

WERF Project No. CC7C11

Extreme Climate/Weather Events: Lessons Learned from Water and Wastewater Utilities

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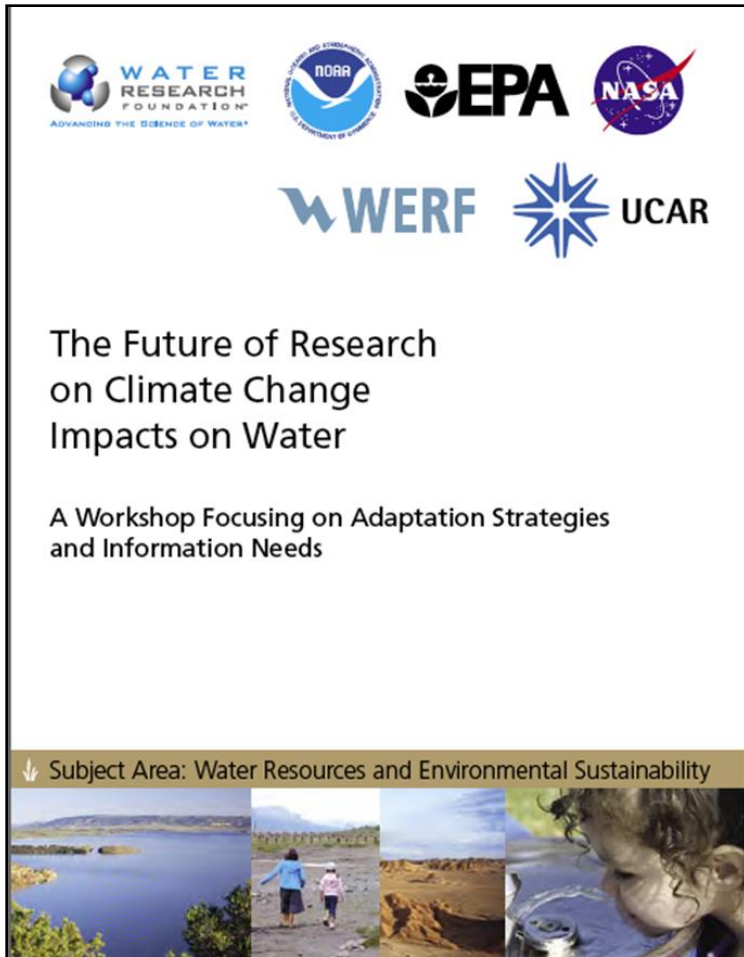
Alexandria, VA

Water Resilient Cities Conference – Cleveland, April 2016

For today's presentation...

- WERF Project (CC7C11)
- What are the risks?
- How can we better manage risks?
- Show me resilience!
- Path Forward

Project Background



- Partnership began 2009 -
 - 2 federal agencies (EPA, NOAA)
 - 2 water-related foundations
 - Other research organizations
- Initial workshop 2010 - research and tools needed to address climate change.
- Outcome – need workshops on what works/doesn't.

Project Objectives

- Workshops where experienced extreme event(s).
- Impacts on utilities & communities.
- Response & future plans.
- Information needs & gaps.
- Project report – in depth regional basin studies, synthesis.



Case Study Sites

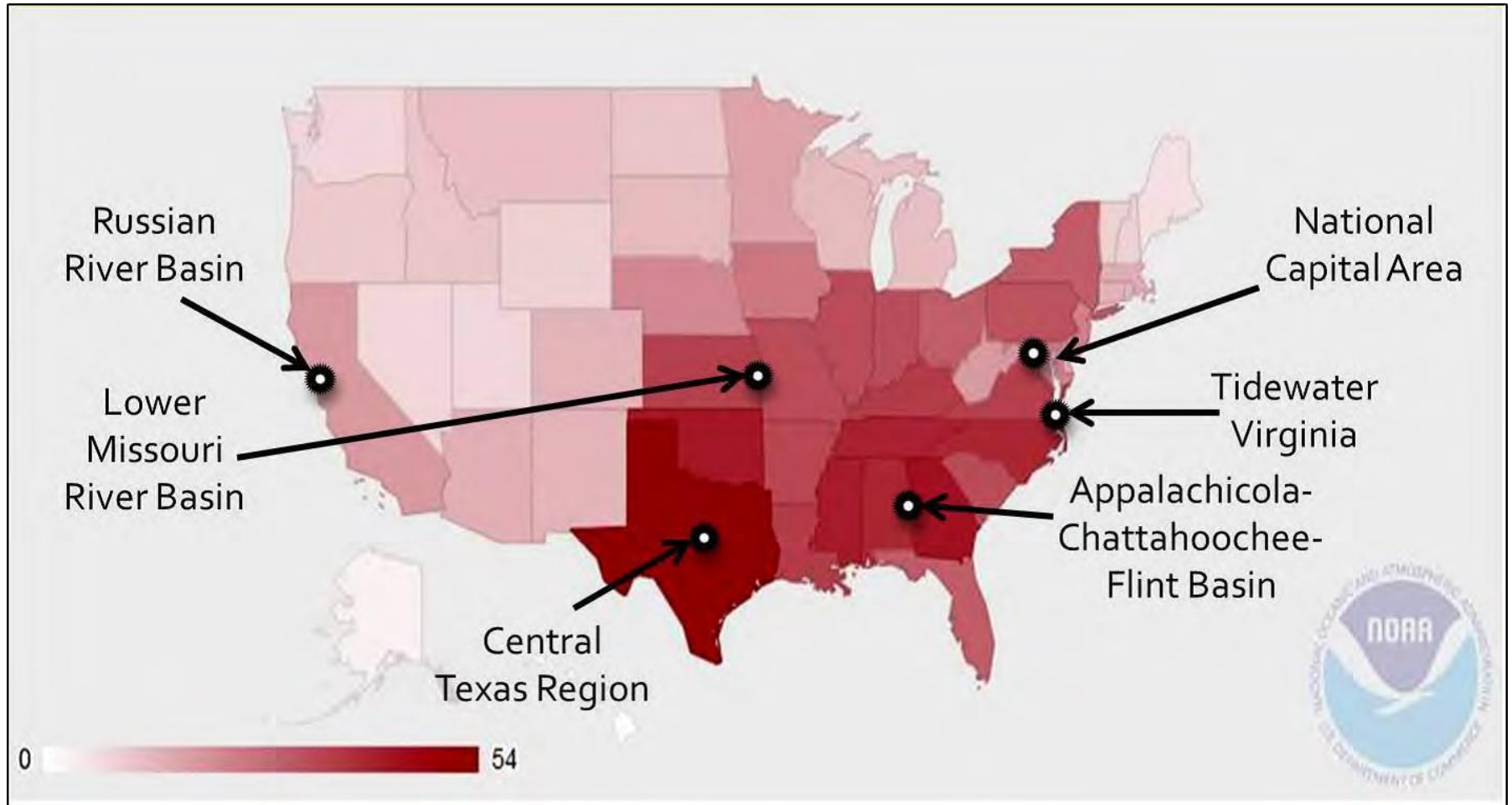


Figure 2-1. Extreme Event Case Study Locations and Number of 1980-2012 Billion-Dollar Climate/Weather Disasters.

Source: Adapted from NOAA, 2013 in Beller-Simms et al., 2014.

What are the risks?

Defining an *Extreme Event*

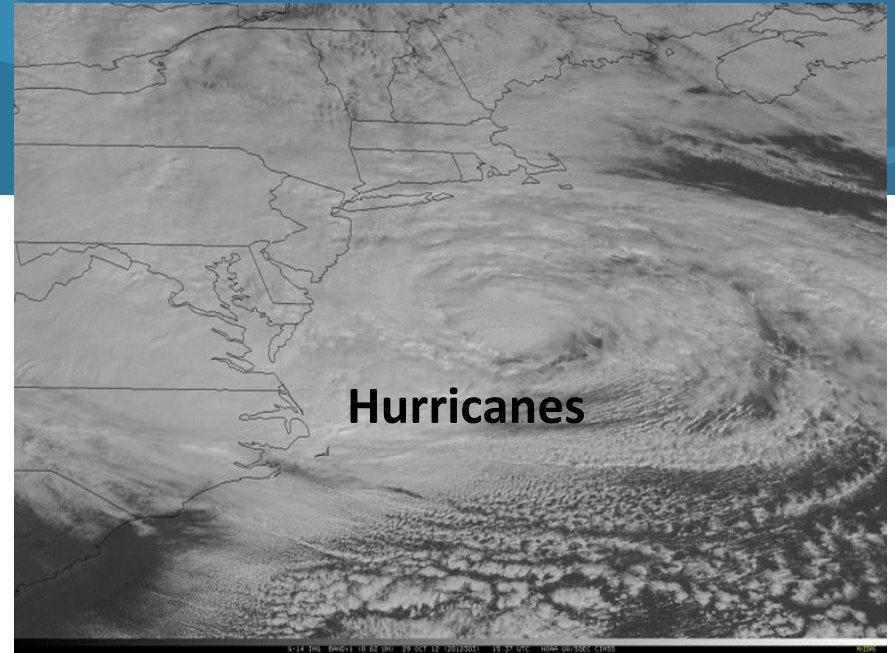
An event that is

*highly unusual within local memory
and that has significant consequences
as defined by that community
(in terms of impact, cost, etc.).*

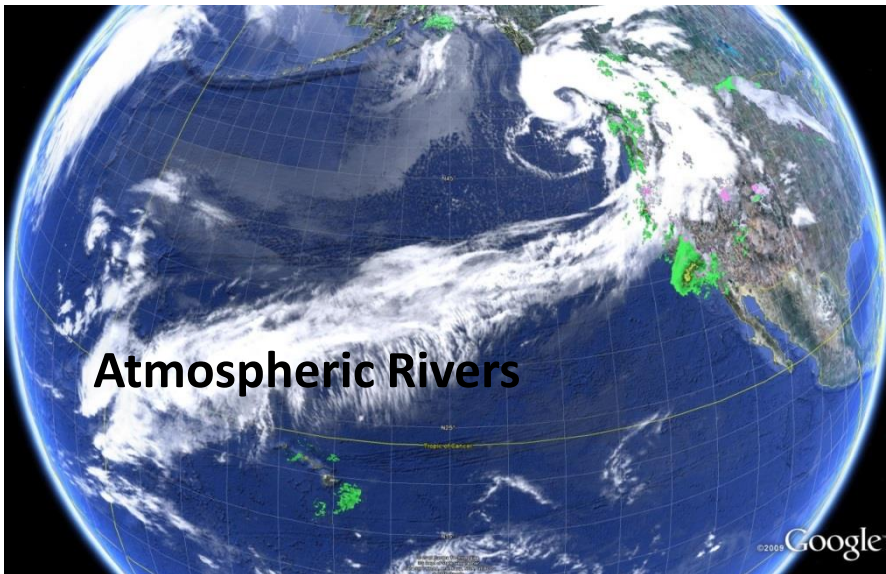
~Beller-Simms et al., 2014



Wildfires



Hurricanes



Atmospheric Rivers



Droughts

Nor'easters

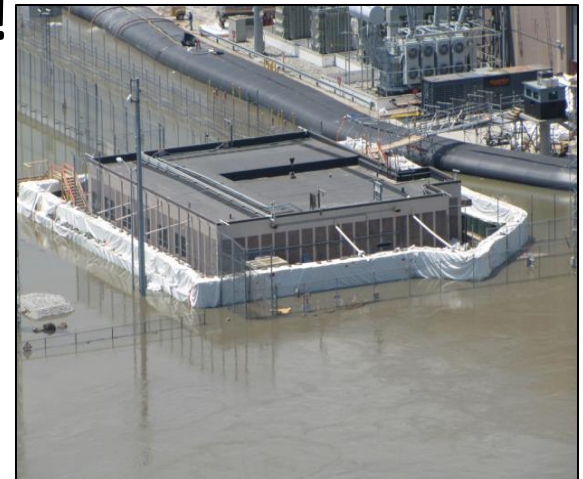
Sea Level Rise

Derechos

...and more!

Risks & Impacts

- Changes in water cycle
- Disrupted services
- Cost implications
- Water quality and environmental impacts
- Reverberating impact on economy!



What do we need to *rebuild differently*?

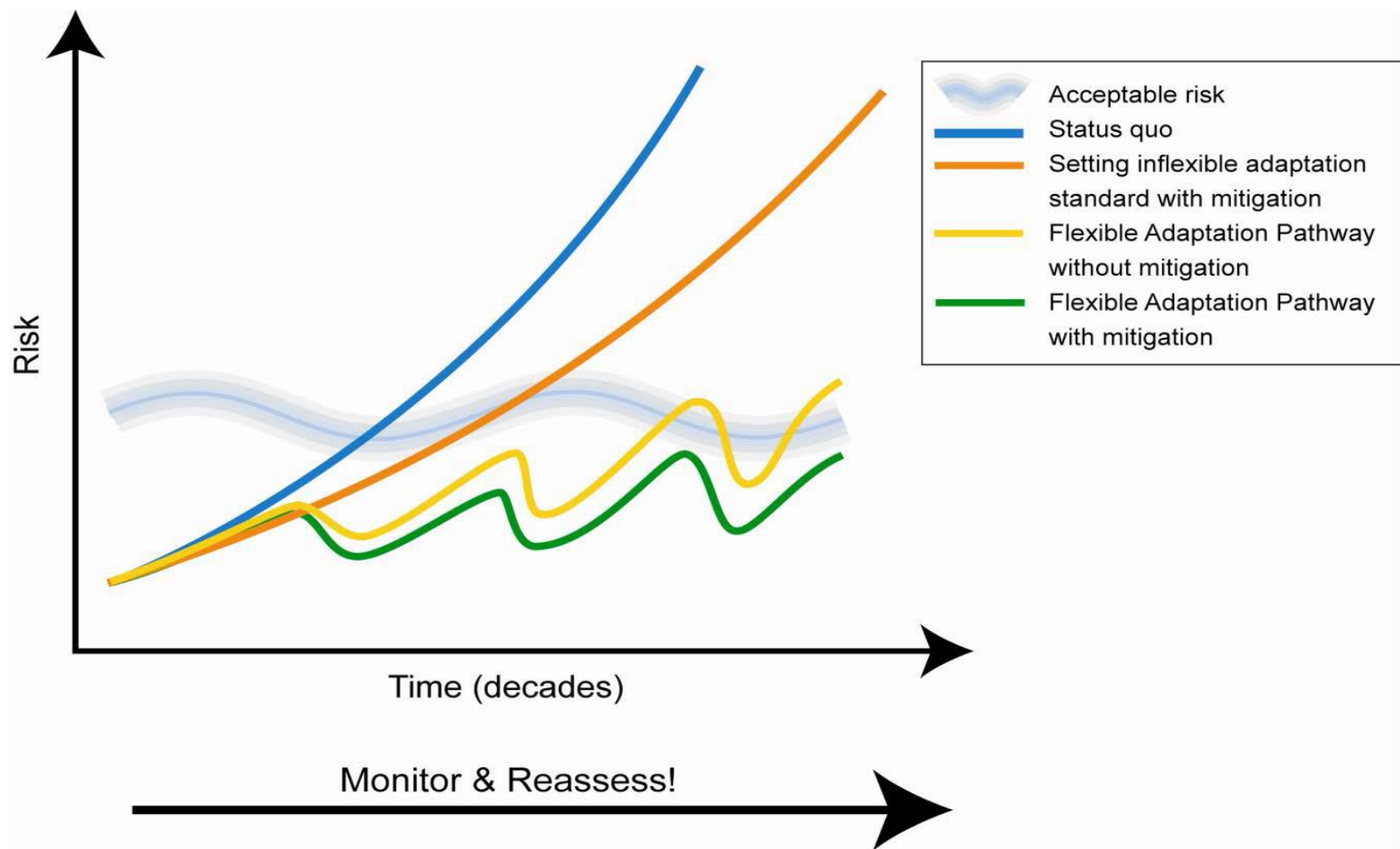


Figure 4-1. Flexible Adaptation Pathways.

Source: New York Panel on Climate Change, 2010.

How can we better manage risks?

Utilize Local Context & Resources

- No silver-bullet for adaptation strategies
- Highlighting tangible examples that may (not) apply
- Learning from other communities, utilities, sectors
- Experiences as one point in time
- Taking a step towards resiliency

Common Theme #1:

Manage multiple events, integrate planning for risks.



✓ Resiliency Strategy



**Bastrop
County Fires
and Burst
Pipes.**

*Credit:
Central Texas
Workshop
(Beller-Simms
et al, 2014).*

Water utilities and firefighters in **Central Texas** work together to restore water infrastructure damaged by wildfires.

Common Theme #2:

**Consider emergency response and
long-term preparedness.**

DC Water Personnel Work Together to Prepare for Superstorm Sandy's Landfall.
Credit: DC Water Employee. Source: Office of Emergency Management, DC Water.



✓ Resiliency Strategy



Utilities in the
ACF Basin
elevate critical
assets and install
recovery
equipment.

Flooded BNR Basins and Blower Building, RM Clayton Water Reclamation Center.

Photo Credit: City of Atlanta, Watershed Department.

Source: Bush, 2012.

Common Theme #3:

Coordinate with communities and embrace innovation to build support.



✓ Resiliency Strategy

Water utilities, grape growers, and wine councils build storage and conserve water in the **Russian River Basin.**



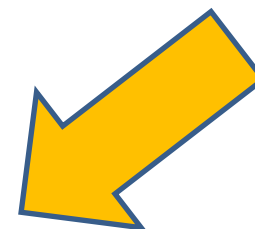
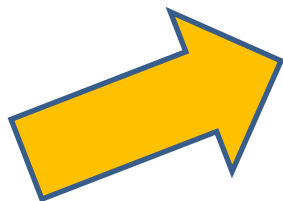
Vineyard irrigation and protective coating for grapes during the Spring Frost.
Credit: Lauren Fillmore and Russian River Basin Workshop (Beller-Simms et al., 2014).

Common Theme #4:

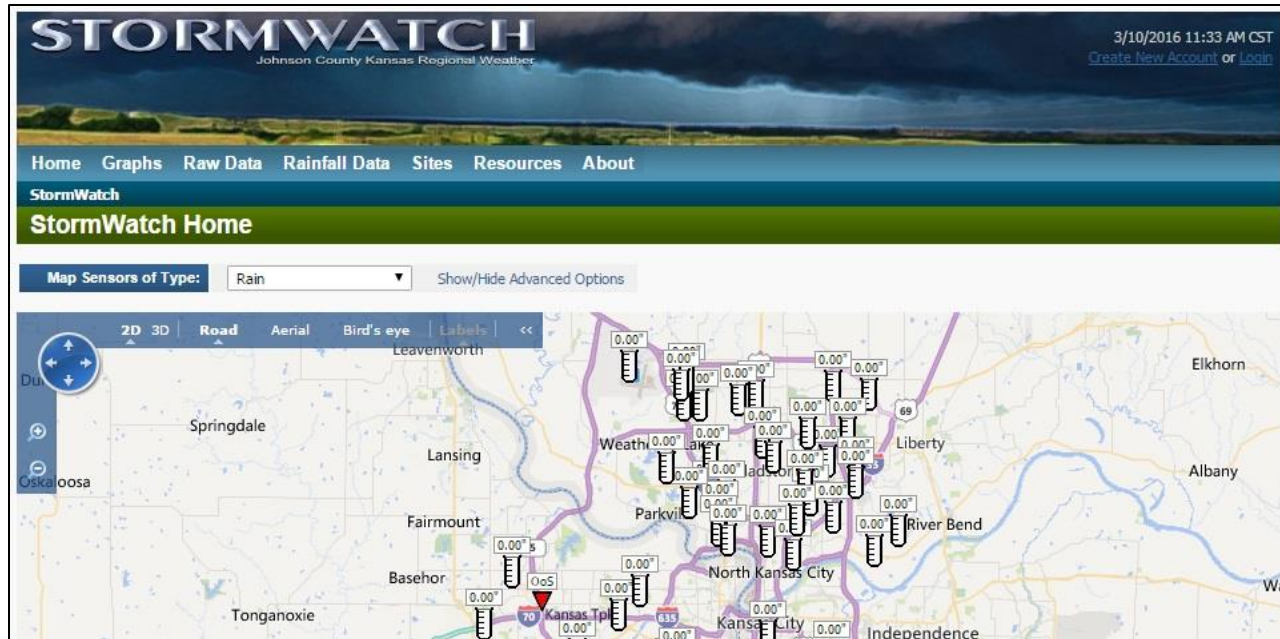
Create

actionable

information.



✓ Resiliency Strategy



Customizing data to create a localized flood warning system in the **Lower Missouri River Basin.**

Path Forward

Where do we go from here?

Continue....

- ✓ Building political awareness and support
- ✓ Engaging stakeholders
- ✓ Collaborating and tailoring solutions locally
- ✓ Making information accessible...and using it in our planning!



Climate Resiliency Toolkit



U.S. Climate
Resilience
Toolkit

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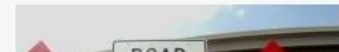
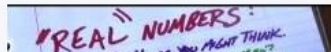


Meet the Challenges of a Changing Climate

Find resources and a framework to understand and address climate issues that impact people and their communities.

- 1 Identify the Problem
- 2 Determine Vulnerabilities
- 3 Investigate Options
- 4 Evaluate Risks & Costs
- 5 Take Action

Find Out How People Are Building Resilience




<https://toolkit.climate.gov/>

Water Resources Dashboard



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Water Resources Dashboard

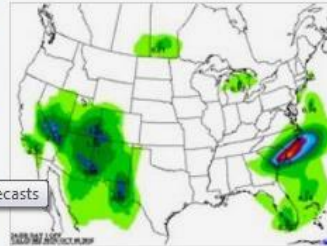
This dashboard is designed to help water resource managers and urban planners build resilience to extreme precipitation events. Its scope and contents are driven by feedback from user communities and our federal partners.

Forecasts & Outlooks



NWS Forecasts

Current conditions and short- to medium-range (1-7 days) forecasts for precipitation, temperature, wind, and clouds. These forecasts often identify



24-hour Precipitation

Forecasts for cumulative precipitation over the next day or longer. Paired with awareness of your locality's threshold for excess precipitation, this forecast can



Weather Model Analyses and Guidance

Access maps, animations, and plots from weather observations and prediction models. Decision

Browse Topics

- > Coastal
- > Ecosystems
- > Food
- > Health
- > Transportation
- > **Water**
 - Municipal Water Supply
 - Flooding
 - Drought
 - Ecosystems
 - **Water Resources Dashboard**

“Expect the unexpected. Build partnerships and establish communication procedures ahead of time. So that when the time comes and you have to call an institution at 2am in the morning, they will actually pick up that phone and deliver that badly needed generator.”

– Rajendra Bhattarai,
Austin Water Utility

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Presentation based on:

Beller-Simms, N., E. Brown, L. Fillmore, K. Metchis, K. Ozekin, C. Ternieden, and K. Lackey. 2014. **Water/Wastewater Utilities and Extreme Climate and Weather Events: Case Studies on Community Response, Lessons Learned, Adaptation, and Planning Needs for the Future.** *Project No. CC7C11* by the Water Environment Research Foundation: Alexandria, VA.

http://www.werf.org/c/KnowledgeAreas/ClimateChange/Extreme_Weather.aspx

*Individual case studies, fact sheets, and full report are available!

Final Report Co-Authors

Special thanks to:

Nancy Beller-Simms, NOAA

Erica Brown, AMWA

Lauren Fillmore, WERF

Karen Metchis, EPA

Kenan Ozekin, WRF

Claudio Ternieden, WEF

Partners

Partnering with WERF on this project and to improve the resiliency of water service practitioners:



Questions?

Thank you!

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Images & Figures

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