CAROLINAS INTEGRATED SCIENCES & ASSESSMENTS

About CISA

The Carolinas Integrated Sciences & Assessments (CISA) is 1 of 11 NOAA-funded Regional Integrated Sciences & Assessments teams. CISA works at the intersection of climate with water, coasts, and health to create, tailor, and provide climate information to improve planning and management approaches that build healthier, safer communities in the Carolinas.

CISA Connects Climate Science & Water Resources Decision-Making Through

- Applied research to produce relevant climate information
- Assessments of climate impacts and adaptation strategies
- Providing support and information to for planning processes
- 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 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.

FOCUS AREA: WATER AND CLIMATE

The Carolinas experience a variety of weather and climate extremes, many of which affect our region's water resources. Recent events – tropical storms, floods, and drought – reveal how important sectors of our economy are affected by climate variability.

- **Agriculture:** Precipitation or temperature extremes during critical growing periods can decrease crop yields.
- **Energy production:** Water usage for energy production increases during warmer periods.
- **Fisheries:** Changes in surface water temperatures or salinity levels can affect fish migration and reproduction.
- **Forestry:** Fire risks increase during warm, dry periods.
- **Public health:** Runoff from heavy rain events can negatively impact water quality.
- **Recreation and tourism:** Warm temperatures and dry conditions support many outdoor recreational opportunities such as fishing, boating, beach-going, and golfing. Extreme events can cause event cancellations and loss of tourism.
- **Water and wastewater utilities and infrastructure:** Flooding during heavy rainfall can overtop systems. Low flows during drought can threaten drinking water sources and cause salinity intrusion in coastal areas.


Photo Credit: Anderson Water Utility

CISA collaborates with research and stakeholder partners to investigate the connections between climate, extreme events, and impacts to water resources. Research findings are often used to tailor climate information for specific decision-making needs and to develop resources that help make climate information more accessible and useful for a variety of audiences.

CISA's Water and Climate Resources and Tools

Carolinas Precipitation Patterns and Probabilities Atlas: The Atlas provides downloadable maps and figures characterizing various measures of precipitation and drought. It offers information not readily available elsewhere, such as frequency and duration of both dry and wet events, photographs, videos, and narratives of the impacts of precipitation extremes in the Carolinas. Access the tool at www.cisa.sc.edu/atlas.

Hazardous Extremes for Risk Assessment (HERA) Tool: HERA provides county-level information, maps, and visualizations about the occurrences and impacts of extreme events such as heavy rainfall and flooding. The HERA tool can be found on CISA's Convergence website: https://convergence.unc.edu/tools/hera/.

South Carolina Water and Climate Videos: This video series showcases the role of climate and water in the lives of South Carolina citizens working in conservation, business, and management. The documentary-style videos also define abstract concepts such as drought and climate variability through interviewees' on-the-job observations. Access the videos at www.cisa.sc.edu/videos.html.


Photo Credit: Chuck Burton

Assessment of the 2015 Extreme Rainfall and Flood Event: This is 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 was designed to initiate conversation about rebuilding with resilience to future, similar events. The document is available at www.cisa.sc.edu.

WATER AND CLIMATE PROJECTS

Creating a Coastal Salinity Index

CISA collaborated with the USGS South Atlantic Water Science Center on the development and testing of a new coastal salinity index (CSI). This tool can be used to characterize coastal drought, monitor changing salinity conditions, and improve understanding of the effects of changing salinities on fresh and saltwater ecosystems, fish habitat, and freshwater availability for municipal and industrial use. Access the tool on the USGS website: https://www2.usgs.gov/water/southatlantic/projects/coastalsalinity/home.php


Photo Credit: Christopher Lumpp

Engaging Citizen Scientists in Drought Impacts Monitoring and Reporting

We work with citizen scientists and the Community Collaborative Rain, Hail, and Snow (CoCoRaHS) network to promote drought impacts reporting. Volunteers provide weekly "condition monitoring" reports to document the effects of weather and climate on their local communities and environments. CISA developed the Condition Monitoring Web Map to provide online access to the reports. View the map at: www.cocorahs.org/Maps/conditionmonitoring/.

Innovating Drought Communications with North Carolina Decision Makers

This project with the State Climate Office of North Carolina focuses on improving the usability of drought-relevant information with partners from the NC Drought Management Advisory Council and constituents such as Cooperative Extension agents and public water supply system managers. Researchers are developing communications materials intended to help decision makers better understand how drought is monitored, the environmental conditions that can cause or worsen a drought, and drought impacts on various sectors including agriculture, forestry, and water resources. Additional information is available on the project website: https://climate.ncsu.edu/nighthawk.

Supporting the SC Drought Response Program

CISA and the South Carolina State Climatology Office initiated this project in 2017 to enhance the State's Drought Response Program and drought preparedness. Activities have included conducting two statewide drought and water shortage tabletop exercises and developing a new portal for drought information, available at www.scdrought.com.


Photo Credit: Chandler Green

Assessing Extreme Rainfall Events

One recent project 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. Another project investigated the use of rainfall observations with model output to better understand the nature of heavy rainfall and flooding events in two South Carolina watersheds.


Photo Credit: Melinda Ball

Tailoring Global Climate Change Information for Local Decisions

CISA produced future precipitation scenarios for a high-resolution flood model that will be used to better understand and communicate flood risks in the Charleston, SC, region. In a project focused on Georgetown County, SC, CISA developed a series of temperature and precipitation projections to help educate decision makers about local climate change risks and how to effectively use climate change information for planning and resource management.

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Project Partners

- 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 lastest climate-related news and events.

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