



SRFs and Resilience to Extreme Weather

Emily Nicasio

Council for Infrastructure Financing
Nov 2013

Denver Flood (2013)



A geyser of flood water shoots out of a sewer in Manitou Springs, Colorado.
Photograph: Michael Ciaglo/AP

Colorado floods: Water-treatment plants struggle to keep up

By *Yesenia Robles*
The Denver Post

POSTED: 09/14/2013 12:01:00 AM MDT | UPDATED: ABOUT A MONTH AGO

Late Friday, the Boulder announced that a 300-foot breach has opened in its main wastewater pipeline, but said it was no threat to drinking water in Boulder or Lafayette.

In Arvada, silt levels in the city reservoir skyrocketed 950 units from the typical 4 and forced the shutdown of the water treatment plant for a few hours Friday .

News

Colorado Flooding Update: E. Coli Found in Town's Drinking Water

P. Solomon Banda and Manuel Valdes | Published: Sep 20, 2013, 2:59 PM EDT | Associated Press

Millions of gallons of sewage have been released around the state because of septic systems and sewer lines torn out by flood waters and flooded waste treatment plants, said Steve Gunderson, director of the state's water quality control division. People in some communities have had to boil their

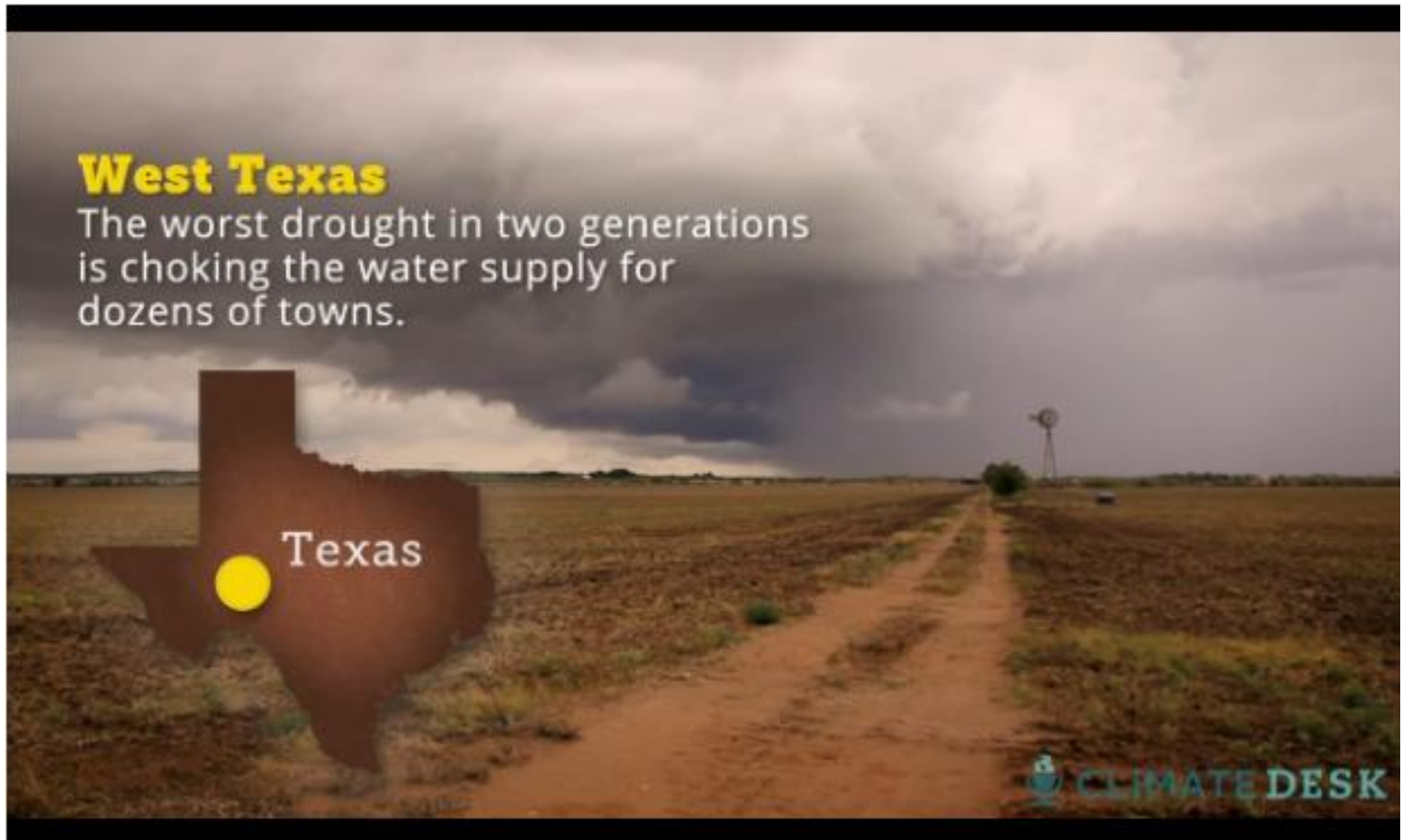
Clean water, working toilets continue to be Colorado flood issues

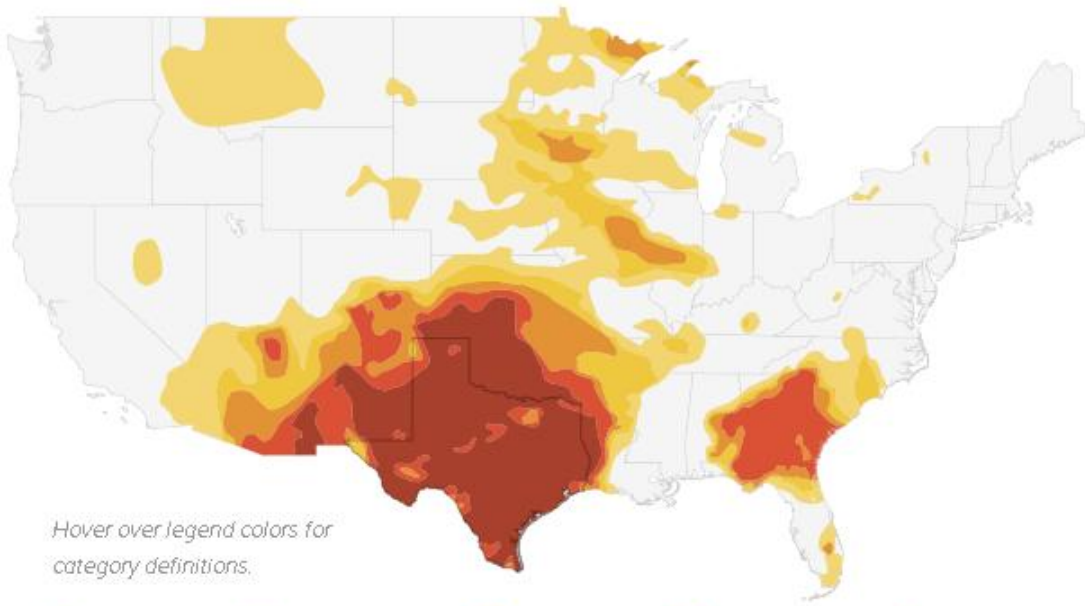
By *Joey Bunch*
The Denver Post

POSTED: 09/21/2013 12:01:57 PM MDT | UPDATED: 30 DAYS AGO

"Crews and contractors are working day and night to repair blocked or damaged sanitary sewer lines that were compromised during the flood and then filled with debris," the city of Boulder

Texas Drought (2011-2013)

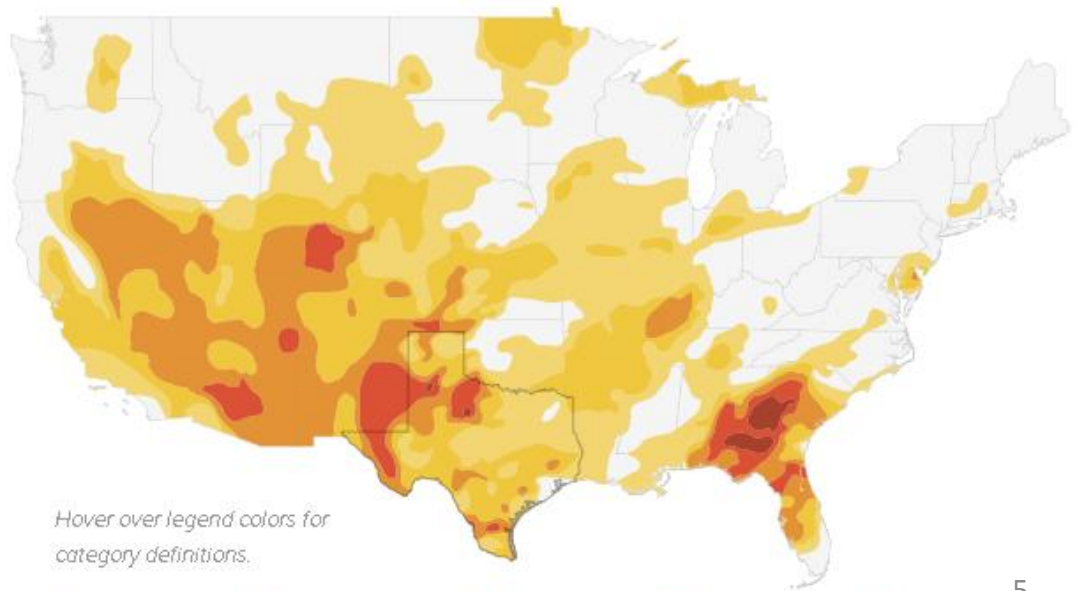




Hover over legend colors for category definitions.

- Abnormally Dry
- Moderate Drought
- Severe Drought
- Extreme Drought
- Exceptional Drought

June 5, 2012



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How 10 Western Cities Are Dealing with Water Scarcity and Drought

AUGUST 2, 2013 | 6:00 AM

BY HOLLY HEINRICH

This summer, **much of the American West is in drought**. And climate change in the American West is **expected to bring longer droughts**, increased wildfire risk, and diminished water supplies. The region is also one of the fastest-growing in the nation.

1. Denver, CO
2. Orange County, CA
3. Las Vegas, NV
4. San Antonio, TX
5. Santa Fe, NM
6. El Paso, TX
7. Santa Cruz, CA
8. Tuscon, AZ
9. Pheonix, AZ
10. Los Angeles, CA



Lack of Floodplain Maps Could Leave Rural Texas Unprepared for Next Big Storm

Superstorm Sandy (2012)



Partially Treated Sewage Still in Area Waterways After Superstorm ...

Outline

Now that we've seen what extreme weather can do to water and wastewater utilities...

- What is adaptation?
- What is the CWSRF's role?
- What is eligible?
- What can States do?



Adaptation

Definitions of Key Terms

From: *America's Climate Choices* (NRC, 2010a-d)

- **Adapt, Adaptation:** Adjustment in natural or human systems to a new or changing environment that exploits beneficial opportunities or moderates negative effects.
- **Adaptive capacity:** The ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.
- **Mitigation:** An intervention to reduce the causes of changes in climate, such as through reducing emissions of greenhouse gases to the atmosphere.
- **Resilience:** A capability to anticipate, prepare for, respond to, and recover, from significant multi-hazard threats with minimum damage to social well-being, the economy, and the environment.
- **Risk:** A combination of the magnitude of the potential consequence(s) of climate change impact(s) and the likelihood that the consequence(s) will occur.
- **Stationarity:** The idea that natural systems fluctuate within an unchanging envelope of variability.
- **Vulnerability:** The degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity.

- Adaptation or mitigation?
- Resilience or resiliency?
- Risk or vulnerability?



Adaptation

Presidential Policy Directive/PPD-8: National Preparedness

March 30, 2011

(c) The term "resilience" refers to the ability to adapt to changing conditions and withstand and rapidly recover from disruption due to emergencies.

(f) The term "mitigation" refers to those capabilities necessary to reduce loss of life and property by lessening the impact of disasters. Mitigation capabilities include, but are not limited to, community-wide risk reduction projects; efforts to improve the resilience of critical infrastructure and key resource lifelines; risk reduction for specific vulnerabilities from natural hazards or acts of terrorism; and initiatives to reduce future risks after a disaster has occurred.

- The meaning of mitigation depends on the context

Climate adaptation \approx Hazard mitigation

Role of the CWSRF

- DRAA, 2013 – Congress tasked EPA with improving the resilience of water utilities
- Eligible projects must:
 - “reduce flood damage risk and vulnerability”
 - “enhance resiliency to rapid hydrologic change or a natural disaster at treatment works”
- Projects must also be otherwise SRF eligible

Eligible Projects

- Specific eligibilities identified through the Disaster Relief Appropriations Act of 2013
 - Wind resistant features (e.g. roofing, windows)
 - Physical flood barriers
 - Flood attenuation/diversion/retention infrastructure
 - Larger capacity and/or saltwater resistant storage tanks for chemicals and fuel

Eligible Projects

- Projects to create redundancy at a facility or interconnections with other utilities
- Projects that reduce vulnerability to a power outage
 - Backup generators
 - Alternative energy
 - **Hardening of grid connection**
- Planning projects
 - Identify vulnerabilities
 - Develop emergency response plans



Ideas for States

1. Educate utilities about resiliency—why it's important and how it can be achieved
 - Share resources
2. Encourage utilities to evaluate their current vulnerabilities and consider mitigation options
 - Promote planning
3. **Fund projects that improve resiliency to extreme weather**
 - Encourage utilities to consider building resilience into projects currently planned
 - Encourage new resiliency projects
 - Prioritize resilience



Clean Water
State Revolving Fund

Resources

These and other resources can be found on the Water Security Division's [Climate Ready Water Utilities Toolbox](#)



Adaptation Strategies Guide for Water Utilities



Office of Water
Environmental Protection Agency

August 2010
EPA 800-R-10-001

Climate Change Vulnerability Assessments: A Review of Water Utility Practices



ADAPTING TO CLIMATE CHANGE: A PLANNING GUIDE FOR STATE COASTAL MANAGERS



NOAA Office of Ocean and Coastal Resource Management
www.noaa.gov

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