Drought Management and Response Discussion – Part 2

John Boyer

Agenda Item 7

DROUGHT PLANNING GUIDEBOOK

A Resource for Water Systems in the Palmetto State

Guidance for Reviewing and Updating Drought Management Plans and Response Ordinances

Presented by
The South Carolina State Climatology Office within the S.C. Department of Natural Resources

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Lower Savannah and Salkehatchie Drought Management Plans (examples)

Water Supplier	Year	DMA	Water Source	Drought Indicator / Trigger Types[1]
City of Barnwell	2003	West	**Groundwater** – 5 wells	Aquifer levels less than 5%, 10%, or 15% normal level.
Bamberg Board of Public Works	2003	Southern	**Groundwater** – 8 wells	Average daily flow greater than 1.5, 1.75, or 2.0 MGD for 5 consecutive days.
Beaufort-Jasper Water & Sewer Authority (BJWSA) - Main System	2003	West	**Surface Water and Groundwater** - Savannah River and 4 auxiliary wells	Both raw water reservoirs at 66% capacity for 14 consecutive days, 50% capacity for 14 consecutive days, or below 50% capacity for 21 consecutive days. Daily Savannah River streamflow less than 4,000 cfs river levels are below 3.0 feet MSL, streamflow less than 3,500 cfs and river levels are below 1.5 feet MSL, or streamflow less than 3,000 cfs and river levels are below 0.5 feet MSL. Aquifer levels at all auxiliary wells exceed 60, 70, or 80 feet below the top of the well casing elevation. System-wide elevated & ground storage falls below 50%, 35%, or 25% of total tank capacity and unable to recover above these levels in 24 hours. Average daily production for any consecutive 15-day period exceeds 85% of total system capacity, for any consecutive 7 days exceeds 95% of total system capacity, or for any consecutive 3 days exceeds 100% of total system capacity.
Graniteville	--	West	**Surface Water** - Horse Creek	*No Drought Plan is on file with the SC State Climate Office*
City of North Augusta	2008	West	**Surface Water** - Savannah River	River flow less than 3,000, 2,400, or 1,500 cfs for 7 or more consecutive days. Inability to recover full system storage for 2, 5, or 7 consecutive days. 85%, 90%, or 95% of production capacity for 5 consecutive days.

Drought in urban water systems: Learning lessons for climate adaptive capacity

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ABSTRACT

In this paper we examine current policies to combat drought in urban areas in the United States to illuminate lessons learned for building climate adaptive capacity. We conducted interviews with practitioners involved in drought management at urban water utilities across the U.S. to understand: 1) both short- and long-term actions taken in response to drought; 2) perceptions of what constitutes an 'effective' drought response and whether and how this was measured; and 3) limitations to drought response. We apply criteria from a theoretical framing of adaptive capacity and then 'reason by analogy' to understand how adaptive capacity may be built or constrained in the future by such responses, including how future actions may be otherwise limited by political, social, physical and other factors. We find that drought responses overall are seen as successful in reducing water demand and helping to maintain system reliability, but can also reduce flexibility and introduce other limitations. Public perception, the multi-purpose nature of water, revenue structures, expectations and other social factors play a dominant role in constraining drought response options. We also find that some urban water utilities face challenges in measuring the effectiveness of demand reduction strategies because it can be difficult to attribute water savings, especially those related to outdoor water use. The limitations in drought policies experienced by urban utilities offer important lessons for the ability of systems to innovate toward more sustainable water systems for the future.

The authors interviewed water utility managers from 19 urban areas to understand…

1. What were the short- and long-term actions taken in response to drought?

2. What constitutes an effective drought response and how was this measured?

3. What are the limitations to drought response?

Table 1
Most commonly mentioned responses to drought across the cities sampled.

	Policy Instrument	Examples
Demand Focused		
Mandatory Outdoor Use Restrictions	Watering schedules	Limited to certain days of the week
	Prohibiting certain uses	Filling ornamental fountains, pools, or washing car
	Enforcement	Ticketing, hotlines to "report" neighbors
Voluntary Outdoor Use Restrictions	Customer education, outreach	Advertising, targeted meetings, using local media
Incentives for Permanent fixture or landscaping changes	Rebates, fixture give aways,	Low flow toilets, money toward efficient appliances, money for removing turf
Rate adjustments	Tiered water rates, drought surcharges, raising water rates	
General public education on saving water	Customer education, outreach	
Planning	drought triggers, drought plan	Lake or reservoir levels, regional plan, interruptible supplies
Supply Focused		
New reservoir/increasing size of reservoir		
New long term contract		
New connection		New pumping connection, new way to alternate between sources
Diversifying water sources		Adding surface and desalination
Upgrading infrastructure		Fixing aging wells
Purchasing new water rights		Agricultural water
New ways of reusing wastewater		Pumping into lake to be retreated, use of greywater
Governance Changes	Complete reorganization of water delivery into centralized authority with obligation to provide water in return for agreed price, and environmental safeguards	
No action taken/solidarity		Sympathy program; or does not think about drought

What constitutes an effective drought response and how was this measured?

1. Reduction in per capita or overall water use
2. Ability to avoid mandatory restrictions
3. How supportive the public was in implementing response strategies
4. Ability to discontinue polices that limit use
5. Getting a positive response to communication efforts

They also gaged effectiveness of drought response in terms of…

1. **Robustness** - being less sensitive to changing conditions

2. **Flexibility** - the ability to change in response to altered circumstances

3. **Uncertainty** over how policies will work (if the measures rely on actions taken by others)

4. **Efficiency**, **Equity** and **Legitimacy**

What Are Some Lessons Learned and Limitations to Drought Response?

- Voluntary measures or community education initiatives were vastly preferred compared to mandatory restrictions.
- Public perception – neither supply side responses nor demand side responses were immune from public criticism.
- Drought surcharges were rarely utilized as they were seen to be quite unpopular.
- Being part of a regional plan provided a sense of solidarity.

What Are Some Lessons Learned and Limitations to Drought Response?

- Permanent reductions in demand allowed for a cushion between water supply and demand that could allow for banking water but made it difficult to achieve additional reductions in highly urban, low outdoor use contexts.
- Most utilities are not yet weighing the tradeoffs that may be present in dealing with drought risk in the near term and climate change in the long term.

What Are Some Lessons Learned and Limitations to Drought Response?

- Restrictions are more effective than pricing policies and tend to be more equitable across different income groups than pricing measures are, which fall more heavily on poorer households.
- A drought event itself may galvanize political will to implement policies that in normal years may not be publicly acceptable.
- Nearly every manager interviewed considered demand management an integral part of their practices: "***Our customers expect us to be in the business of encouraging efficient and environmentally sound use of resources***".

What Are Some Lessons Learned and Limitations to Drought Response?

"The issue of certainty in supply that we all grew up with no longer exists and we don't know how different it's going to be in the future, but we do know it's going to be different. *From a public policy perspective, we do well to prepare our organizations and our infrastructure to be flexible enough to deal with whatever comes at us, because we have that unequivocal obligation to meet demand. It's not only a contractual obligation. We're the people who produce the supply that puts out the fires and washes babies, so we've got to have the supply no matter what. When we fail, there's a whole lot of problems. We've got to be in a position to not fail."*

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Drought in the Southeast: Lessons for Water Management

John Manuel

Long spared the persistent droughts that have plagued the western United States this century, the Southeast suddenly finds itself the most rain-starved region of the country. In the face of this threat, policy makers and utility companies are struggling to identify sensible, sustainable options for managing the region's water. Although there currently is no immediate public health threat posed by the Southeastern drought, it does point to a very real situation in regions around the world that struggle to maintain an adequate supply of potable water.

According to the Intergovernmental Panel on Climate Change report *Climate Change 2007: The Physical Science Basis*, as global temperatures increase due to rising atmospheric concentrations of carbon dioxide, so does evaporation. That, combined with cyclical drought, could pose dire threats to water supplies. By one model, published in volume 78, issue 5 (2006) of the *Journal of Hydrometeorology*, if global warming–related precipitation changes continue apace, the percentage of the Earth's surface in severe drought could rise from the current 3% to 30% by 2100.

The Southeastern drought has already had serious economic consequences, according to the National Drought Mitigation Center at the University of Nebraska, which estimates in its Winter 2008 *DroughtScape* newsletter that 2007 losses to major field crops including corn, wheat, soybeans, cotton, and hay totaled more than $1.3 billion. Cattle farmers, nursery and landscape businesses, and recreation and tourism also have been hard hit. Low lake levels have forced power companies such as the Tennessee Valley Authority (TVA) and Duke Energy in North Carolina to reduce electricity generation from cheap, renewable hydropower and substitute more expensive and polluting fossil fuels. By the same token, if cooling reservoir levels were to fall far enough, it could force the shutdown of nuclear power plants.

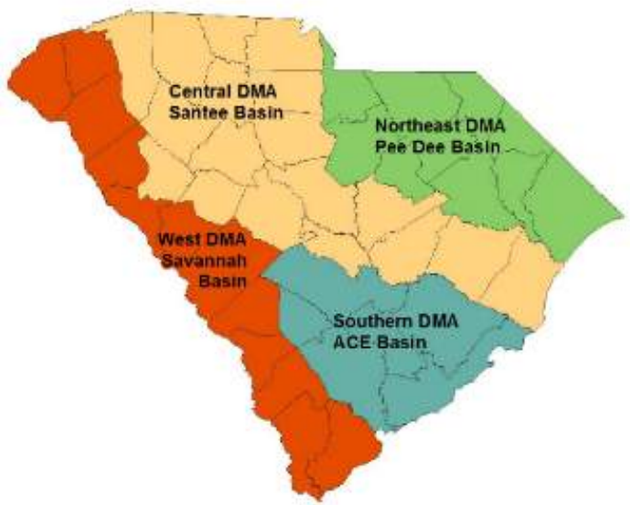
South Carolina Drought Response Committee

Drought Response Committee (DRC)

Representatives of each DMA serve on the DRC

Drought Management Areas (DMA)

- West DMA (Savannah Basin)
- Central DMA (Santee Basin)
- Southern DMA (ACE Basin)
- Northeast DMA (Pee Dee Basin)

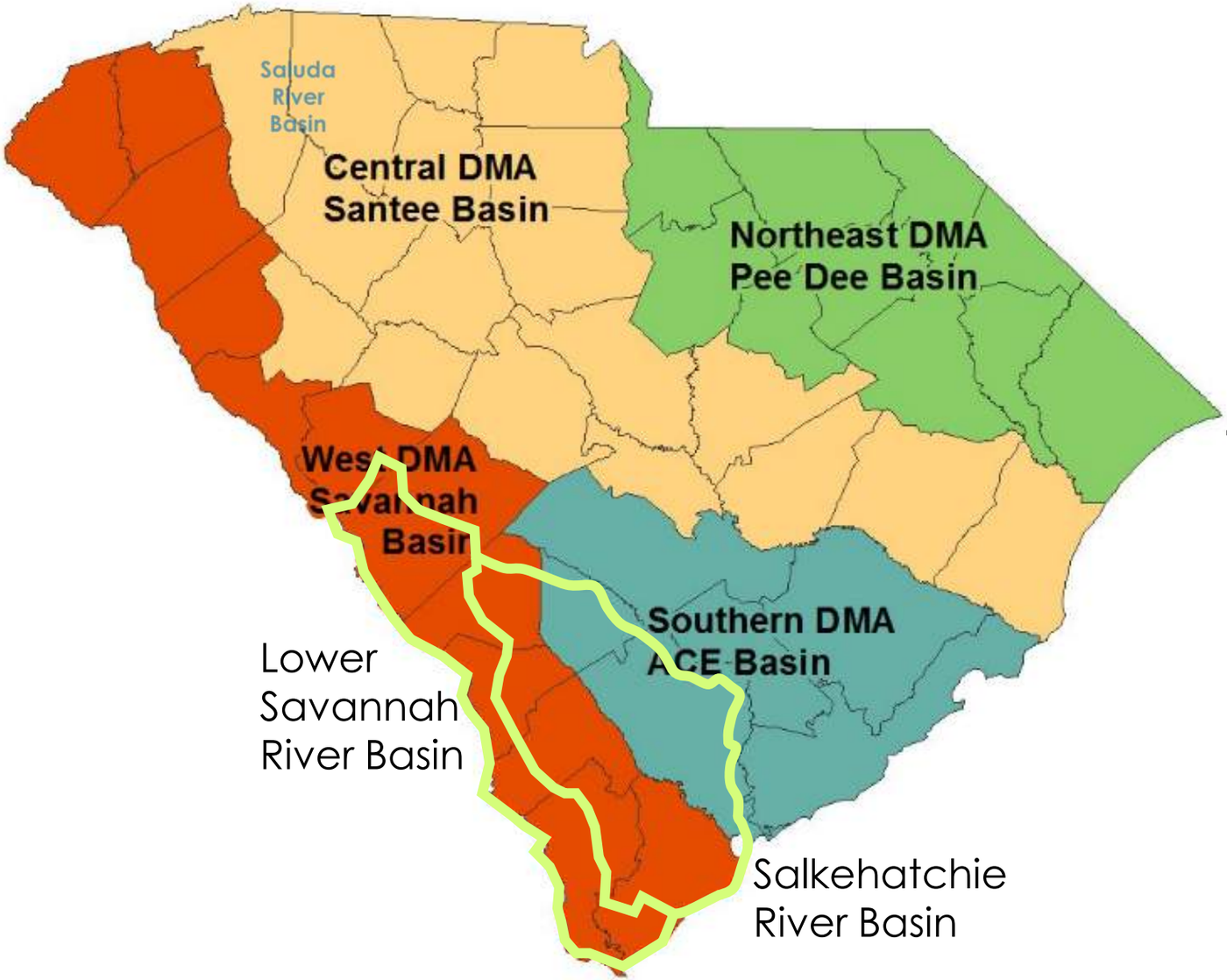


State Agency Members

Committee Member	Agency
Mr. Ken Rentiers	SCDNR, LWC Division
Mr. David Thachik	SC Emergency Management Division
Mr. Joe Koon	SCDHEC
Mr. Darryl Jones	SC Forestry Commission
Mr. Chad Truesdale	SC Department of Agriculture

The DRC carefully and closely monitors, conserves, and manages the State's water resources in the best interest of all South Carolinians.

Drought Management Areas



West DMA

Group	Committee Member	County
Agriculture	Reg Williams	Edgefield
Commission of Public Works	Cheryl Daniels	McCormick
Counties	Mark Warner	McCormick
Domestic User	Eric Carrier	Aiken
Industry	David Evans	Pickens
Municipalities	Vacant	
Power Generation Facilities	Preston Pierce	Oconee
Private Water Supplier	J. Scott Willett	Anderson
Public Service District	Chris Rasco	Anderson
Regional Council of Governments	Rick Green	Edgefield
Soil & Water Conservation Dist.	Yvonne Kling	Aiken
Special Purpose District	Brian Chemsak	Beaufort

Southern DMA

Group	Committee Member	County
Agriculture	James Traywick	Orangeburg
Commission of Public Works	Jason Thompson	Charleston
Counties	Vacant	
Domestic User	Christopher Sandifer - Appointment Pending	Bamberg
Industry	Vacant	
Municipalities	Eric Odom	Orangeburg
Power Generation Facilities	Matthew McCants	Berkeley
Private Water Supplier	Vacant	
Public Service District	Vacant	
Regional Council of Gov.	Ronald E. Mitchum	Charleston
Soil & Water Conservation Dist.	Marion L. Rizer	Colleton
Special Purpose District	Vacant	