



CAROLINAS INTEGRATED SCIENCES & ASSESSMENTS

about cisa

The Carolinas Integrated Sciences & Assessments (CISA) is 1 of 10 NOAA-funded Regional Integrated Sciences & Assessments teams. CISA works in North Carolina and South Carolina to integrate climate science into decision-making processes and improve society's ability to respond to climatic events and stresses.

cisa connects climate science and water resources decision making through

- » Applied research to produce relevant climate information
- » Assessments of climate impacts and adaptation strategies
- » Processes to support and inform community planning
- » Fostering climate networks and climate communities of practice

decision-relevant science

CISA works with decision makers to identify information needs and questions about climate impacts on water supply and quality in the Carolinas. CISA uses historical data, watershed models, and global and downscaled climate models as our "tools of the trade" to respond to these requests. Questions or information needs that require new or innovative analyses of existing data inspire the development of new approaches and tools to integrate climate and hydrological information.

FOCUS AREA: WATER AND CLIMATE

weather vs. climate

Climate is long-term average weather conditions (seasonal to millennial periods) that are characteristic of a region like the Carolina coast, Piedmont or mountains. Climatology is the study of climate and includes historical and projected climate characteristics, ranges of natural variations in climate and long-term climate change.

how does climate impact water resources in the Carolinas?

Climate influences water resources in the Carolinas in many different ways.

Below are just a few examples.

- » Temperature
 - › Evaporation rates
 - › Surface water temperatures
- » Precipitation
 - › Surface water levels
 - › Changes in salinity in coastal waterways
- » Extreme Events
 - › Flooding
 - › Drought



Many important sectors of our economy rely on water resources and are affected by climate variability and change such as:

- » Agriculture (e.g. decreased crop yields due to precipitation or temperature extremes during critical growing periods)
- » Energy production (e.g. increased water usage for energy production during warmer periods)
- » Fisheries (e.g. changes in surface water temperatures or salinity levels can affect fish migration and reproduction)
- » Forestry (e.g. fire risks during warm, dry periods)
- » Public health (e.g. impacts to drinking water supplies)
- » Recreation and tourism (e.g. warm temperatures are a draw for boaters and beach-goers)
- » Water and wastewater utilities and infrastructure (e.g. flooding during heavy rainfall, salinity intrusion caused by low flows during drought)

cisa's water and climate resources

CISA develops resources to demonstrate the significance of water in the Carolinas and provide the region with information about water and climate interactions and impacts.



Photo Credit: Chandler Green

Putting Climate in Context through Local Videos:

CISA has produced a series of video interviews with water resource managers and users throughout South Carolina. The series showcases the role of climate and water in the lives of local citizens working in conservation, business and management. The documentary-style videos also define abstract concepts such as drought and climate variability through interviewees' easy to understand, on-the-job observations. Access the videos at: www.cisa.sc.edu/videos.html.

Outreach and Research in Response to the October 2015 Extreme Rainfall and Flood Event:

CISA produced a comprehensive assessment of the October 2015 extreme rainfall and flood event in South Carolina from a climatological and meteorological perspective. An informational 4-pager, distributed throughout networks in the Carolinas, was designed to initiate conversation about rebuilding with resilience to future, similar events. CISA team members have continued research to assess the event as part of a broader analysis of extreme rainfall events in the Carolinas. The 4-pager is available on the homepage of the CISA website: www.cisa.sc.edu.

CISA WATER AND CLIMATE PROJECTS

CONNECTING CLIMATE AND WATER RESOURCES

By improving understanding of current climate variability and projected future changes in the Carolinas, CISA provides information to help incorporate climate information into water resources management.

Assessing Climate Model Simulation of Heavy Rainfall Events

In order to better understand potential change in precipitation extremes, team members evaluated the ability of downscaled regional climate models to reproduce the intensity, duration and frequency of heavy rainfall events as well as projected changes in these events at a regional scale across the United States.

Collaboration with the National Integrated Drought Information System (NIDIS)

CISA collaborates with NIDIS to build understanding of drought's effects on the Carolinas' coastal ecosystems, conduct related research, and engage decision makers. Specific projects include:

Development of an Atlas of Hydroclimate Extremes for the Carolinas:

In order to meet decision maker needs for an improved baseline understanding and information about drought and normal precipitation in the Carolinas, CISA is producing an atlas of hydroclimate extremes for the Carolinas. This tool, developed with support from the National Integrated Drought Information System, will provide information such as the frequency of drought events and conditions necessary to support drought recovery. It will also incorporate narratives to help tell the story of drought in the Carolinas, relating the climate information to on-the-ground impacts at different stages of drought.

Improving Drought Impacts Monitoring and Reporting through Citizen Science: The aim of this project is to further understanding of the usefulness of citizen science engagement as a means to enhance drought impacts monitoring and reporting and improve understanding of drought impacts. Building on existing tools developed by the Community Collaborative Rain, Hail, and Snow (CoCoRaHS) Network, volunteers throughout the Carolinas submit daily precipitation measurements and weekly status report about the condition of ecosystems and communities in their area. This information helps to create a baseline for comparison of change through time and to improve understanding of the onset, intensification, and recovery of drought. More information is available at: www.cisa.sc.edu/CoCoRaHS.html.



Photo Credit: Christopher Lumpp

SUPPORTING WATER RESOURCES MANAGEMENT

CISA team members produce tailored climate information, tools and resources to meet the specific needs of our stakeholders.



Plum Island Wastewater Treatment Plant, Charleston, SC

Coastal Water Infrastructure Vulnerability and Connections to Public Health

CISA researchers are assessing the potential vulnerability of municipal water and wastewater infrastructure to coastal hazards. Water infrastructure locations are mapped in relation to potential sea level rise, storm surge and riverine flooding risks. A new component of this work extends the assessment to understand how infrastructure vulnerabilities can lead to public health impacts. Team members are engaging public health officials to develop a community-level susceptibility index of vulnerable populations. By understanding levels of risk, work can then be done to increase resilience to these coastal hazards.

Assessing Climate Sensitivity and Long-term Water Supply Reliability

In collaboration with utility representatives in North Carolina, CISA is assessing the raw water supply available to determine its vulnerability to changing climatic conditions. The project focuses on modeling the water system's response to climate in order to understand its vulnerability to facilitate the consideration of climate change in the utility's long range planning.



Team Members

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Project Partners

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- » National Integrated Drought Information System (NIDIS)
- » NC Sea Grant
- » SC Sea Grant Consortium
- » SC State Climatology Office
- » State Climate Office of NC
- » USGS South Atlantic Water Science Center

Connect with CISA

CISA publishes a quarterly newsletter, the *Carolinas Climate Connection*, and manages the *Carolinas Climate Listserv* in order to share the latest climate-related news and events.

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