

# Regional Partnerships Working to Build Resilience

## Developing a Process to Determine Vulnerability in the Southeast

James Fox, Matt Hutchins, Caroline Dougherty, Nina Hall (UNC Asheville's NEMAC)  
Peter Nierengarten (SSDN)



### Summary

The Partnerships for Empowered Planning (PREP) initiative, as part of the Southeast Sustainability Directors Network (SSDN), worked with UNC Asheville's National Environmental Modeling and Analysis Center (NEMAC) to develop a Community Resilience Handbook for communities across the Southeast. This program fostered regional collaboration by promoting ongoing communication among ten Southeastern cities. The group used the U.S. Climate Resilience Toolkit as a resource for the process of building resilience to climate variability and change and extreme weather events.

The group recognized the importance of a standardized process that all participating cities could use to collaborate and work together on building resilience. In addition, the cities wanted to be able to take national-level data and apply it at a local scale.

The ability to examine complex systems is critical. By identifying the climate stressors, hazards, and assets impacted, the group began to determine their vulnerabilities and options to build resilience.

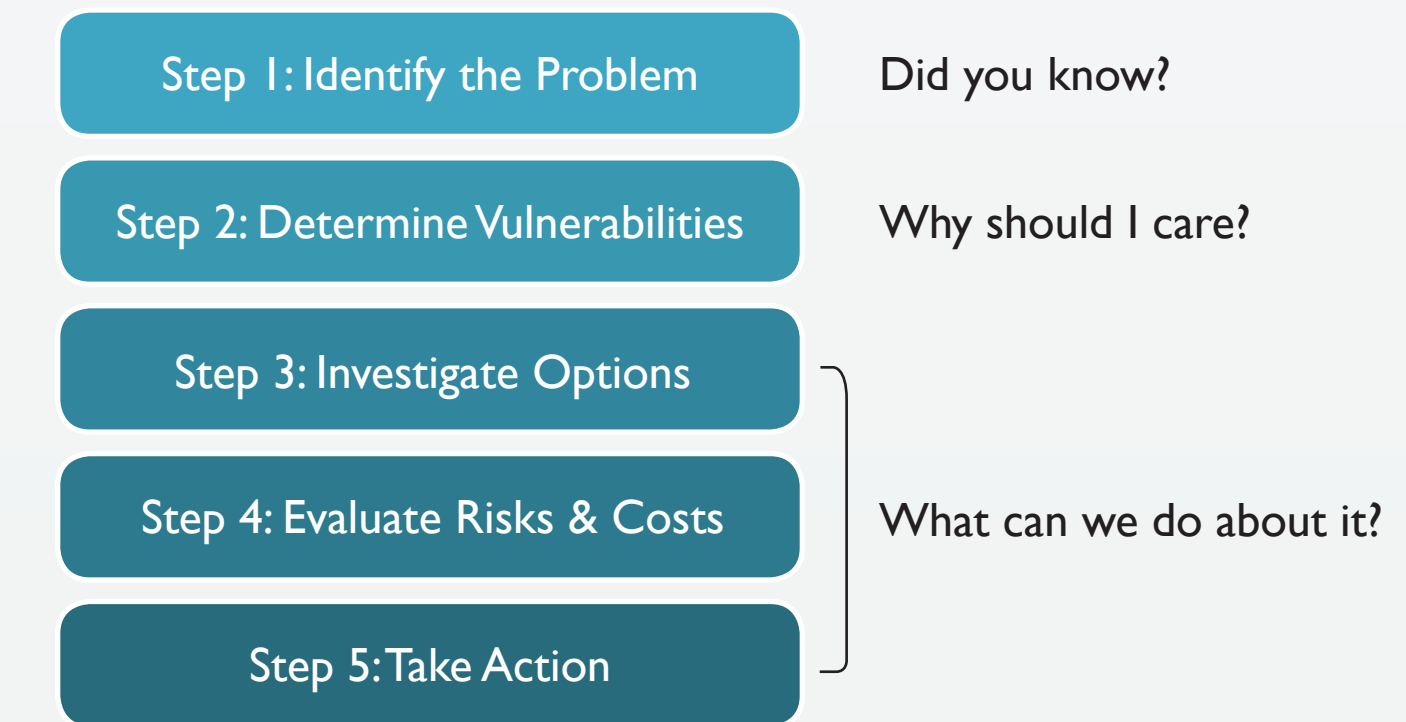
### Building Climate Literacy and Steps to Resilience

Research shows that the best way to learn is by doing. With "new reality" topics such as climate change, it takes longer for people to build a knowledge base than with more familiar subjects.

The American public and decision makers are starting to move from "Did you know?" questions to the higher-level questions of "What can be done?"

The U.S. Climate Resilience Toolkit is designed around five steps to resilience that move through these key questions to help build literacy and work toward resilience.

### Adaptation (Building Resilience) Workflow from the U.S. Climate Resilience Toolkit

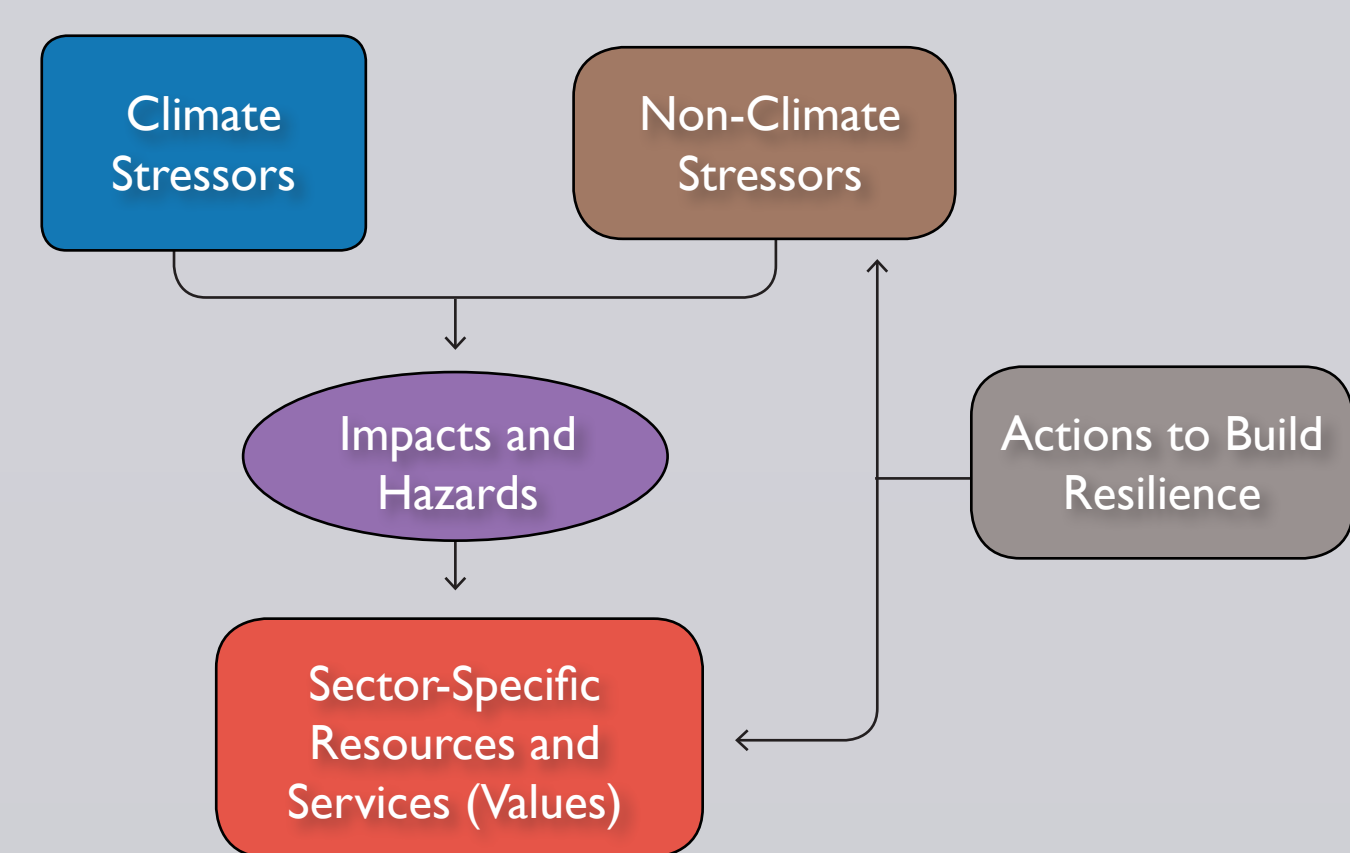


### Identifying the Problem, Including Stressors and Impacts

Conceptual models show how complex systems work by illustrating the relationships between variables.

- Planning and communication—Conceptual models show relationships of how a complex system is working. Groups can jointly construct a model by discussing all of the key elements and then linking these elements with arrows that show cause and effect.
- Data structure for assessing vulnerability—Datasets for variables identified in the conceptual model can be used as indicators of exposure, potential harm, and vulnerability.

### A Conceptual Model for Building Resilience



- Communities will **not** make decisions based on climate alone
- Must be **integrated** with other stressors across multiple sectors
- Driven by **values**
- Leads to recognition and understanding of **vulnerability and linked actions to build resilience**

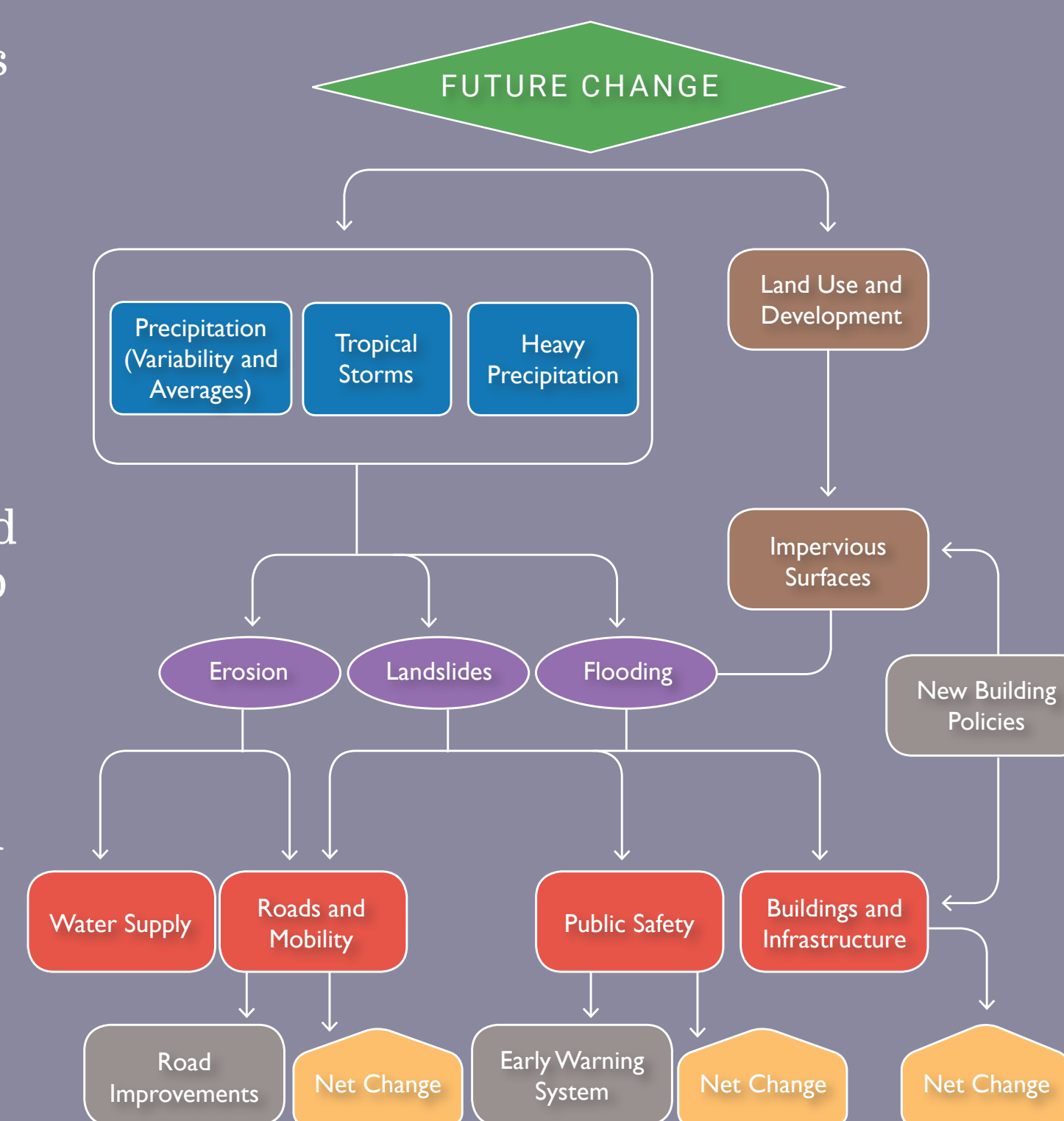
### Example: Flooding in Asheville, NC

Looking at experiences from past events is one way of examining stressors and impacts. In 2004, a major flood event impacted Asheville, NC. The question arises, "How often will these type of events happen in the future and how do we build adaptive capacity?"

While flooding was the primary hazard, we found that the impacts of erosion and landslides have greater consequences to public safety and key infrastructure.

The community identified ways it can take action. This is about the decision makers accepting **RESPONSIBILITY** and assigning **RESOURCES**.

The orange pentagons are the measurement boxes to see the cost/benefit from the investment in the gray boxes.

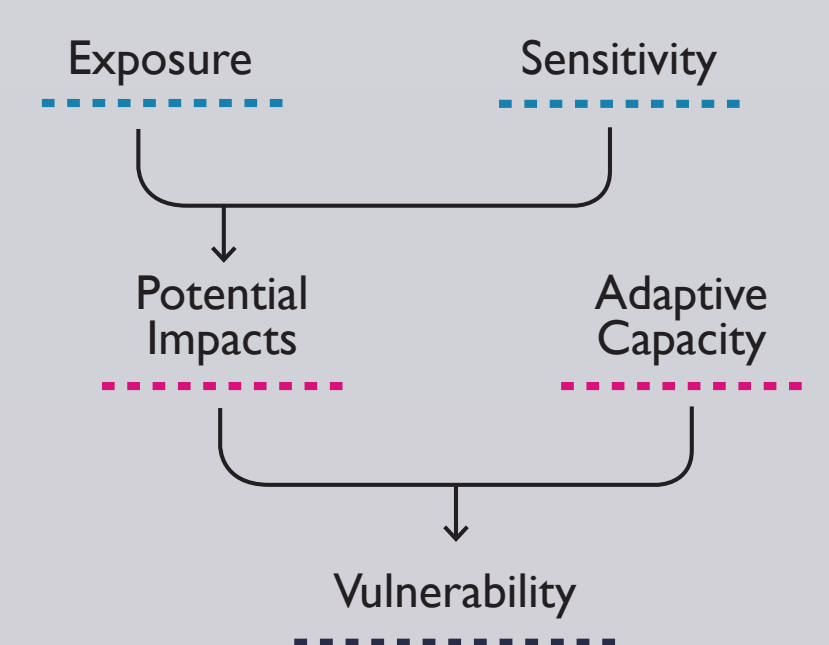


### Exposure, Sensitivity, and Vulnerability

Many communities recognize that they are exposed to climate-related impacts and hazards, but seek to move to take the next step of determining their vulnerability. Below are the factors that lead to vulnerability:

- Exposure: presence of resources or assets
- Sensitivity: degree to which a resource or asset is affected

- Potential Impacts: effects on natural and human systems
- Adaptive Capacity: ability to cope with stressors and resulting impacts



### Sensitivity Tables in PREP Handbook

1. Sector and/or Planning Area	2. Current and Expected Stressors (Climate and Non-climate)	3. Conditions that Contribute to Stressors	Potential Impact or Consequence to Planning Area (Resources and Services Affected)	5. Projected Change in Stressors and Contributing Conditions	6. Degree of Sensitivity
Stormwater Management	Flooding	Heavy precipitation, amount and timing of precipitation, tropical storms, and sea level rise and storm surge	Damage to property and infrastructure in floodplain, impassable roadways, threat to human safety, and business interruption	Recent increase in heavy precipitation in the region is already a concern, trend can be expected to continue	High
Erosion and/or Landslides		Runoff from heavy precipitation events, steep slopes	Damage to property and infrastructure in floodplain, impassable roadways, threat to human safety, and business interruption	Recent increase in heavy precipitation in the region is already a concern, trend can be expected to continue	*only an example; sensitivity degree must be determined by each community team
Impervious surfaces		Land use and use of best practices in developments	More stormwater contributing to runoff and flooding	Increased development into the future can be expected	

### Climate Information and Tools to Guide Resilience Planning

#### Climate at a Glance (NOAA) – A View of Climate Stressors

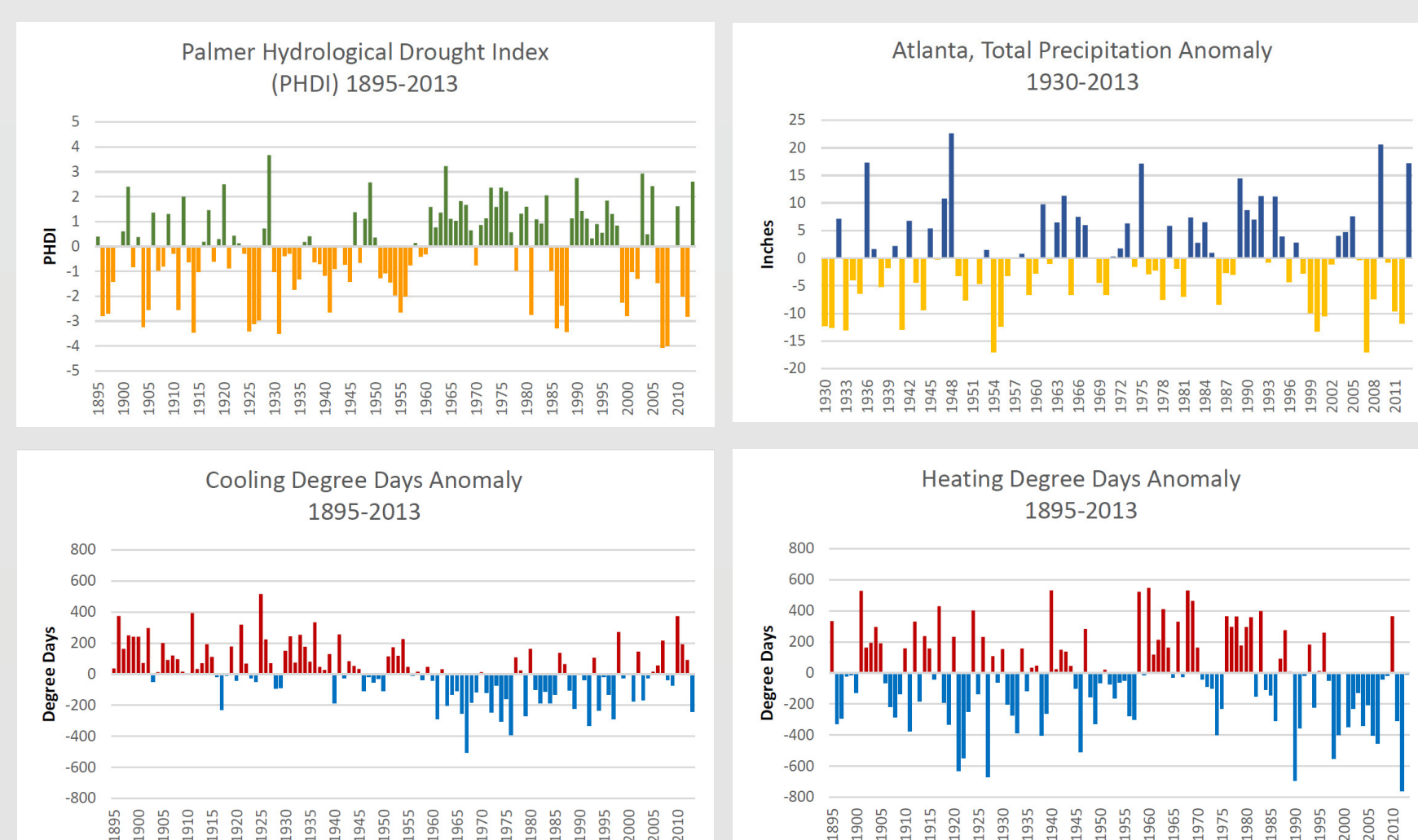
[ncdc.noaa.gov/cag](http://ncdc.noaa.gov/cag)

Climate stressors are not just spatial map layers, but have a key temporal component.

Local scale is critical. Cities are interested in their region, but they make decisions based on locally applicable data.

This example shows four metrics for Atlanta, GA. Note that droughts are becoming more frequent and severe, while at the same time heavy precipitation events are also getting more severe. However, there is not a clear trend for increased heat leading to more cooling degree days, and there is a clear trend of less heating degree days.

Therefore, drought is a primary impact that Atlanta should prioritize.



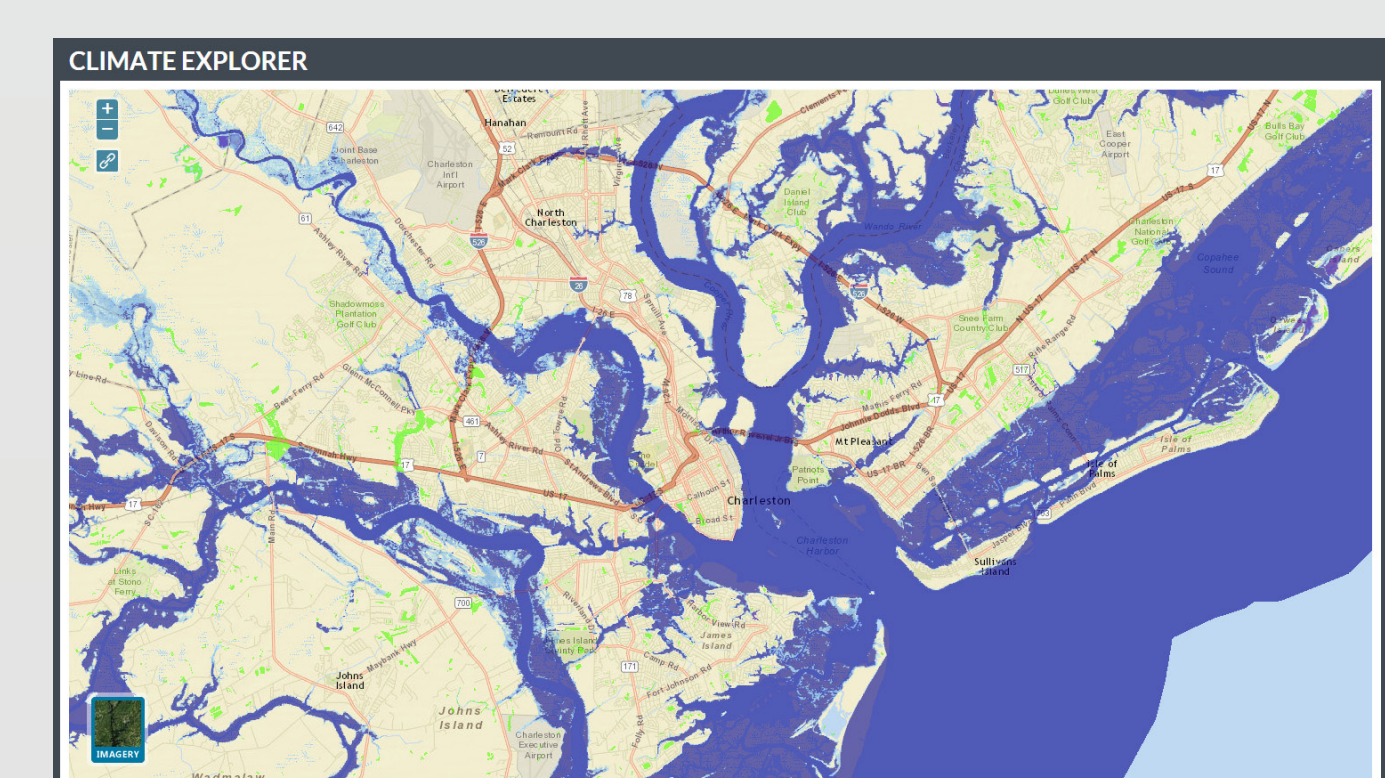
#### The U.S. Climate Resilience Toolkit

Most of the Toolkit's Taking Action case studies are very local, and all have key narratives that link the climate stressor or stressors to impacted assets. The true benefit of these case studies is that they allow people to see how similar individuals, businesses, and communities across the nation are examining vulnerability and then moving through the next three building resilience steps to answer the question, "What can we do about it?" Each of the case studies is linked to related topic descriptions, tools, partners, and pertinent additional resources so that users can explore the story in more detail.

[toolkit.climate.gov](http://toolkit.climate.gov)

#### Climate Explorer

The case studies are supported by the Climate Explorer, which links to data, tools, and other resources.



#### Online Portal

One of the most important goals of the SSDN group was to establish a framework and ability to share lessons learned. An online portal was developed and used by the team as a collaboration and communication tool that allowed participants to organize and share information. This was critical, because much of the study was done virtually and through webinars. The structure of the portal was also designed to support the creation of the Community Resilience Handbook.

#### Acknowledgements

NEMAC gratefully acknowledges our working partnership with NOAA in the design, development, and launch of the U.S. Climate Resilience Toolkit ([toolkit.climate.gov](http://toolkit.climate.gov)).

Southeast Sustainability Directors Network and the 10 cities that participated in PREP/SSDN: Miami, FL; Orlando, FL; Raleigh, NC; Charleston, SC; Asheville, NC; Fayetteville, AR; Huntsville, AL; Knoxville, TN; Nashville, TN; Atlanta, GA.