus on:

- Key Findings
- Adaptive Response Framework
- Enabling Environment Recommendations




- CRWU Working Group will provide final report and recommendations to NDWAC in December 2010
- NDWAC will provide its recommendations to EPA



Climate Ready Adaptive Response Framework



Climate Ready Water Utilities Working Group

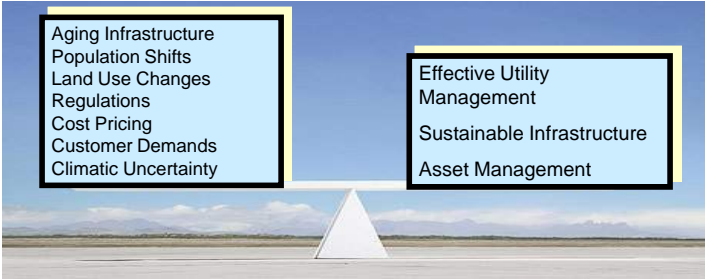


Integrating Climate Change

- Leverage existing programs as most efficient and effective means to pursue “Climate Ready” status
 - Effective Utility Management
 - Climate Ready Estuaries

Aging Infrastructure
Population Shifts
Land Use Changes
Regulations
Cost Pricing
Customer Demands
Climatic Uncertainty

Effective Utility Management
Sustainable Infrastructure
Asset Management



Climate Ready Water Utilities Working Group



Tools to support water sector climate readiness

- Develop tools, training, and products needed in five main areas
 - Internal understanding and education
 - Partnership building
 - Climate impact assessment
 - Climate adaptation decision support
 - Stakeholder communication

Opportunities for Recognition and Incentives

- Establish communication forum
- Integrate “Climate Ready” into existing award programs
- Explore establishing a separate recognition program
- Establish financial incentive program and/or ensure integration into existing SRF funding programs
- Establish relationship between climate readiness and lower operational risk
- Resources needed for applied research and innovation



Why Should EPA Develop a CRWU Program?

- Climate change impacts may challenge the water sector's ability to fulfill its mission
 - Demise of stationarity: historical conditions may not be accurate predictors of future conditions
 - Prepare for challenges not experienced to date
- Majority of water utilities lack the tools to prepare
 - Access to relevant climate science
 - Climate change impact assessment
 - Adaptation and mitigation options
- EPA can contribute to existing Federal programs
- Need for EPA engagement with water sector due to potential impacts and regulatory challenges



CRWU - Current Activities

Climate Resilience Evaluation & Awareness Tool

Risk assessment tool designed to build climate change knowledge and support adaptation planning in the water sector.

CRWU Toolbox

Searchable resource containing information to support the “Climate Ready” process, including government and utility activities, workshops, publications, funding, and tools.

Tabletop Exercise Tool for Water Systems

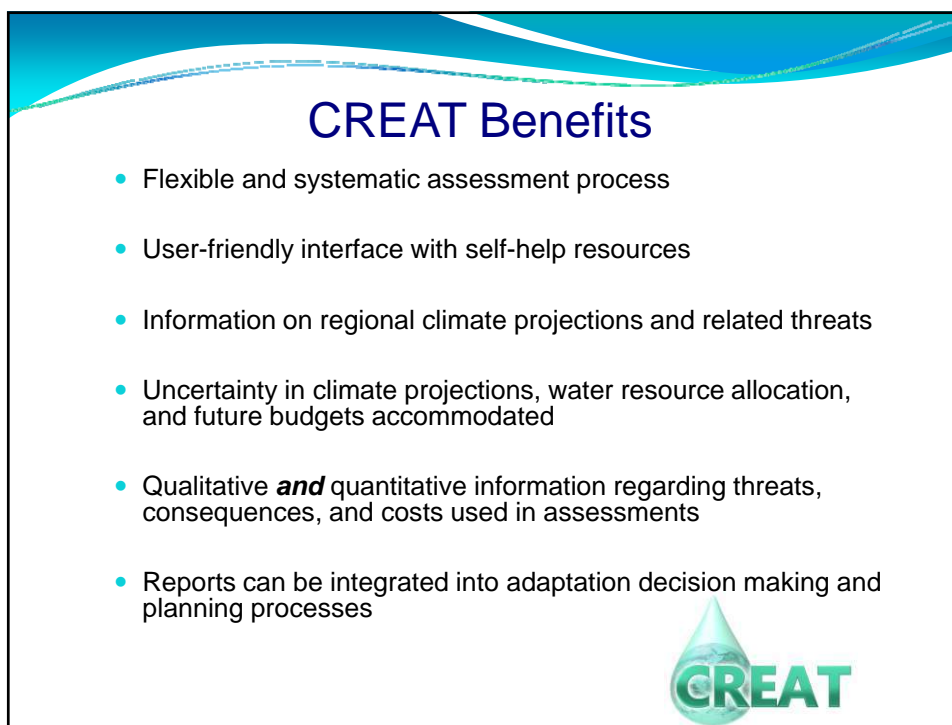
Customizable materials for designing exercises for utilities to consider long-term planning measures in order to adapt to the potential impacts of climate change.



CREAT Overview

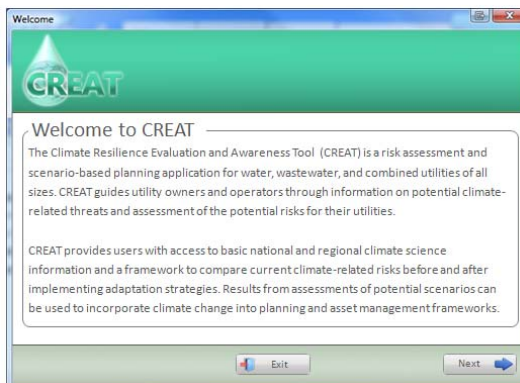
- CREAT assists drinking water and wastewater utility owners and operators in:
 - Assessing the climate-related risks at their utility
 - Evaluate adaptation options to reduce risk
 - Conduct assessments as part of long-term planning and decision making processes
 - Complement existing tools used to make projections or assessments regarding utility management (i.e., models of hydrology, urbanization, and demand)
- CREAT is designed to evolve over time
- Accommodates a range of uncertainty in climate information





Release and Outreach

- Software is available for download
Download at <http://water.epa.gov/infrastructure/watersecurity/climate/creat.cfm>
- Training and Outreach
- CREAT version 2.0




CRWU Toolbox

Searchable database for utilities to obtain resources related to climate change and water.

- Goal is to provide access to freely available, on-line resources of interest to the water sector.
- Searches generate lists catered to utility attributes, climate concerns, and response strategies selected by the user.
- Current version contains approximately 350 resources in five categories
- Toolbox will be updated periodically

Toolbox Interface


Water Security
U.S. ENVIRONMENTAL PROTECTION AGENCY

Contact Us
Search:
All EPA
This Area
Home

You are here: [Water](#) > [Water Infrastructure](#) > [Water Security](#) > [Climate Ready Water Utilities](#) > [CRWU Toolbox - beta version](#)

Climate Ready Water Utilities Toolbox - beta version

The Climate Ready Water Utilities (CRWU) Toolbox provides access to resources containing climate-related information relevant to the Water Sector. These resources include several categories of information and can be searched by geographic region, water utility type and size, water resources, climate change impact, and climate change response strategies. These resources will be updated frequently to provide the most current Water Sector climate change information.

Begin using the Toolbox by selecting one or more information categories (buttons), then selecting items of interest under each heading. Resources that apply across utility types, sizes, or regions can be found by selecting the "Not Type/Size/Region Specific" option under the appropriate heading. The third column presents five climate change strategies with specific actions listed under each strategy. For each strategy, please select the actions of interest. Strategy definitions can be reviewed by clicking the "Show Help" button below. Click the "Select/Deselect All" button to either select all items or clear selections under a heading. A selection needs to be made under each heading for the Toolbox to function. Once you have finished selecting search criteria, click "Show Results" to begin reviewing the resources that address the selected topics.

Please e-mail any questions or comments to CRWUhelp@epa.gov

Show Results
Show Help

Which categories of information would you like to search?

Current Activities


Funding Opportunities

Publications & Reports

Tools & Models

Webinars & Seminars

Who are you?	What are your concerns?	How do you want to respond?
Utility Type	Water Resource Type	Reduce carbon / water footprints
<input type="checkbox"/> Not Type Specific <input type="checkbox"/> Drinking Water <input type="checkbox"/> Storm Water <input type="checkbox"/> Wastewater <input type="checkbox"/> Combined	<input type="checkbox"/> Groundwater <input type="checkbox"/> Surface water <input type="checkbox"/> Desalinated water <input type="checkbox"/> Reclaimed water	<input type="checkbox"/> Reduce greenhouse gas emissions <input type="checkbox"/> Enhance operational flexibility <input type="checkbox"/> Expand capacity <input type="checkbox"/> Develop alternative resources
Utility Size	Climate Impact	<input type="checkbox"/> Changes to operations and maintenance <input type="checkbox"/> Response planning <input type="checkbox"/> Water efficiency <input type="checkbox"/> Energy efficiency
<input type="checkbox"/> Not Size Specific <input type="checkbox"/> Small (up to 3300)	<input type="checkbox"/> Sea level <input type="checkbox"/> Temperature <input type="checkbox"/> Precipitation	



CRWU Toolbox: Next Steps

- Fall 2010 update will add ~125 additional resources
- Obtain feedback from utilities and other users on interface, usability, and potential improvements
- Any thoughts or questions on Toolbox, desired improvements, key functionalities, etc.?

Send to CRWUhelp@epa.gov

www.epa.gov/safewater/watersecurity/climate

Tabletop Exercise Tool for Water Systems: Emergency Preparedness, Response, and Climate Resiliency

- Mini-DVD with materials that assist users in developing and conducting customized tabletop exercises
- Utilities can use these scenarios to raise awareness of potential climate change impacts and examine approaches to respond
 - Extreme Flooding
 - Extreme Drought
 - Sea Level Rise
 - Intense Fire in Protected Catchment
 - Impact of Freeze Thaw Shift on Main Breaks



Building Resilience in the National Estuary Program

Climate Ready Estuaries



CRE Vision and Mission

CRE Vision

- CRE is supporting and spurring a vibrant community of practice made up of capable coastal managers all around the U.S. who are assessing climate change risks to sustainability and healthy environments, and are implementing adaptation measures that are appropriate for their situations.

CRE Mission

- The core mission of CRE is to help our coastal partners raise the adaptive capacity of their communities so they can effectively identify risks and adapt to the impacts of climate change.

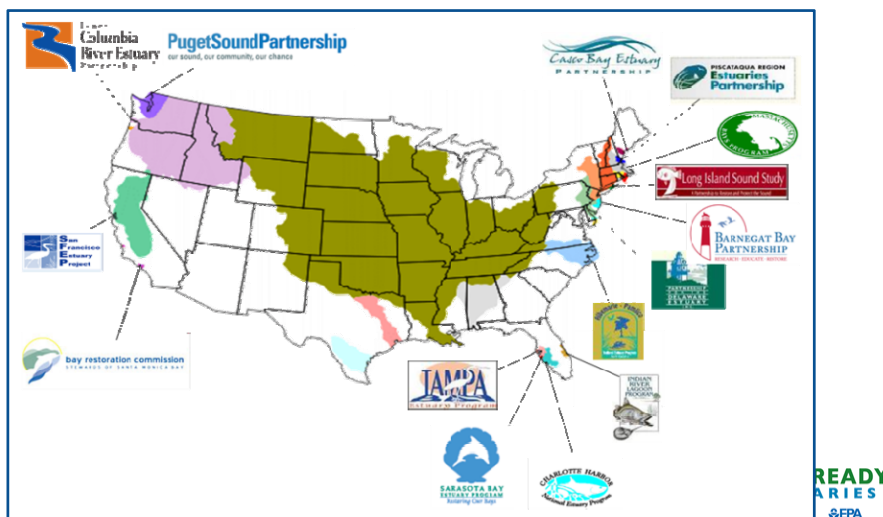


CRE Goals: Fulfilling Our Mission

- Assembling lessons-learned from our- and other climate adaptation projects
- Researching and developing best practice guidance for important adaptation steps
- Promoting peer-to-peer, and researcher-practitioner communication and learning
- Providing technical assistance and grants that will lead to demonstration projects
- Testing ideas and filling knowledge gaps about adaptation with practical experimentation
- Encouraging communities to begin implementing adaptation measures, with small steps if necessary



CRE's Local NEP Partners (FY08–10)



CRE Funded Projects, FY08–10

- Vulnerability assessments – sea level, habitat types, natural resources
- Planning – land use, conservation, strategies, resiliency
- Outreach/education – toolkits, visualization, workshops, outreach plans
- Monitoring and indicators

Coordinating Adaptation in Coastal Communities

- CRE in FY11
 - Make our federal partnerships bear fruit
 - Consolidate lessons-learned
 - Supporting local projects
 - Outreach and communications

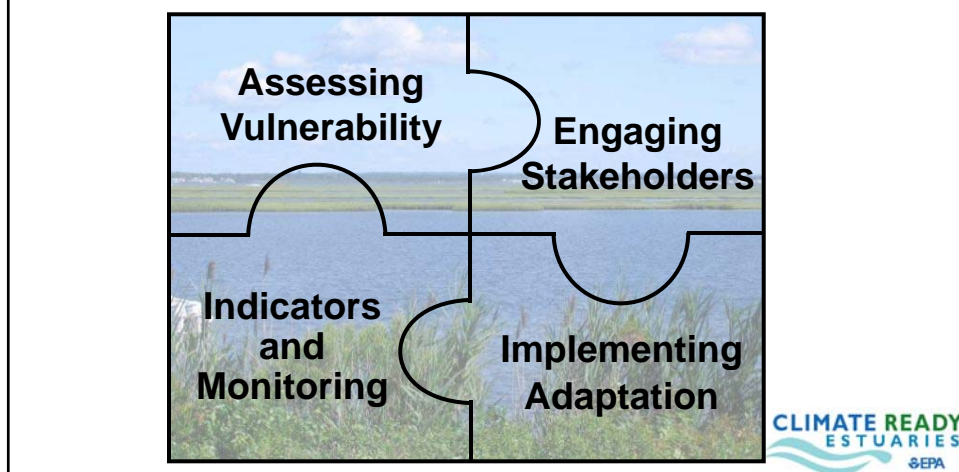


What Have We Learned From 3 Years of CRE?

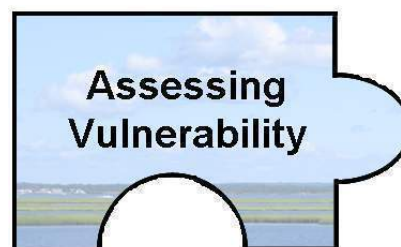
- Broad interest in distilling common successes, challenges, and opportunities encountered by CRE partners
- Means of increasing exposure for great work of partners, and better coordinating coastal adaptation work across the federal government




CRE Adaptation Planning and Implementation: Putting the Pieces Together




- Non-climate drivers often exacerbate climate vulnerabilities
- Collaborate with local partners to move projects forward
- Utilize regional experts and best professional scientific judgment to help fill data gaps
- Emergency and disaster management is a great entry point for the “climate conversation” with state/local governments
- Vulnerability assessments can be narrow in scope and still generate significant support for adaptation







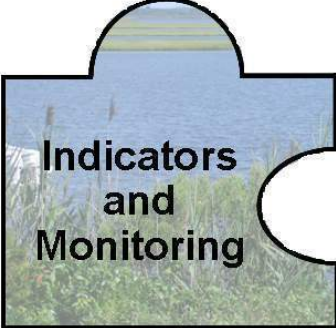
- Leverage existing efforts in stakeholder engagement and outreach, recognizing that different organizations have different strengths
- Focus on local issues and priorities
- Link adaptation messaging to preserving clean water and maintaining functional stormwater drainage
- Target messaging to the entities responsible for constructing and maintaining public infrastructure




Engaging Stakeholders




- Identify desired climate change information outputs prior to selecting indicators
- Coordinate with existing monitoring efforts to prevent duplication of effort, and for maximum efficiency
- Consider local factors when deciding on a process for indicator selection, as local and state policies and requirements can greatly influence the process and outcomes




Indicators and Monitoring



- Particularly in areas with little political support for adaptation, start small, demonstrate success on that level, and scale up
- Practice (and institutionalize) adaptive management, as adaptation is an iterative process and will always need to respond to new information and stakeholder needs
- Build adaptation into other local, state and/or federal planning efforts, in order to a) bring more resources to bear; and b) ensure that adaptation becomes a part of routine activities that public officials and citizens already support



**Implementing
Adaptation**




CLIMATE READY
ESTUARIES
EPA

NEP “Climate Readiness” Survey

Does Your NEP...

	Yes	No
Incorporate climate change into its CCMP and/or Work Plans?	18	10
Define climate change as a Priority Issue?	15	13
Participate in the CRE program, now or in the past?	15	13
Engage in adaptation-related work outside of the CRE program?	5	23



CLIMATE READY
ESTUARIES
EPA

The screenshot shows a web browser window titled "Coastal Toolkit | Climate Ready Estuaries | U.S. EPA - Windows Internet Explorer". The address bar shows the URL "http://www.epa.gov/cre/toolkit.html". The page header includes the EPA logo and the text "U.S. ENVIRONMENTAL PROTECTION AGENCY". The main heading is "Climate Ready Estuaries" with a "Share" button. Below this is a search bar with options for "All EPA" and "This Area", and a "Go" button. A breadcrumb trail reads: "You are here: EPA Home » Climate Change » Climate Ready Estuaries » Coastal Toolkit".

The main content area is titled "Coastal Toolkit" and contains the following text: "The Climate Ready Estuaries Coastal Toolkit provides resources for estuaries and coastal programs that are interested in learning more about climate change impacts and adaptation. The Toolkit pages below provide information and links to websites, reports, and other resources related to the following areas:"

Below the text are seven links, each with a small icon:

- Monitoring Climate Change
- Where to Find Data
- Coastal Vulnerability and Adaptation Tools
- Adaptation Planning
- Smart Growth in the Context of Climate Change
- Sustainable Financing Options
- Communications and Outreach Materials

At the bottom of the page, there are links for "EPA Home", "Privacy and Security Notice", and "Contact Us". The browser's status bar at the bottom shows "Local intranet" and "100%" zoom.

Want More Information?

CRWU website:

<http://water.epa.gov/infrastructure/watersecurity/climate>

CRE website:

<http://www.epa.gov/cre>

Sign up for e-newsletters:

EPA Climate Change and Water News: Send a blank email to water_and_climate_change_listserve-subscribe@lists.epa.gov

EPA climate change activities:

<http://epa.gov/climatechange>

Questions?

Climate Ready Water Utilities

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Baranowski.Curt@epa.gov
202-564-0636

John Whitley
Whitley.John@epa.gov
202-564-1929

General CRWU Questions
CRWUhelp@epa.gov

Climate Ready Estuaries

Jeremy Martinich
Martinich.Jeremy@epa.gov
202-343-9871

Michael Craghan
Craghan.Michael@epa.gov
202-566-1946



EPA's Climate Ready Water Utilities Program Spartanburg Water – A Utility Case Study



Rebecca F. West
Deputy General Manager of
Engineering & Technical Services



EPA's Climate Ready Water Utilities Program

- Climate variability impacts may challenge the water sector's ability to fulfill its mission.
- A majority of water utilities lack the tools to assess climate change impacts, identify adaptation and mitigation options
- EPA's Climate Ready Water Utilities (CRWU) program provides resources for the water sector to develop and implement long-range plans that account for climate change impacts.

Key Themes of the Findings from the CRWU Working Group Report

- Science, policy and management implications
- Capacity to engage in climate ready activities varies
 - determined by hydrologic conditions, public opinion, availability of resources
 - climate readiness approach needs to accommodate spectrum
- Adaptive learning and management framework
 - early stages of identifying impacts, developing adaptation options
- Expanded concept of infrastructure
 - distributed, green infrastructure, move towards hybrid approaches
 - greater levels of collaboration, new skill sets
 - consideration of legal, institutional, financial, behavioral adaptation options

Key Themes of the Findings from the CRWU Working Group Report (cont'd.)

- Robust support
 - horizontal federal coordination; vertical federal, state, local
 - climate ready regulators
- Water specific research
 - water sector should be viewed as users *and* shapers
 - keep water sector needs high on national agenda
 - long term data collection, decision support, local impacts
- Sector interdependencies and public agencies
 - Energy, agriculture, land use planning, economic development

Key Themes of the Recommendations from the CRWU Working Group Report

- Create a climate ready program
 - EPA in coordination with other federal partners
- Strengthen and deploy decision support models and tools
 - expanded decision support tools and training
 - more information on benefits and costs of green infrastructure
- Enhance interdependent sector collaboration
 - highlight shared water management responsibilities
- Promote watershed planning
 - encourage adoption of integrated water resource management

Key Themes of the Recommendations from the CRWU Working Group Report (cont'd.)

- Leverage associations
 - mechanism to reach utilities and deliver services
 - integrate climate adaptation into existing programs
- Develop adaptive regulatory capacity
 - identify areas where changes in water quality and quantity may creates challenges to meeting regulatory requirements
 - establish pilot projects to address those challenges
- Develop climate research strategy
- Advocate for federal family coordination on climate change
 - Better coordination among federal agencies

Spartanburg Water A Joint Water Utility In Upstate SC

- Providing Drinking Water and Wastewater Services
- Serves Approximately 200,000 people



Spartanburg Water Water Infrastructure Investments



3 WTFs and 13 Water Storage Facilities

- Lake Blalock WTF: 27 mgd
- RB Simms WTF: 64 mgd
- Landrum WTF: 1 mgd

9 WWTFs and 87 Wastewater Pump Stations

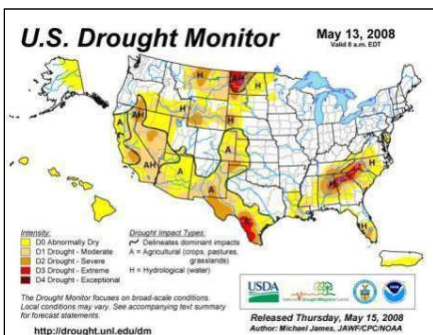
- Fairforest Regional WWTF: 25 mgd

Other Infrastructure

- 1300 miles of water mains and 940 miles of sewer lines
- 5 Dams and 3 Surface Water Reservoirs



Spartanburg Water Impacts Realized from Climate Change



- Recent Persistent Droughts
- Extreme Weather Events
- Increased Summer Temperatures



Climate Change and Realized Impacts to the Utility



- Long Term Financial Planning
- Reviewing System Vulnerabilities
- Future Capital Planning
- Asset Rehabilitation and Repairs
- Managing Surface Water Reservoirs



Incorporating Climate Change Into Effective Utility Management

Ten Attributes of Effectively Managed Water Sector Utilities

- Product Quality
- Customer Satisfaction
- Employee & Leadership Development
- Operational Optimization
- Financial Viability
- Infrastructure Stability
- Operational Resiliency
- Community Sustainability
- Water Resource Adequacy
- Stakeholder Understanding & Support



Watershed Impacts from Climate Change Stakeholder Understanding & Support



Opportunities from Climate Change Sustainable Utility Management

- Integrated Watershed Planning
- Recalibrating Capital Improvement Planning
- Sustainable Utility Financing
- Application of Green Technologies
- Community Water Stewardship



Questions ?

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Local Government Tools for Adapting to Climate Change

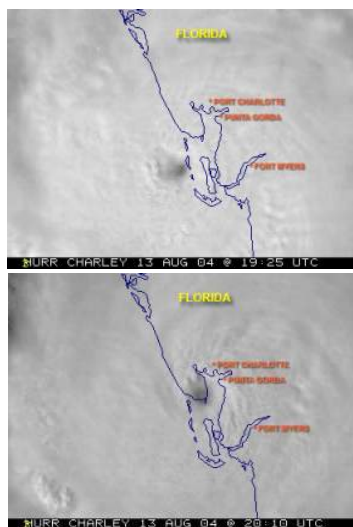
Lisa Beever, Director,
Charlotte Harbor National
Estuary Program, Florida
lbeever@swfrpc.org



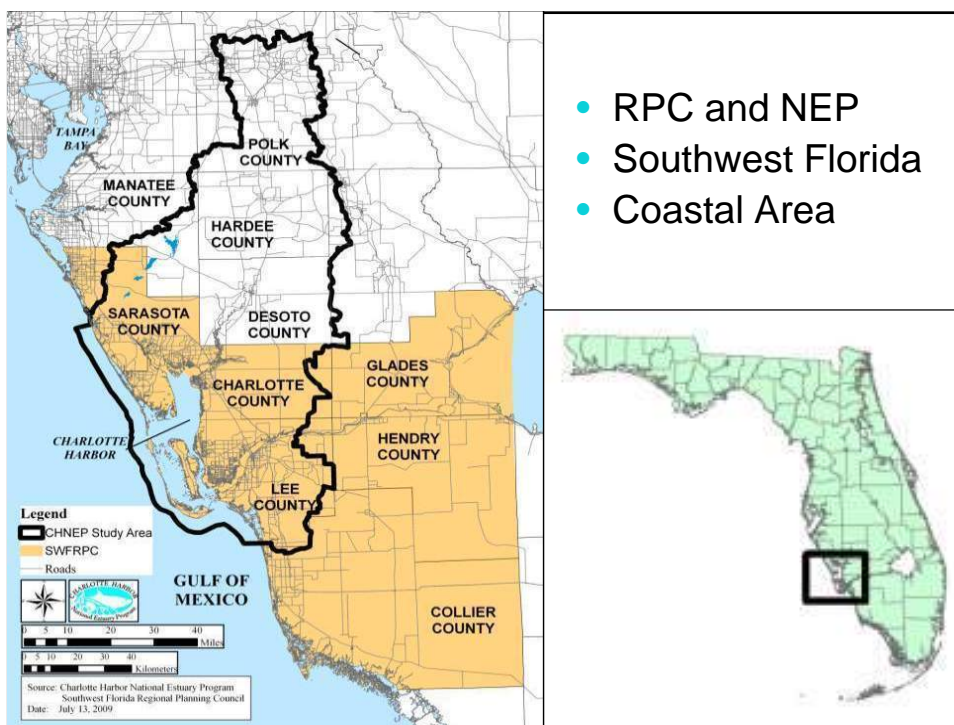
National Estuary Programs: Created under Section 320 of the Clean Water Act, under auspices of EPA. 28 in nation.



CHNEP Well-Positioned



- Host agency's 2 decades of storm surge modeling & hurricane planning.
- 2001 500-yr & 2008 100-yr droughts.
- 2004 Category 4 land-falling storm; Hurricane Charley.
- Climate-aware population.



- RPC and NEP
- Southwest Florida
- Coastal Area



Committing to Our Future
A Comprehensive Conservation and Management Plan
for the Greater Charlotte Harbor Watershed
from Venice to Bonita Springs to Winter Haven



Update 2008



Comprehensive Conservation and Management Plan

SG-Q: Build capacity for communities and their local leadership to mitigate and adapt to the effects of climate change through joint efforts.

Projects in support of SG-Q

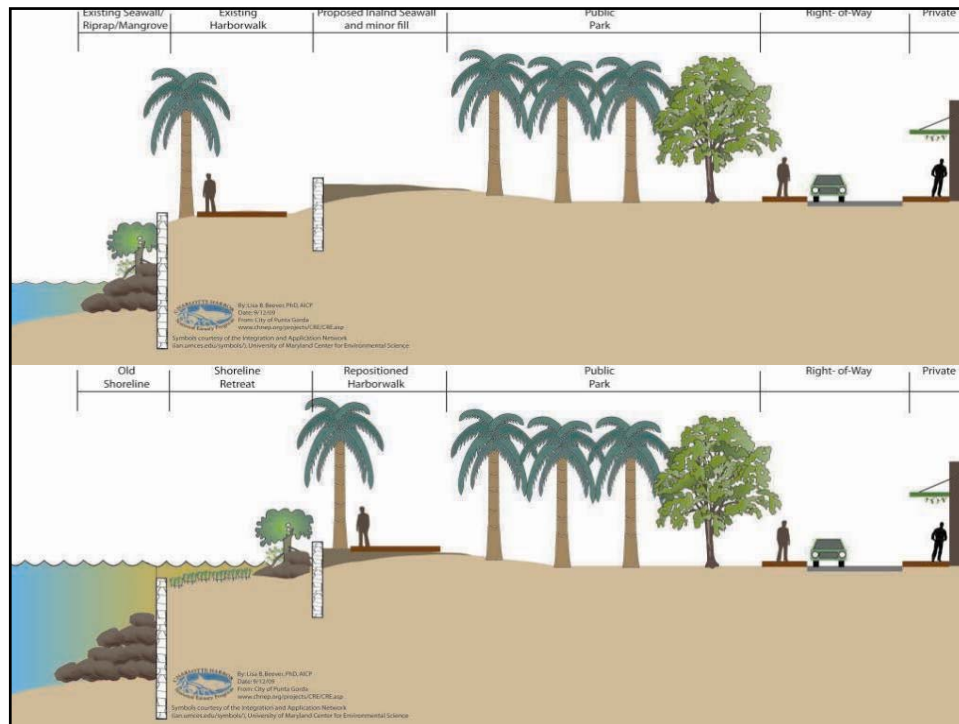
- Regional Vulnerability Assessment (2007-2009)
- **Punta Gorda Adaptation Plan (CRE 2008-2009)**
- Vulnerability Assessment Lite (2009-2010)
- CC Environmental Indicators (CRE 2009-2010)
- **Model Ordinances/Comp Plan (CRE 2009-2010)**
- **Punta Gorda Comp Plan amend (2009-2010)**
- Salt Marsh Adaptation (2009-2012)
- Seagrass response to SLR (2009)
- **Lee County Resiliency Plan (2009-2010)**
- Conceptual Ecological Models (CRE 2010-2011)
- Bonita Springs Adaptation Plan (Battelle pilot)

- Card Game (brainstorm & prioritize vulnerabilities)
- Envelopes Game (brainstorm adaptation options)
- Thumbs up/down (Consensus on vulnerabilities)
- Board Game (Locate, prioritize, discard adaptations)



City of Punta Gorda Adaptation Priorities

- Workshop 1 participants identified ~230 adaptation options.
- Workshop 2 participants prioritized ~270 adaptation options.
- Workshop 2 participants discarded ~30 adaptation options.
- Workshop 3 participants validated 7 priority adaptation actions.



State of Florida 1985 Growth Management Act

- The Local Government Comprehensive Planning and Land Development Regulation Act (163 FS).
- Cities and Counties must adopt Comp Plans, following detailed rules (9J-5 FAC).
- Goals, Objectives, Policies; force of law.
- Evaluation and Appraisal Reports (EARs), 7 year updates.
- EARs suggest how the plan should be revised, proposed amendments.
- Final Adoption.

City of Punta Gorda 4 Comp Plan Major Issues

1. Transportation Concurrency Exemption Area
2. Energy Efficiency Alternatives
3. Climate Adaptation/SLR Strategies
4. Declining Tax Revenues & Budget Cutbacks

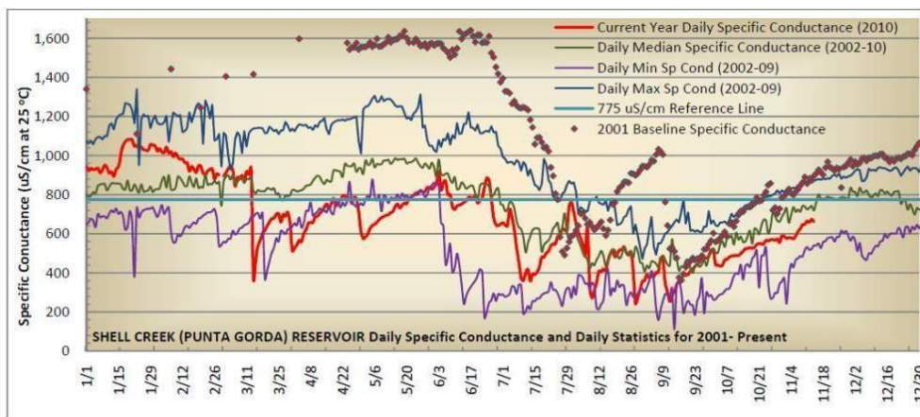
CONSERVATION & COSTAL MANAGEMENT ELEMENT	
ISSUE/CONCERN	COMMENT
Climate Adaptation Strategies to include: Seagrass Protection & Restoration, Native Plant Landscaping, Areas to retain Natural Shorelines, Constrain locations of high risk infrastructure, Fertilizer Uses, Promotion of green building alternatives through education, taxing incentives, green lending, Drought preparedness planning	Development of strategies were a result of partnership between the National Estuary Program and the Southwest Florida Regional Planning Council to complete the Punta Gorda Climate Adaptation Plan. City Council approved the plan's proposed strategies to be reviewed and considered for strategies to be possibly included in the Evaluation and Appraisal Report.

Issue	Source	Major Issue	Related Element & Comments
3) Analyze Climate Adaptation/Sea Level Rise Strategies	City Staff	Yes	Staff will be reviewing the alternative strategies provided in The City of Punta Gorda's Climate Adaptation Plan which was approved by Council to be used in the EAR review. The goal will be to develop an action plan preparing Punta Gorda for future climate change.
a) Review & evaluate the recommended adaptation strategies with regard to HB697	City Staff	Major Issue Component	Conservation & Coastal Management Elements: Review and add policies to include factors that affect energy conservation. Housing Element: Review strategies for future housing to include use of energy resources based on energy deficient design and construction.
b) Explore City's future directions regarding sea level rise, & reduction of greenhouse gas emissions	City Staff	Major Issue Component	Conservation & Coastal Management Elements: Review and consider strategies from the City of Punta Gorda's Climate Adaptation Plan over the next planning decade. Seek strategies to combat SLR effects on the City's shoreline.

Source: Punta Gorda Planning Commission Update, 8/23/10

Issue	Source	Major Issue	Related Element & Comments
2) Analysis of the energy efficiency alternatives	City Staff	Yes	Examine all element policies to address HB 697 greenhouse emission reductions
a) proximity of daily needs and workplaces to residential	Citizen Concern	Major Issue Component	Future Land Use: proximity of uses may reduce number of auto trips and/or vehicle miles traveled. Transportation Element: Component of the new Mobility Plan. Recreation & Open Space: Connectivity between all major residential, commercial, and recreational areas through the completion of the City's Ring Around the City
b) Study optimal commercial intensity/residential densities that are walkable, bicycle friendly, and transit supportive	City Staff	Major Issue Component	Future Land Use: balance of residential units to retail/workplace potential. Transportation Element: This will address a portion of the HB 697 requirements & may overlap w/ other issues discussed in Climate Adaptation and FLU.
c) Sustainable food production	City Staff	Yes	Future Land Use: Increases in local food production could help address concepts of HB 697. Recreation & Open Space Element: Implementation of GOP's identified in the recently adopted Parks & Recreation Master Plan.
c-1) Develop Future Land Use category suitable for local food production	City Staff	Major Issue Component	Future Land Use: Development is required only if analysis supports the creation due to the proximity of appropriate lands adjacency to the existing City Limits.
c-2) Support creation of community gardens	Citizen Concern	Major Issue Component	Future Land Use: Ensure no roadblocks exist to community garden creation. Recreation & Open Space: Implementation of GOP's of the Parks & Recreation Master Plan.
c-3) Study existing and potential food production areas in all of South Charlotte County	City Staff	Major Issue Component	Future Land Use: May identify the need for strategies to annexation non-urban areas for food production area preservation


Shell Creek Reservoir Specific Conductance



Source: Southwest Florida Water Management District

**Shell Creek and Prairie Creek
Watersheds Management Plan**

Reasonable Assurance Documentation



Shell, Prairie, and Joshua Creeks
Watershed Management Plan Stakeholders Group

Final Plan
December – 2004

City of Punta Gorda Water Treatment Plant

- Replace 45 year-old dam structure
- Add groundwater supply and membrane process (instead of reservoir expansion)
- Expand facilities for growth.



Charlotte County- Punta Gorda Metropolitan Planning Organization Hazard Mitigation Strategy

Mitigation Options	Hazards Addressed					
	Storm Surge	Sea Level Rise	Erosion	Rainfall Flooding	Hurricane Force Wind	Wildfire
Accommodation Mitigation Options						
Mitigation and Recovery Planning	✓			✓	✓	✓
Elevation		✓		✓		
Stormwater Drainage				✓		
Design and Material Modifications	✓	✓		✓	✓	
Protection Mitigation Options						
Structural Shoreline Protection	✓	✓	✓			
Non-Structural Shoreline Protection	✓	✓	✓			
Relocation/Retreat Mitigation Options						
Relocation and Right of Way Acquisition	✓	✓	✓			
Monitor and Eventual Retreat	✓	✓	✓			



CLIMATE READY ESTUARIES
EPA

FREE

Workshop!



**UTILIZING COMPREHENSIVE PLANS
AND LOCAL ORDINANCES**



**TO IMPROVE COMMUNITY RESILIENCE TO
CLIMATE CHANGE
WORKSHOP**

3.5 CM Credits Pending Approval

Workshop Agenda

1. Overview of Climate Ready Estuaries, CHNEP
2. Model Florida Comprehensive Plan Sea Level Rise Adaptation Language, UF Law School
3. Rolling Easements and Climate Change Resiliency, EPA
4. Revisions to Rule 9J-5 concerning Energy Efficiency, FDCA.

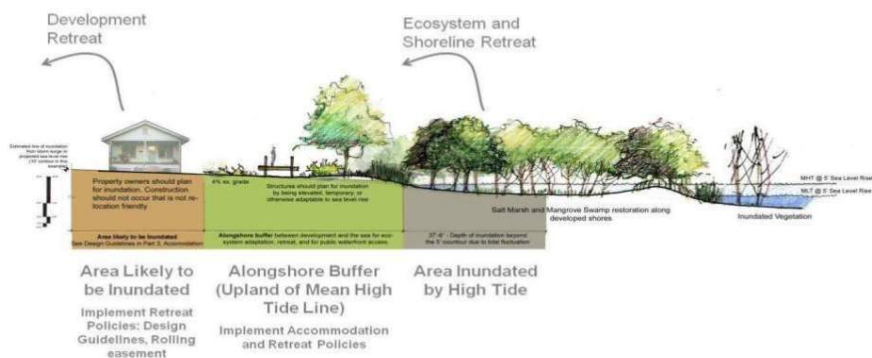
Goal 1: Temporal and Spatial Context

Goal 2: Armoring, Filling, Diking (Protection)

Goal 3: Redesign (Accommodation)

Goal 4: Planned Relocation (Retreat)

Managed Retreat Shoreline Section



Goal 1: [General] To develop the temporal and spatial context for sea-level rise adaptation planning in the County

Objective 1.1: [Spatial Overlay] To identify the **Vulnerable Area** of the County where the protection, accommodation, and retreat strategies should be used.

Policy 1.1.1: The County shall use data and analysis to establish a sea level rise (SLR) adaptation overlay district encompassing all areas within the County that are vulnerable to SLR consisting of three coastal zones.

- SLR Adaptation Overlay Protection Zone
- SLR Adaptation Overlay Accommodation Zone
- SLR Adaptation Overlay Relocation Zone

Policy 1.1.2: [SLR Notice] To require all sellers of real property within the SLR Overlay District to provide **notice** that such structures and properties are located in within the SLR Spatial Overlay

Objective 1.2: [Temporal]: To expand planning horizons for sea-level rise adaptation to capture the anticipated impacts of SLR based on current SLR models

Policy 1.2.1: Utilize a 50 year planning horizon when considering the adoption of any protection, accommodation, and managed retreat strategy.

Source: Thomas T. Ankersen, Director; Krystle Macadangdang and LLM, Melissa Newmons, J.D., Student Associates. 2010. University of Florida Fredric G. Levin College of Law Coastal Development and Ecosystem Change Clinic

GOAL 2: [Protection.] To ensure adequate protection of the built environment through soft and hard shoreline stabilization that seeks to maintain a static shoreline position within the County.

Objective 2.1: [Inventories] To identify areas of the built environment vulnerable to sea level rise where shoreline stabilization strategies will be appropriate

Policy 2.1.1: [Protection Strategy] By 20(15), the County shall develop a **comprehensive shoreline stabilization strategy** to address **protection of the built environment where** it has been determined to be **feasible and in the best interest of the County to protect economic investment and infrastructure**.

Policy 2.1.2: [Soft Stabilization Preferred] The County shall require the **use of soft shoreline stabilization techniques** unless precluded by engineering or regulatory constraints.

Policy 2.1.3 [Public Interest]: The County shall **prohibit further hardening** of shorelines **unless found to be in the public interest**.

Policy 2.1.4: Based on projected rates of sea level rise within the SLR planning horizon the County shall **inventory all existing shoreline stabilization structures** and **determine their capacity to maintain functionality throughout the SLR planning horizon**.

Policy 2.1.5: The County shall **inventory all public buildings and infrastructure** that are vulnerable to sea level rise within the SLR planning horizon and **determine whether such buildings and structure are suitable for protection through shoreline stabilization**.

GOAL 3: [Accommodation]: To accommodate increasing sea levels and the additional flooding that will result by adapting the built environment and enhancing the resiliency of the natural environment where it is economically and ecologically practicable to do so

Objective 3.1: [Built Environment] To assure that all aspects of the built environment within the accommodation zone can withstand additional permanent or periodic inundation based on sea level rise projections through structural and non-structural solutions.

Policy 3.1.1: [Performance Standards] The County shall require **all new construction** within the Accommodation Zone to adhere to performance standards designed to enable development to withstand permanent and/or temporary inundation due to rising sea levels....

Objective 3.2: [Land Use] To reduce the density and intensity of development and redevelopment in the SLR adaptation overlay district landward of unprotected shorelines

Policy 3.2.1 [Down-planning/Down-zoning] The County shall limit the residential density within the accommodation zone to no more than ___ units per acre. The County shall develop design guidelines that promote compact development and redevelopment that maximizes the use of floodways and flood storage within the zone of accommodation.

Policy 3.2.2: [Limitation on Building Footprint] The County shall limit the building footprint for all new residential structures within the accommodation zone to () square feet and commercial structures to (____) square feet.

Objective 3.5 [The Natural Environment] To facilitate coastal ecosystem migration through the maintenance and restoration of adequate open space within the zone of accommodation.

Policy 3.5.1: [Riparian Buffers] The County shall establish riparian buffers that reflect projected rates of sea level rise within the planning horizon for all tidally influenced waterbodies. Such buffers shall be designed to allow the conversion of adjacent uplands to wetlands while retaining transitional ecotones where ecologically feasible.

Policy 3.5.2: [Conservation Land Acquisition Priority] The County shall develop priority areas for land acquisition based on their strategic capacity to support coastal ecosystem migration.

Goal 4: [Managed Relocation]: Reduce vulnerability in the built environment and preserve coastal ecosystems through the orderly abandonment and /or landward relocation of structures and associated infrastructure

Objective 4.1: To reduce the density and intensity of future land use along unprotected shorelines at a rate consistent with projected rates of shoreline recession over the SLR planning horizon

Policy 4.1.1: Within the managed relocation overlay, the County shall **eliminate new investment in public infrastructure** likely to be inundated due to sea level rise within the planning horizon

Policy 4.1.2 Reduce residential land use densities to no more than ___ units per acre and commercial structures to ____ square feet per acre within the "Managed Retreat Zone"

Objective 4.2: To preserve coastal ecosystems by ensuring that natural shoreline migration processes may continue unimpeded.

Policy 4.2.1: All **hard shoreline stabilization** techniques are **prohibited** within Managed Relocation Zone

Policy 4.2.2: Establish an erosion-based minimum setback for shoreline development based upon the **(annual coastal erosion rate) x (a planning period representing the economic lifetime of the coastal structure) + (an additional buffer)**

Objective 4.3: To develop programs to encourage properties within the "Managed Relocation Zone" to abandon or relocate structures consistent with projected rates of shoreline recession over the SLR planning horizon

Policy 4.3.1: **Prioritize and seek to acquire properties** or interests in property within the managed relocation overlay

Policy 4.3.2: Identify and **establish a land bank** for the purposes of relocating critically important infrastructure and municipal support facilities.

Policy 4.3.3: Create a **mandatory transferrable development rights** program within the managed relocation overlay that transfers densities and intensities

Policy 4.3.4: Promote the acquisition of **rolling conservation easements** based on the priorities developed in policy 4.3.1.

Lee Co. Resiliency Strategy

- Outlines the essential elements of a resiliency strategy
- Summarizes vulnerabilities
- Summarizes input received from Lee County leadership and constitutional officers
- Identifies strategies that Lee County could pursue to increase resiliency to the identified vulnerabilities
- Identifies ways to incorporate climate change resiliency into the Comprehensive Plan
- Outlines monitoring and evaluation strategies.



Online Survey

Years in Florida
Years in Lee County
Perceptions of changes in weather, water quality, fishing and wildlife

Impacts of Hurricane Charley on department assets, personnel and processes

County Commissioners
Division Heads
Constitutional Officers


Age & location of facilities
Potential for facilities to be storm-hardened
Potential energy-saving measures for facilities and staff

What is the most important thing for Lee County to do to prepare for climate change?
What is the worst thing Lee County could do to prepare for climate change?



Interviews

<p>Reaction to online survey Reaction to draft Did we leave out anything important? Who else should we talk to?</p>	<p>Potential effects of climate change on the department Lee County's greatest vulnerability to climate change</p>
<p>County Commissioners Division Heads Constitutional Officers</p>	
<p>How important do you think it is for Lee County to try to deal with climate change in an organized manner?</p>	<p>Avoidance, minimization, mitigation and adaptation ideas</p>



Multiple Public Water Suppliers

“An often overlooked consumer of energy is the municipal potable water service.”



- **Acquire land** for flood/water supply. 🌱
 - Acquire land for **recharge**. 🌱
 - **Agricultural water reuse**.
 - **Reduce local GHG emissions**.
 - Build **climate-friendly landscaping** into codes and educate homeowners and require in County landscaping.
 - Capture **digester gases** from wastewater reclamation plants and use them to produce electricity.
 - **Change ordinances** that require turf grass, etc.
 - **Charge more for treated water** similar to Sarasota (**Sliding scale**).
 - Use and encourage use of **cisterns/rain barrels**.
 - **Conservation education**
 - Consider climate change in **water supply planning**.
 - Control **fertilizer** use. 🌱 (see www.fertilizesmart.com)
 - Control **invasive exotic** species.
 - Create **redundancy** in water supply
 - Maintain **drinking water standards**. 🌱
 - Engage in **drought preparedness planning**
- 🌱 =Already Implementing Measure



Page 1 of 2



- Encourage **composting and mulching** to reduce irrigation. 🌱
- Identify **alternative water sources**, including **Desalinization**.
- **Identify conflicting policies** between programs.
- Improve plant efficiency through the installation of more **energy efficient motors and variable frequency drives on water pumps**.
- Improve water distribution systems and **leak detection**.
- Improved system of **retaining rainwater**.
- Increase **stormwater management capacity**.
- **Increase tree cover** to reduce evaporation from ground.
- Install **rainfall sensors** to reduce automatic irrigation.
- **Minimize impervious surfaces** to increase recharge.
- **Minimize use of potable water for irrigation**. 🌱
- **Protect groundwater** sources. 🌱
- **Reduce runoff** into streams.
- **Reinforce** existing infrastructure.
- **Restore natural accretion** processes.
- Use **native plants** in landscaping. 🌱
- Use of **reclaimed water for irrigation**. 🌱

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Tools for Local Gov't Implementation

- Have staff & citizens identify vulnerabilities and adaptation options.
- Build on personal experiences with climate challenges.
- Rely on local creativity for addressing challenges.
- Use existing processes to build climate resiliency in local government.
- Give “credit” for existing good practices.
- Provide options for elected officials.
- Lay groundwork and then build on it.

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Next Watershed Academy Webcast:

**Designing LID to Work:
Lessons Learned from North Carolina**



**Thursday, December 9, 2010
1:00–3:00pm Eastern**

www.epa.gov/watershedwebcasts

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http://water.epa.gov/learn/training/wacademy/upload/2010_12_2_certificate.pdf

You can type in each of the attendee's names and print the certificates.