

Building Resilience to Climate Change: Conducting a Vulnerability Analysis



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Structure of Today's Training

Goal: Ensure participants have a foundational understanding of how to undertake a vulnerability assessment

- Welcome and Introductions
- Introduction to Adaptation Planning
- Guidance on Conducting a Vulnerability Assessment
- Exercise on Vulnerability
- Break
- Identifying Key Vulnerabilities and Understanding Resilience
- Exercise on Key Vulnerabilities and Resilience
- Share Results
- Closing



Roundtable Introductions



Introduction to Adaptation Planning



Understanding Climate Adaptation



Climate Adaptation – Any measure or action that reduces the negative impacts of climate change or increases new opportunities.



Understanding Climate Mitigation



Climate Mitigation – Any measure or action taken to reduce greenhouse gas emissions.

Adaptation and Mitigation are not mutually exclusive!



Understanding Hazard Mitigation



Hazard Mitigation – Any action taken to reduce or eliminate the **long-term** risk to human life and property from natural hazards

(Stafford Act)



Understanding Emergency Preparedness



Emergency Preparedness – Any action associated with the **short-term** response to and recovery from a disaster event



Preparing for Climate Requires All



Why Plan for Climate Change?

- The climate is already changing
- Climate change impacts are projected to get worse in the coming years.
- Today's choices will shape tomorrow's vulnerabilities.
- Significant time is required to motivate and develop adaptive capacity, and to implement changes.
- Proactive planning is often more effective and less costly than reactive planning, and can provide immediate benefits.



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How Adaptation Planning Occurs

Anticipatory Adaptation

- Taking **proactive** steps to reduce the risks associated with climate change for individuals, communities , and ecosystems

Reactive Adaptation

- Dealing with climate impacts after-the-fact

**Smart Planning is Anticipatory Planning
but... it doesn't have to be new planning**

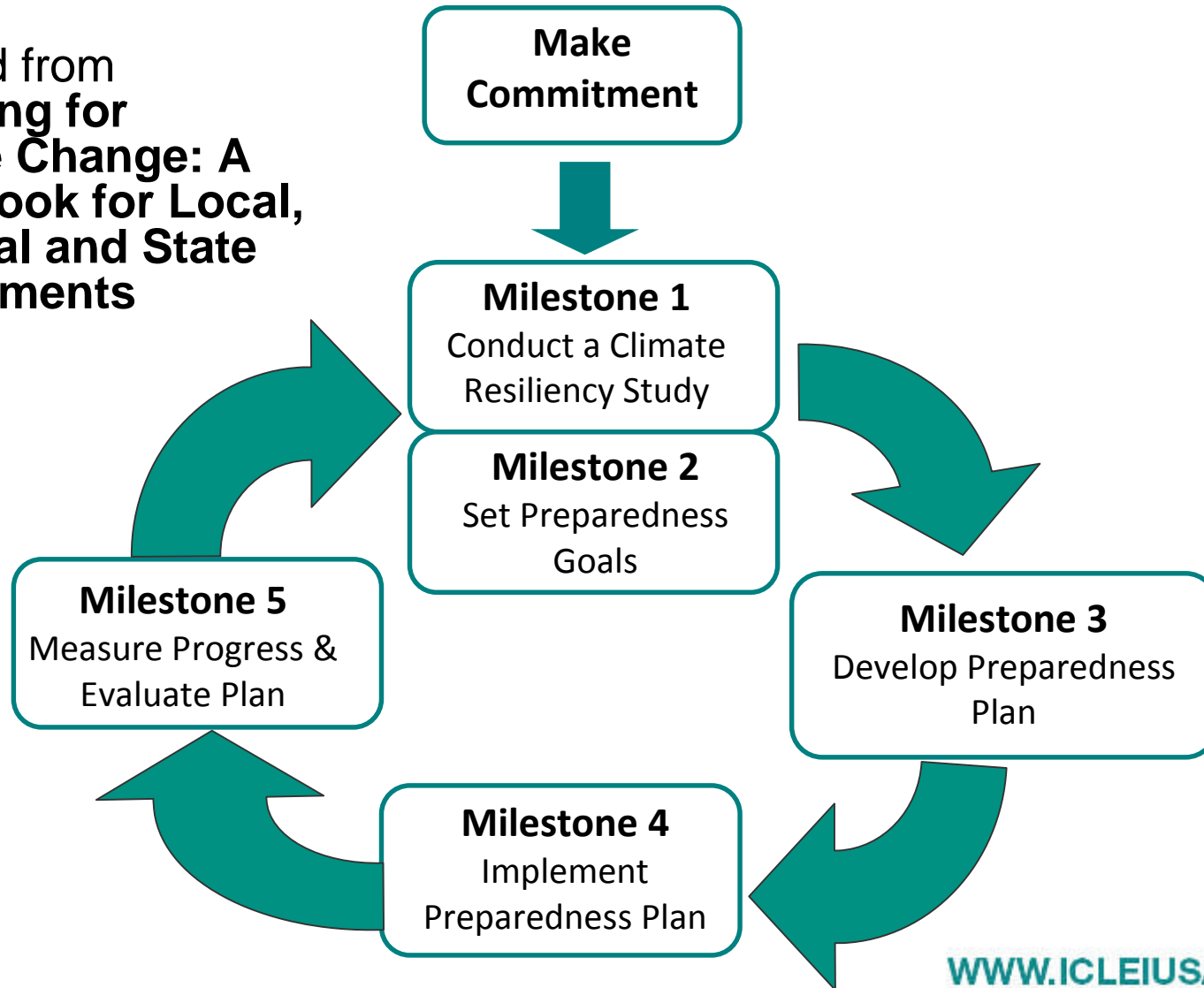


ICLEI's Approach to Adaptation Planning



Five Milestones for Climate Adaptation

Adapted from
**Preparing for
Climate Change: A
Guidebook for Local,
Regional and State
Governments**



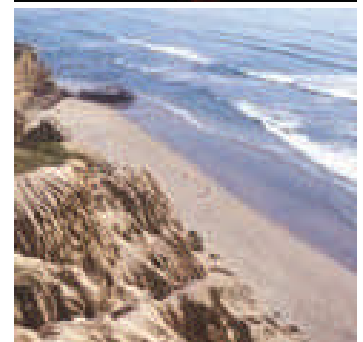
Pre-Milestone One: Getting Started

- Identify who should be involved
- Build support and provide education
- Formalize commitment (resolution)
- Start messaging and outreach
- Form and hold first Preparedness Team meeting



Milestone One: Conduct Resiliency Study

- Assess how regional climate is expected to change
- Assess regional/community ***impacts*** predicted from these changes in climate
- Identify systems that could be impacted (+/-) from forecasted changes in climate
- Conduct climate vulnerability assessment (**sensitivity x adaptive capacity**)
- Identify key vulnerabilities



Milestone Two: Establish Preparedness Goals

- Analyze results of vulnerability assessment
- Establish goals for the systems that have the highest vulnerability
- Consider short, medium, and long-term goals
- Consider alignment with existing community goals



Milestone Three: Create Preparedness Plan

- Review goals established for vulnerable systems
- Identify actions that capitalize on opportunities and reduce vulnerability to climate change
- Prioritize actions
- Draft Adaptation Plan or integrate into existing plans
 - Framework (roadmap) for approaching adaptation
 - Outlines preparedness goals
 - Actions to achieve goals
 - Timelines and associated costs with actions



START

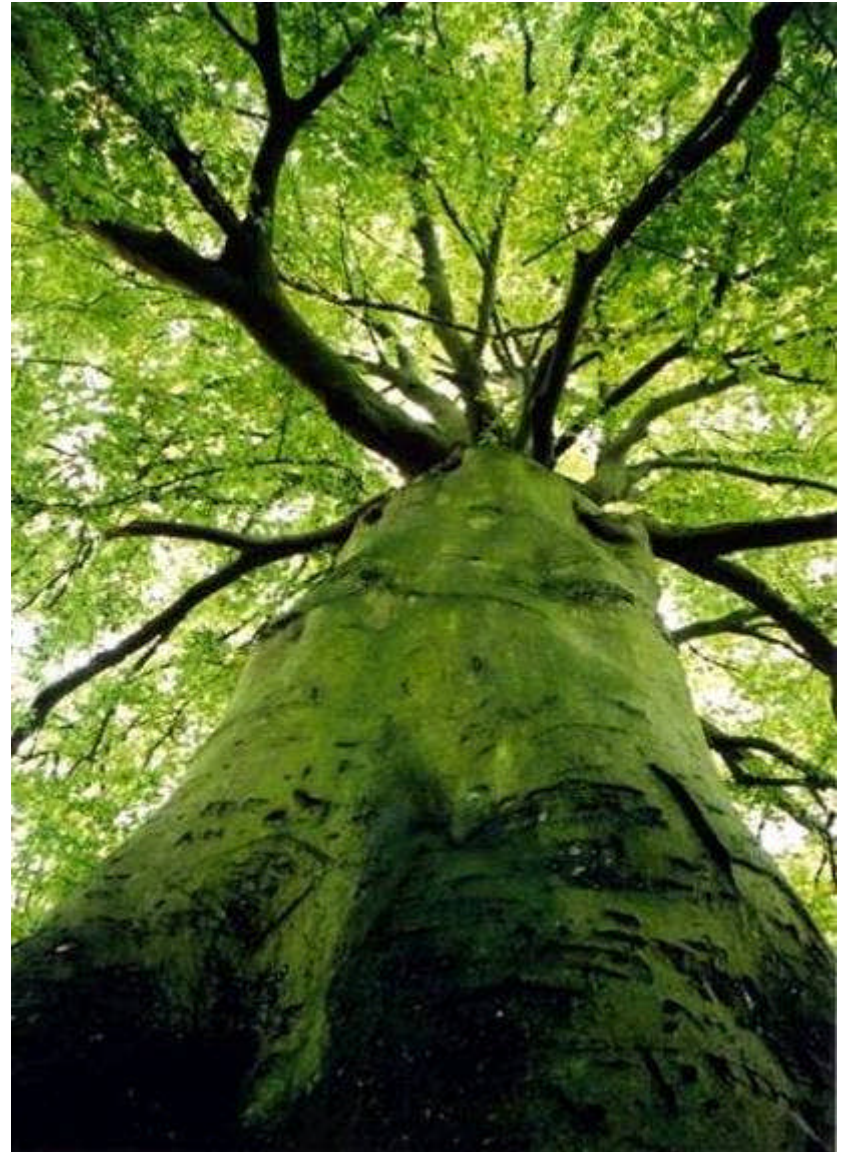
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Milestone Four: Implement Preparedness Plan

IMPLEMENT identified actions

- Create and adopt policy
- Identify funding, staffing, other resource needs, etc.
- Create a timeline and designate responsibility parties
- Share implementation results with community and ICLEI
- Celebrate successes!



Milestone Five: Monitor, Evaluate, and Re-Assess

- Continue implementation and keep track of progress
- Report progress to the elected officials, community, funders, and ICLEI (annually)
- 2 to 5 years in – take stock and evaluate focus
- Revisit updated climate forecasts
- Change course, if needed
- Continue to celebrate successes!



Questions



Conducting a Vulnerability Assessment



Understanding Vulnerability

Vulnerability: The degree to which a system is susceptible to (sensitivity), and unable to cope with (adaptive capacity), adverse effects of climate change (including climate variability and extremes)

Sensitivity: The degree to which a built, natural, or human system is directly or indirectly affected by changes in climate conditions or specific climate change impacts. If a system is likely to be affected as a result of climate change, it should be considered sensitive to climate change

Adaptive Capacity: The ability of a system to adjust to climate change, to moderate potential damages, to take advantage of opportunities, or to cope with consequences



Assessing Vulnerability

To assess vulnerability, a user needs to know:

1. How the climate is changing
2. What systems could be affected by changes in climate
3. How those changes could (or already are) leading to impacts in identified systems

From here, users assess the sensitivity and adaptive capacity of systems likely to be impacted by climate change



Changing Climactic Conditions

Temperature

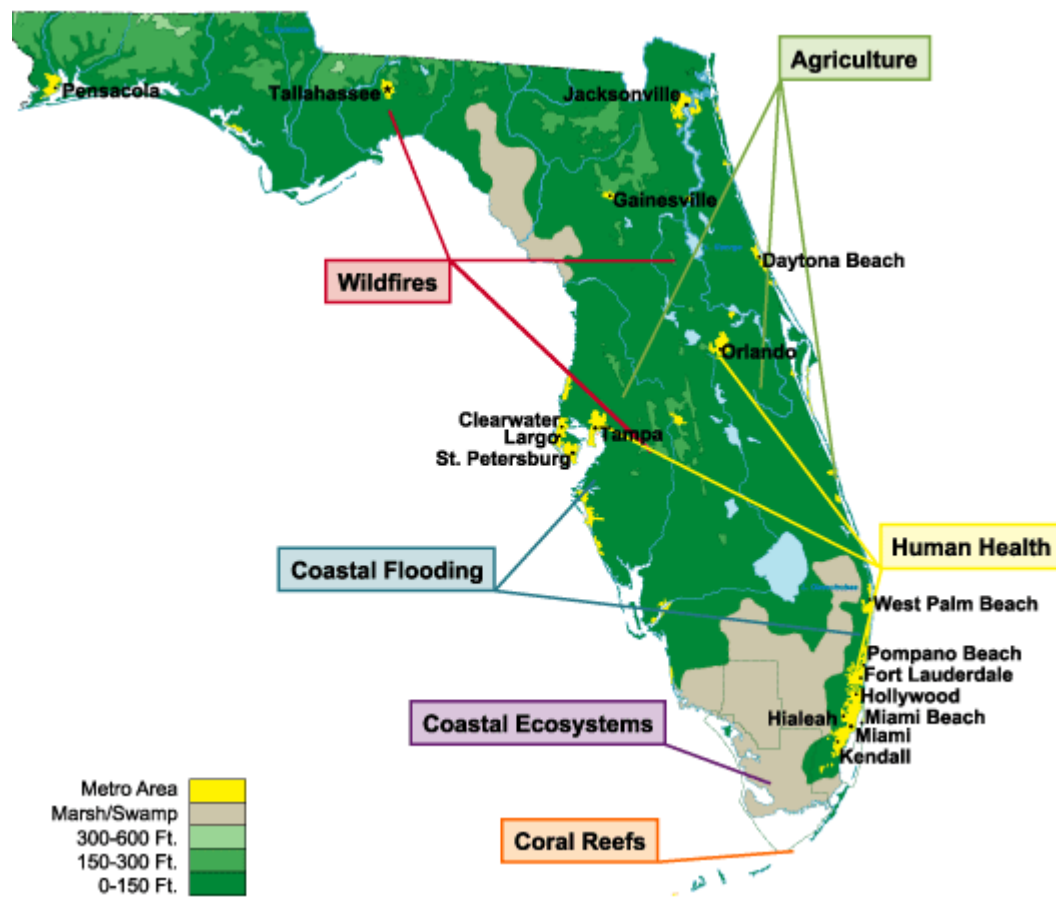
Precipitation

Sea Level Rise



Climate Change in Florida

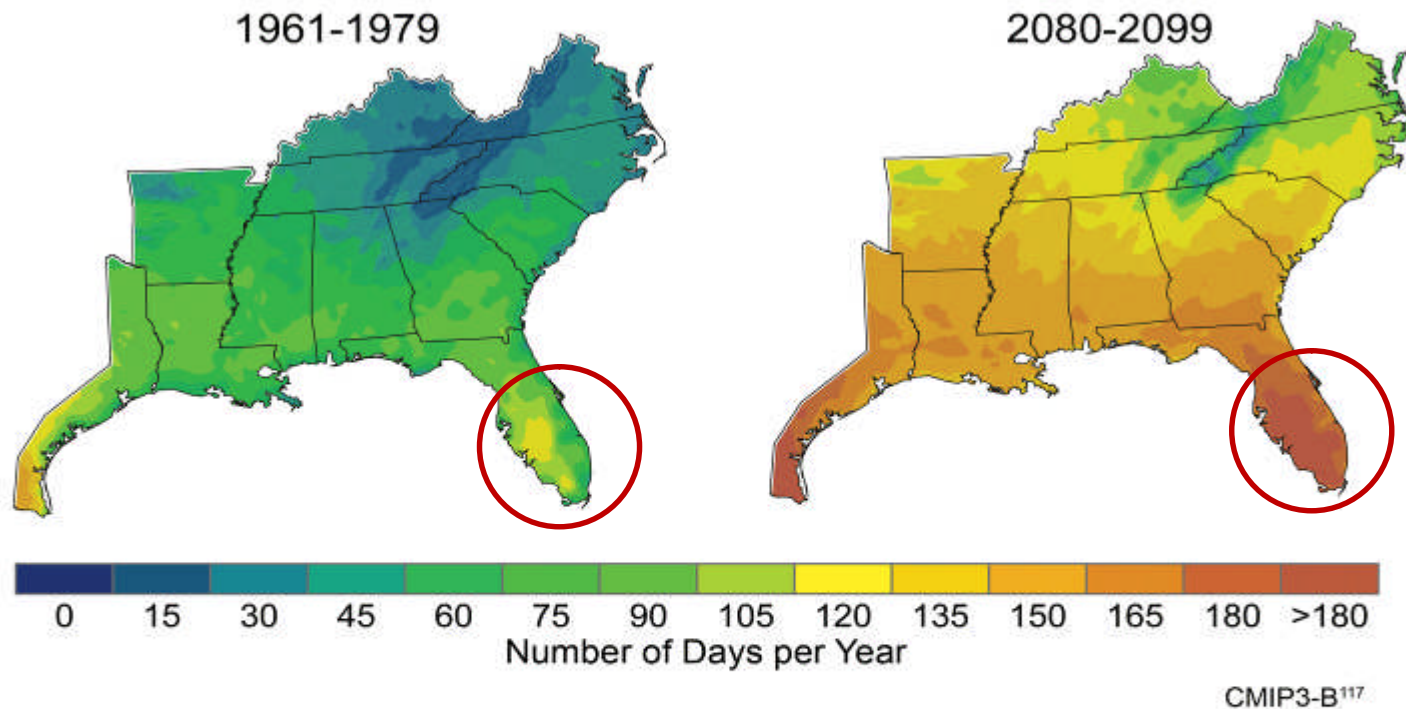
- Drought
- Erosion / Shoreline Change
- Extreme Summer Weather
- Flooding / Waves / High Velocity Water Flow
- Wildfire
- Wind
- Agricultural shifts



From NRDC



Changes in Temperature Patterns



The number of days per year with peak temperature over 90°F is expected to rise significantly, especially under a higher emissions scenario⁹¹ as shown in the map above. By the end of the century, projections indicate that North Florida will have more than 165 days (nearly six months) per year over 90°F, up from roughly 60 days in the 1960s and 1970s. The increase in very hot days will have consequences for human health, drought, and wildfires.

Source: Global Climate Change Impacts in the United States, Thomas R. Karl, Jerry M. Mellilo, and Thomas C. Peterson, (eds.), Cambridge University Press, 2009, p. 112.

Climate models project warming in the SE United States

- Greatest temperature increases expected during the Summer months
- Number of days over 90* is expected to increase

Vulnerable to Extreme Heat

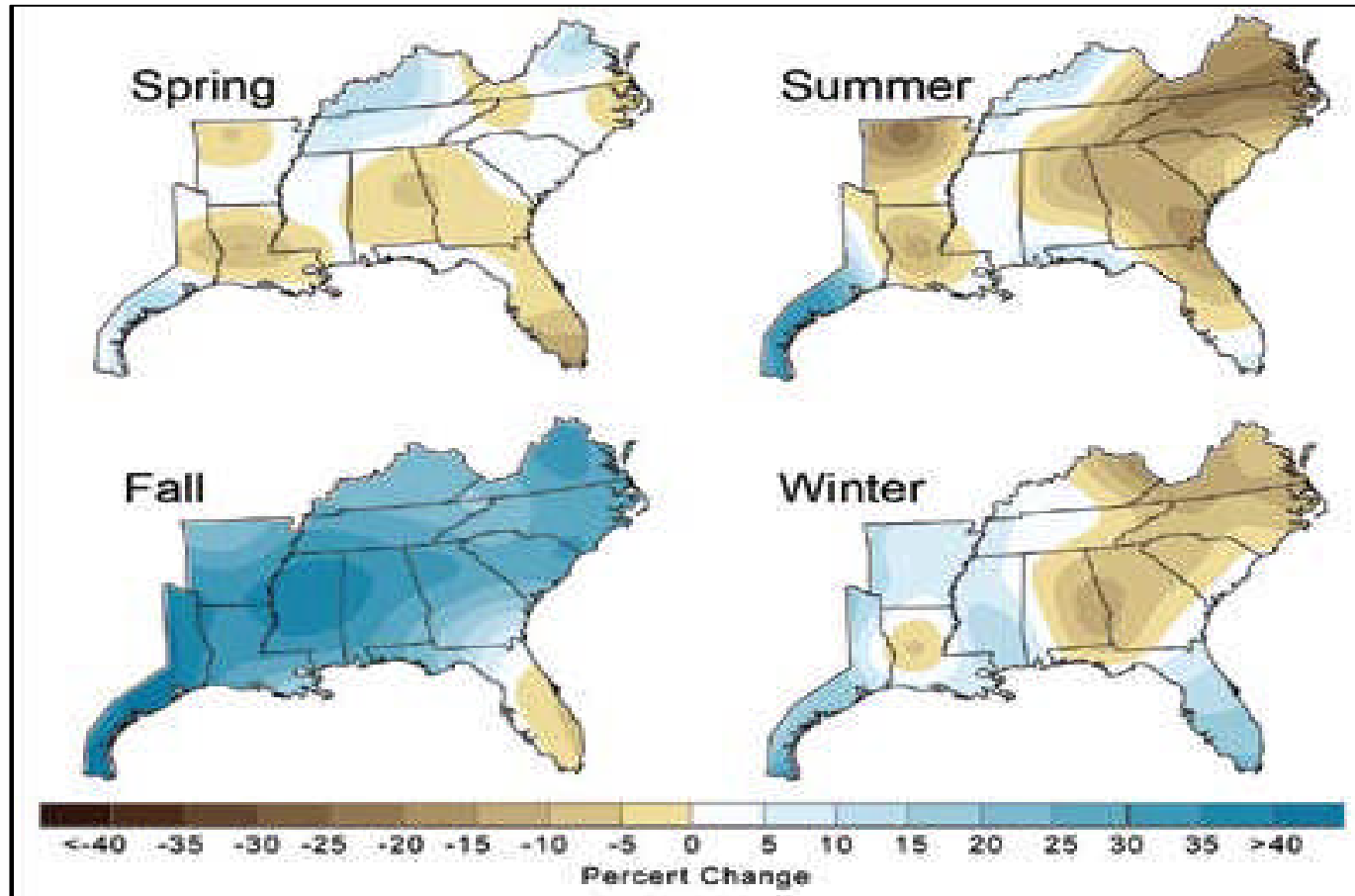


Worsening Air Quality



Changes in Precipitation Patterns

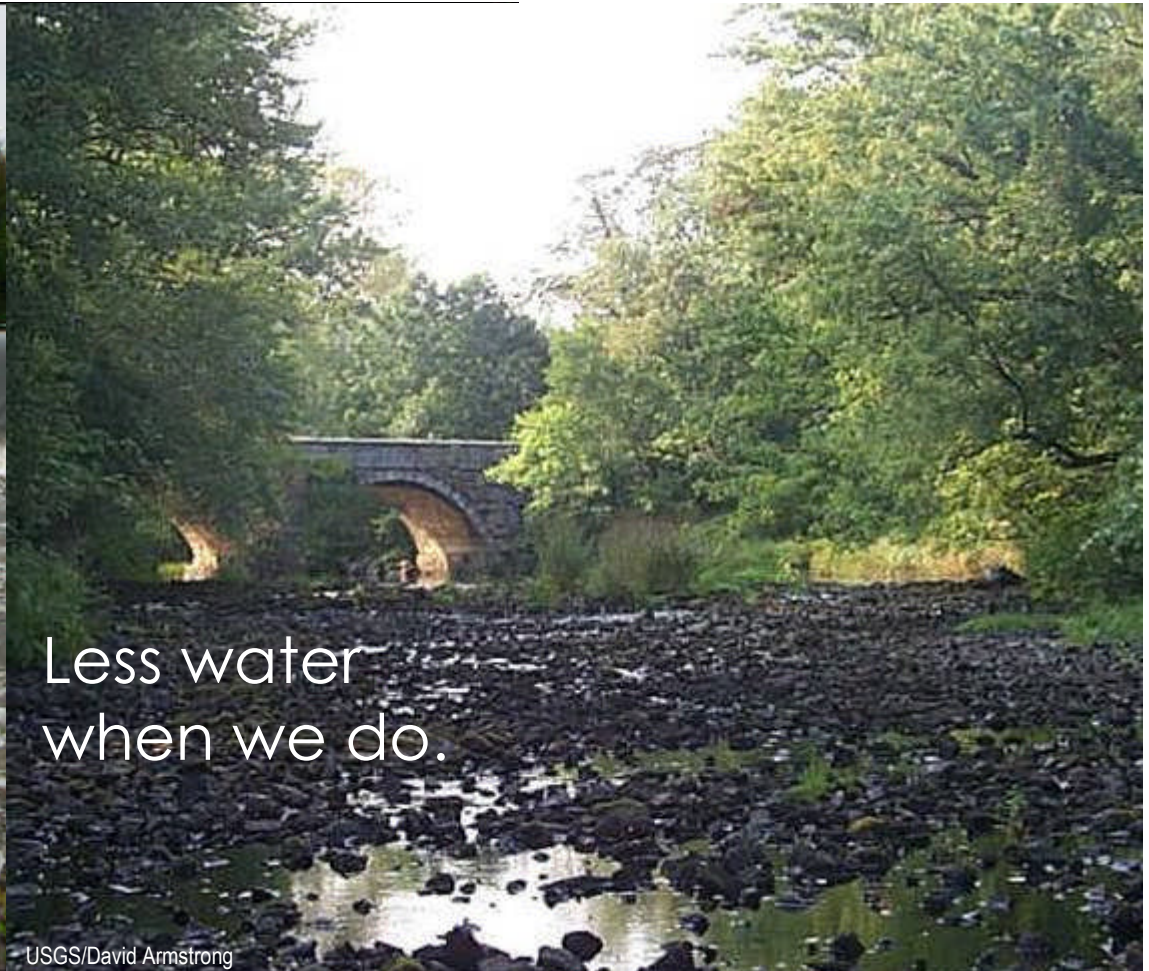
Changes in amounts and seasonality of precipitation can affect water supply and agricultural seasons and crops.



Observed Changes in Precipitation 1901 – 2007

Source: Karl et al., 2009

Changing Water Resources



Vectors for Emerging Infectious Diseases

Algae



Mosquitoes



Tsetse Flies



Lice



Rodents



Ticks



Bats



Fleas



Snails



D1

Decline of Traditional Fruit Crops



Slide 36

D1

I think that Wendy mentioned that apples were not a big crop in DE... maybe we should ask and if possible find a different image

Daniella, 10/19/2010

Changes in Tropical Cyclone Patterns

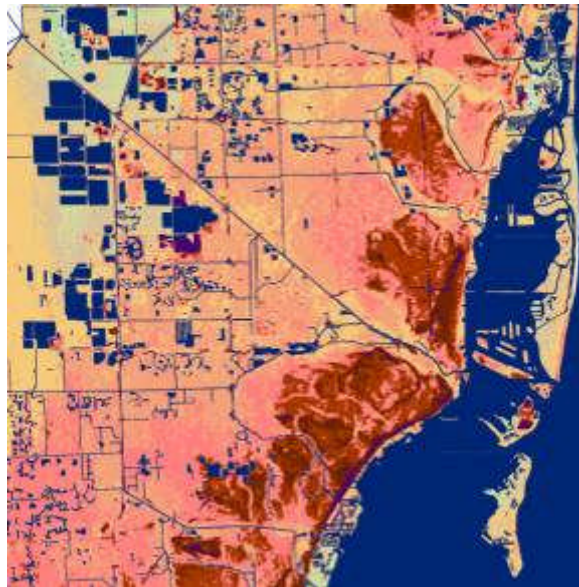


Hurricane Katrina, Photodisk

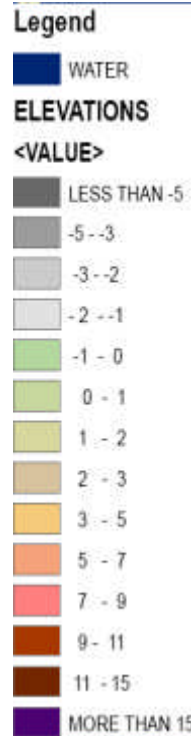
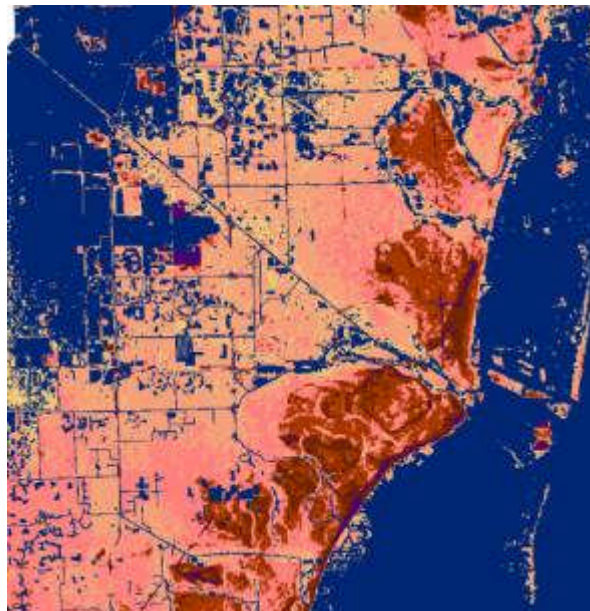
More intense and/or frequent hurricanes

- Storm surge inundation
- High wind impacts
- Impacts to coastal habitats
- Beach erosion
- Stormwater flooding
- Infrastructure damage
- Population displacement

Sea Level Rise Impacts



Current Sea Level (2009)



- Increased flooding & storm surges
- Population displacement
- Infectious diseases
- Infrastructure damage
- Land-use changes
- Impacts to coastal & inland wetland habitats
- Beach erosion
- Saltwater Intrusion impact on water supply and soil salinity



Identifying Regional Climate Resources

1. To determine how the climate is changing?
2. To determine what systems could be affected by changes in climate?
3. How those changes could (or already are) leading to impacts in identified systems?



Exercise



Break



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Assessing Sensitivity

Sensitivity: The degree to which a built, natural, or human system is directly or indirectly affected by changes in climate conditions or specific climate change impacts. If a system is likely to be affected as a result of climate change, it should be considered sensitive to climate change



Subjective Assessment

<p>Amount of Expected Change (expressed as a range) from Baseline by Specific Date [repeat for near, mid, + long-term]</p>	<p>Description of Potential Climate Change Impact (Be as Specific as Possible)</p>	<p>How Climate Conditions Currently Affect this System</p>	<p>Sensitivity: Degree to Which Impact Would Affect System</p>	<p>Justification of Response</p>
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Assessing Adaptive Capacity



Adaptive Capacity: The ability of a system to adjust to climate change, to moderate potential damages, to take advantage of opportunities, or to cope with consequences




Subjective Assessment

<p>What processes already exist and what efforts are currently underway to help improve system preparedness to changing climate condition ?</p>	<p>Is the system flexible, or will the rate of climate change overwhelm the system's capacity to adjust?</p>	<p>Cost* (\$) associated with accommodating or adjusting to the impact (if known)</p>	<p>Adaptive Capacity Level</p>	<p>Justification of Response</p>
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Using ADAPT To Conduct A Vulnerability Assessment

Milestone 1 Workbook: Conduct a Climate Resiliency Study



This workbook, the second in the Adaptation Database and Planning Tool series, is designed to help communities conduct a climate resiliency study, which includes undertaking a climate vulnerability and climate risk assessment of how climate is already and is likely to affect the systems, resources, and assets valuable to your community.

To complete these workbooks, ICLEI recommends utilizing the expertise of your Climate Preparedness Team. If you haven't already formed your Preparedness Team, please refer back to the Getting Started workbook for guidance on how to do this. Due to the importance of conducting a resiliency study, it is likely that Milestone 1 will take a significant time commitment from your Preparedness Team and the municipal staff working on this project. However, users shouldn't be discouraged at the time necessary to complete this workbook as the results from this analysis will help pave the way for your community to increase preparedness towards climate change.

Upon completing this workbook, your local government will have successfully completed Milestone 1 in ICLEI's Climate Resilient Communities Program - conducting a resiliency study. Once you've successfully completed all of the steps in this workbook, be sure to let your ICLEI staff liaison know so that your community can be formally recognized for completion of this major Milestone.

If you would like additional information about conducting vulnerability and risk assessments, please see: [Preparing for Climate Change: A Guidebook for Local, Regional and State Governments](#), referred to hereafter as the Guidebook. The Guidebook was written by the Climate Impacts Group at the University of Washington, ICLEI, and King County, Washington, with funding from the National Oceanic and Atmospheric Administration (NOAA).



Identifying Key Vulnerabilities & Understanding Resilience



Key Vulnerabilities

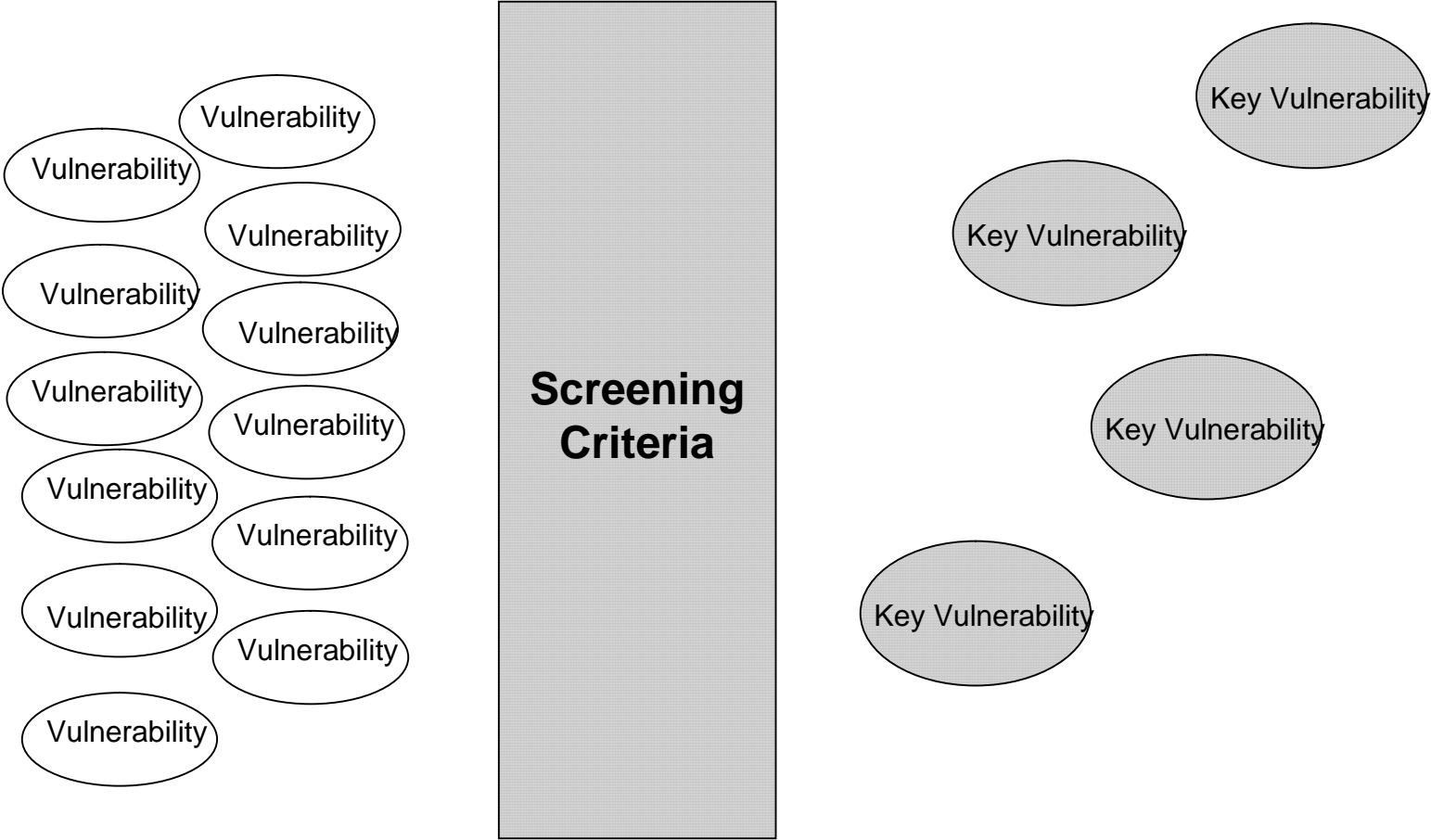
Using select decision criteria to help determine which vulnerabilities to move forward with planning for

Criteria are derived from the Intergovernmental Panel on Climate Change

Qualitative and quantitative information will be used



Key Vulnerabilities



Key Vulnerabilities

Seven criteria for determining key vulnerabilities:

- Magnitude of Impact
- Timing of Impact
- Persistence and Reversibility of Impact
- Likelihood of Impact
- Potential for Adaptation Actions
- Importance of Vulnerable Populations
- Distributional Aspects of Impacts and Vulnerabilities



Key Vulnerability Exercise



ICLEI Planning Tips



Planning With Uncertainty

Look to implement:

“No regrets” strategies

Address climate change projections in a manner that provides benefits now regardless of the future impacts. Focus on existing weather-related problems and flexible actions.

“Low regrets” strategies

Address climate change projections in a manner that creates greater climate resilience at little additional cost or risk

“Win-win” or “Co-benefit” strategies

Reduce climate change impacts while providing other environmental, social, or economic benefits



Dealing with Uncertainty

We rarely have perfect information.

Uncertainty is everywhere.

- Should I buy earthquake insurance?
- Should I change jobs?
- How long will this recession last?

Somehow we manage...here are questions to help when members are struggling:

- How might (X) affect my community?
- What are the consequences of those impacts?
- How likely is that impact?
- What steps can be taken to reduce the consequences?

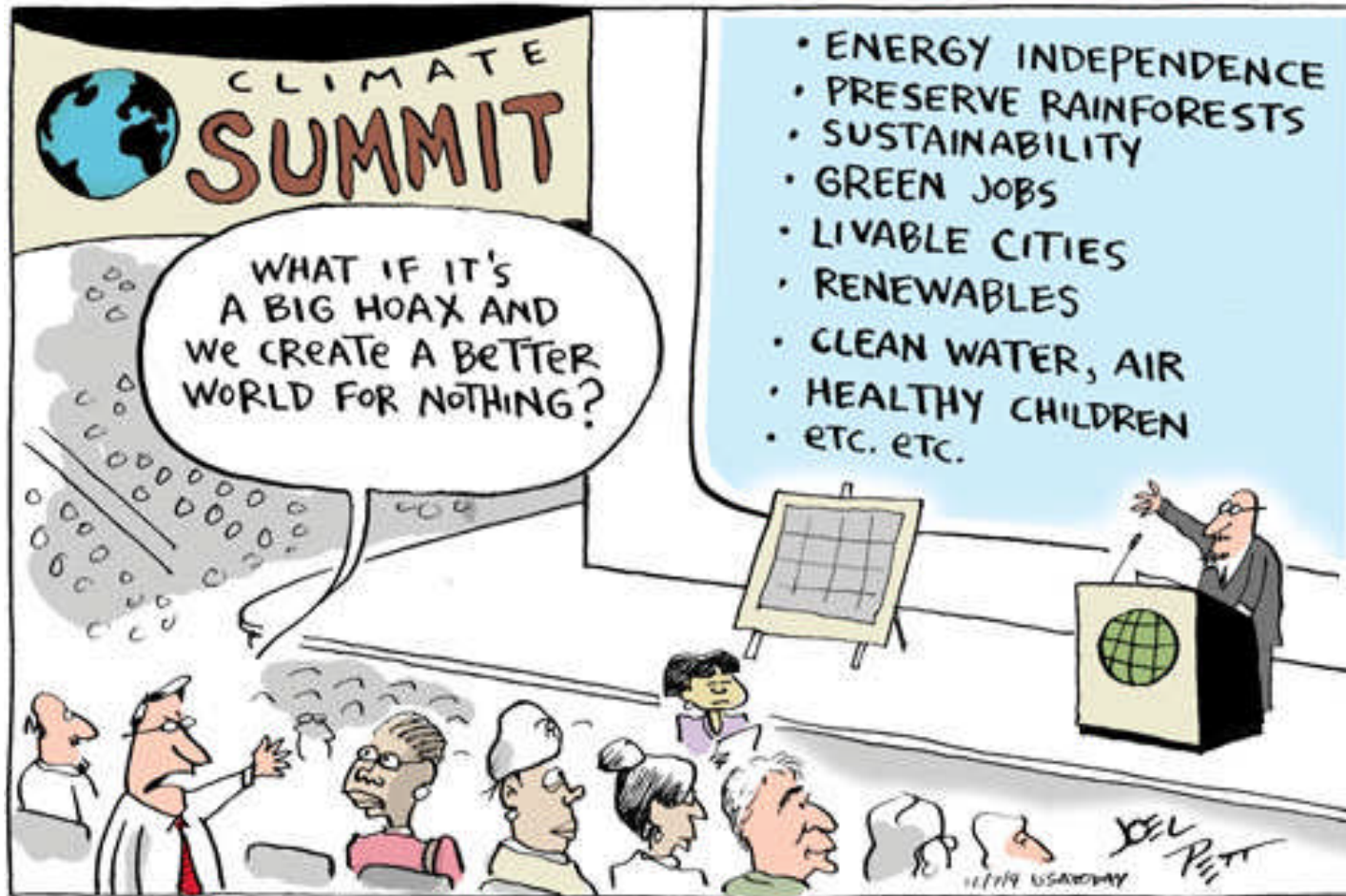


Vision of Resilience

Resilience: The ability of systems to absorb disturbances while retaining the same basic structure and ways of functioning, or to evolve to a new state of operation



Questions?



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