

Building Resilience to Climate Change: Interviews with Water Utilities in the Southeast

Purpose of the Workshop Series

This workshop series was designed by NOAA and the Water Research Foundation to improve its delivery of information resources for small- and medium- size water utilities useful for building their resilience to a changing climate. Each workshop was organized by NOAA's regional partners and addressed issues identified by and for each region. The workshops offered a forum for exchanging ideas to:

- Identify gaps and improve NOAA climate and weather-related tools and information resources;
- Provide timely and relevant weather and climate information and raise regional-scale awareness of NOAA tools and resources;
- Build regional connections that support small-scale utility decision making;
- Develop improved communication materials and enhance NOAA's tools for local decision making.

The SERCC Interviews

The Southeast Regional Climate Center (SERCC) had little prior experience or relationships with the water utility sector so chose a one-on-one interview format rather than a webinar. SERCC reached out to over 20 utilities in the region and had virtual interviews with seven of them, representing small, medium and large customer bases in both the water and wastewater sectors in South Carolina, North Carolina, and Florida. SERCC came to a better understanding of the obstacles to resilience planning that each utility is facing when it comes to weather and climate. SERCC was able to share several tools with the utilities.

Summary

SERCC found that water utilities do not typically have staff with climate and weather backgrounds so they obtain their information from a variety of sources, typically from peer knowledge networks or state emergency centers. Larger regional consolidators were in a better position to access expertise that they use for managing small utilities; independent small utilities, however, are limited in their ability to access expertise on climate and weather. Those who do have GIS and hydrological modeling indicated a need for more localized information, especially sub-hourly and hourly rainfall data, rapid intensification of wet, dry and hurricane periods, and updates to precipitation statistics.

Interviewees indicated that NOAA's website is too overwhelming to be of use to them. They need better explanations not just that they exist, but what they can be used for and how water utilities can use them within their local contexts. Staff need training on the use of the tools in the form of both webinars and one-on-one sessions. They indicated that lessons learned from previous storms and using previous storms as reference points would be useful, and emphasized that smaller water utilities need easy to access, simple tools or indices.

Interview Dates :: Winter 2019/Summer 2020

Science and Trends

Heavy rainfall events and droughts are happening more frequently across the Southeast, as temperatures continue to rise. Drought and rising temperatures increase the demand for water from agriculture and people. As sea levels rise, saltwater intrudes upon freshwater increasing the need for desalination¹. Heavy downpours increase the amount of runoff into rivers and lakes, washing sediment, nutrients, pollutants and other materials into water supplies, making them unsafe or in need of water treatment². When coupled with population growth and changing land-use, these trends will put further strain on water across the region and add to water resource management challenges.

¹ USGCRP (2014). Carter, L. M. et al., 2014: Ch. 17: Southeast and the Caribbean. Climate Change Impacts in the United States: The Third National Climate Assessment, J. M. Melillo et al., Eds., U.S. Global Change Research Program, 396-417.

² CCSP (2008). The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity in the United States. A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research. Backlund, P. et al. U.S. Environmental Protection Agency, Washington, DC, USA.

Lessons Learned



Heavy rain Heavy rainfall is impacting systems more frequently, including flooding; infiltration through old, cracked clay pipes; overwhelmed sewers and treatment works; increased source water turbidity leading to increased treatment costs; etc. While managers understand that climate change means more heavy rainfall and requires infrastructure upgrades, few have information they can use to plan for long term changes.



Drought Communities have been successfully adopting water conservation practices during dry periods, but this also causes water utilities to lose revenue. This affects wastewater utilities as well, as less water used means less quantity of wastewater needing to be treated, also causing lost revenue. This impedes their ability to maintain and upgrade infrastructure.



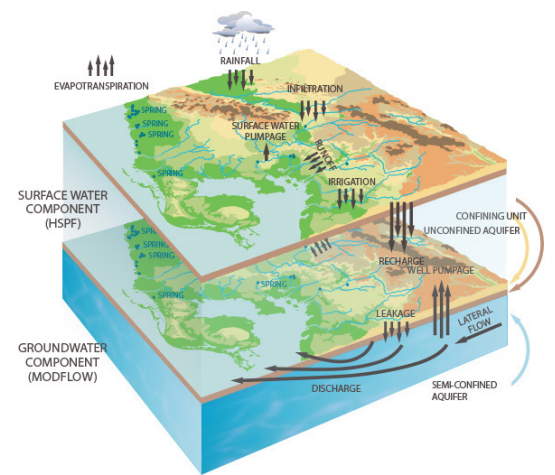
Capacity to Adapt There is tremendous variability between utilities – some small and medium sized utilities are quite advanced in their planning for resilience, while others have limited resources to consider long-term climate variability.



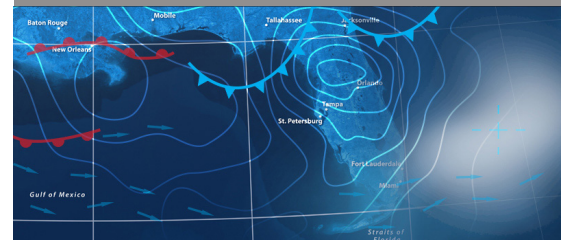
Access to Information Small and medium water and wastewater utility staff find the NOAA website overwhelming, difficult to navigate, and confusing. It is easier to just 'google' for information. Furthermore, information on NOAA's website is lacking context and perspective to provide users a sense of how they can use its tools. Information is needed in water utilities' terms.



Peer-to-Peer Learning Water utilities rely on knowledge networks for sharing information and learning how to address issues. Training more users in these networks will spread between peers and increase information use.



Integrated Hydrological Model
Credit: Tampa Bay Water



Gulf of Mexico
Credit: Tampa Bay Water



Dry Falls Lake, NC, 2008
Credit: NC Dept of Natural Resources



2018, Wrightsville Beach, NC, Flooding from heavy rainfall during Hurricane Florence | Credit: <http://dnr.sc.gov/>



Lightning
Credit: NASA

Interviews

TAMPA BAY WATER, Florida

Tamp Bay Water utility has been working on understanding its vulnerability to climate change for a number of years. Its sophisticated modeling capabilities highlight specific climatology information that can help them be resilient in the near-, mid-, and long-term.

AQUA, North Carolina

Aqua N.C. a subsidiary of Aqua America, Inc., a private company that manages many small municipal water and wastewater systems, is fortunate to have access to a corporate staff meteorologist. Yet, to improve local preparedness, more localized and detailed information is needed, especially concerning drought, wind, and small storm forecasts.

METROPOLITAN SEWERAGE DISTRICT OF BUNCOMBE COUNTY, North Carolina

This small Sewerage District demonstrates how a community can embrace resilience with an aggressive campaign to replace and upgrade its infrastructure, but its mountainous terrain presents unique data challenges complicating their ability to plan for the future.

BEAUFORT-JASPER WATER AND SEWER AUTHORITY, South Carolina

This medium sized water and wastewater utility serves a lowland area including several islands. Its geography and culture put them on the edge – trying to keep up with service demands from a growing population and tourism while also confronting threats of drought, flood, and hurricane. Keeping up with peak demand during extreme drought conditions can be a challenge.

GREENWOOD METROPOLITAN DISTRICT, South Carolina

This small wastewater utility is grappling with two ends of the spectrum: on the one hand, during drought, customers' water conservation practices lead to reduced wastewater treatment revenues; on the other hand, increasing rainfall is forcing them to upgrade its capacity to handle increased flow into their wastewater plants.

GREENWOOD COMMISSIONERS OF PUBLIC WORKS (CPW), South Carolina

Greenwood CPW is a medium size water utility looking to the future. The utility has a 20-year plan and strives to keep up with the latest technology and information that positions them for resilience. Better information about storms and excessive precipitation events would help them plan day-to-day, an important aspect of resilience.

SCAN ME



> [NOAA Workshop Series Website](#)



> [Southeast Regional Climate Center](#)



> [Carolinas Integrated Science Assessment](#)

Tools Demonstrated:

> [CLIMPER Climate Perspectives](#)

> [WetBulb Globe Temperature Heat Tool](#)

> [MPE Multi Sensor Precipitation Estimates](#)

> [NOAA Climate Resilience Toolkit](#)

Information Needs

Data

- More hourly and sub-hourly rain gauges in mountainous areas and real-time digital QPF forecasts to input data into hydrological flow models.
- Updated precipitation and flood return periods derived from the historical record; as well as updated precipitation and flood data, especially the 50- and 100-year events.
- Information to inform drought planning including two-week weather forecasts; forecasts of a rapid switch between dry and wet periods; forecasts of the beginning of wet and dry seasons, and spring conditions; and whether to expect a one-year or two or more-year drought/ENSO cycle.
- Probabilities of rapid cyclone development and streamlined hurricane forecasts.
- Better groundwater level data to model effects on sewage pipe flow.
- Information for maintenance crew safety, including lightning information (e.g., flash density maps, flash frequencies by time of day, and potential future changes) and improved wind forecasts.

Interpretive Forecasts

- Contextual forecast information to help interpret and use extreme weather scenarios and potential impacts; including storm forecasts that provide analogies to past storms.
- How to interpret weather forecasts, especially two weeks out and greater, for heavy rain, drier than normal conditions, and temperature anomalies.
- Quick reference guides to explain the importance of certain weather phenomena – like ENSO and what it means for a particular area, providing examples of extreme years.

Education and Training

- Education on climatology, impacts of extreme events, and vulnerabilities of the region, tailored to water utilities.
- Education on how to communicate meaning of rainfall probabilities to the public.
- Case studies specific to the region; how utilities planned or responded to certain types of storms in the past.
- Workshops specifically geared for the water sector.
- Training on use of tools like MPE and CLIMPer.
- Easier access to information on NOAA web pages; tailor NOAA products to the needs of water resource managers.

Next Steps

This series of interviews was the first time that SERCC has engaged with this sector. SERCC gained new insights into how they and their partners might help fill some of the localized climate informational needs, and how to begin reframing climate information and tools to make them more useful for water resource management. Whether coastal systems or mountainous areas, every water supply and wastewater system has unique challenges that will need to adapt to a changing climate.

Organized by

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<https://cpo.noaa.gov/Meet-the-Divisions/Climate-and-Societal-Interactions/Water-Resources>