

# IMPROVING DROUGHT MANAGEMENT POLICY AND PRACTICE: LESSONS FROM DROUGHT AND FERC RELICENSING

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**Abstract.** South Carolina's recent experience with drought (1998-2002, 2007-2008) and the relicensing of privately owned hydropower dams have prompted a wide range of water resources decision-makers to improve drought response and management. Actions by local public water systems include the updating of laws and ordinances, the use of new technologies to improve efficiency, augmentation of water supplies through capital improvements, public education programs, and participation in communication networks. Other changes include the development of basin-focused activities, such as the Low Inflow Protocol on the Catawba-Wateree, and increased involvement by state-level entities. Findings indicate that although short-term drought management and response has improved, many concerns about the longer-term sustainability of our water resources exist. Interviewees state that vulnerability to future droughts will persist until policy-makers and the public adopt a different mindset about water consumption and until water resources planning expands beyond the purview of individual utilities to include more collaborative efforts within regions and basins. However, coordinating water management during drought remains complicated because it requires the integration of many different levels of water uses and interests.

## INTRODUCTION

This paper examines efforts in South Carolina to improve drought management across the state-, basin-, and local-levels and reports preliminary findings from a doctoral dissertation research project. The starting premise of the study holds that the severe drought of 1998-2002 exposed South Carolina's vulnerability to drought and has prompted water resources managers to initiate activities to reduce vulnerability and improve preparedness, response, and mitigation of impacts. The drought highlighted several broad ways in which drought management could be improved – through the development of drought plans; earlier monitoring and response; improved communications amongst users sharing water from the same basin and with the public;

and, efforts to ensure that all communities and water users within a basin or region implement water conservation measures during drought. This paper uses these lessons as a backdrop to address: management changes and improvements made after the 1998-2002 drought; preliminary lessons from the 2007-2008 drought; and, policy implications.

## METHODS

The author used several approaches to data collection. Primary information sources consist of 1) semi-structured interviews with federal agencies, state agencies, non-governmental organizations, community groups, public water suppliers, and industry representatives and 2) a phone survey of public water systems. Participants in semi-structured interviews were asked about their experiences with drought in 1998-2002 and 2007-2008 and perspectives on drought and water resources management occurring at the state-, basin-, and local levels. Phone survey participants were asked to report on drought impacts from 1998-2002 and 2007-2008; actions taken to improve drought response; factors that facilitated or posed constraints to those actions; the information used to monitor conditions and make drought-related decisions; and, participation in regional and/or basin-level drought and water management activities. Information related to the topics listed above was collected at state- and basin-level drought management meetings from May 2007 to September 2008. Documents related to water resources and drought management provided background information.

## DROUGHT MANAGEMENT ACTIVITIES: CHANGES AND IMPROVEMENTS

Drought management, as conceived and practiced, has traditionally been the purview of local water systems and municipalities. The 1998-2002 drought experience resulted in a major shift in the drought management landscape, when decision-makers acting at the state- and

watershed levels began to explore new strategies to reduce vulnerability and new arenas in which to engage in planning. The South Carolina experience exemplifies several different approaches used to cope with climate-related risks, including:

- Actions to prevent or reduce impacts
- Risk-sharing measures, distributing losses and/or impacts across society
- Capacity building, taking actions to enhance a system's ability to cope or adapt to drought risks through the development of information, supportive social structures, and supportive governance (UK Climate Impacts Programme 2008).

With decision-makers at each level (state, basin, and local) implementing different strategies, the South Carolina experience echoes findings from other areas. Research by Medd and Chappells (2007) suggests that decisions and actions will differ across management levels because the underlying assumptions that frame objectives and policy goals are different at each level. While employing a variety of approaches should serve to improve overall resilience, coordinating drought response can prove challenging when problem-framing and potential solutions are incongruous across different actors and levels.

### **Preventing and Reducing Impacts at the Local Level**

Water managers are tasked with providing reliable water supplies, meeting regulatory requirements, and overseeing day-to-day operations and long-term planning. Amongst these myriad responsibilities, drought management activities focus on measures and actions necessary to manage short-term supply-demand imbalances. In other words, the overall purpose of the drought management plan “is to manage a period of declining supply and increasing demand so that demand does not exceed either supply or system capacity (AWWA 2007, p. 134).” In fact, managers report that other factors – aging infrastructure, accommodation of population growth and increasing demands, regulatory requirements – have served as the primary impetuses for system improvements. System capacity already takes into account the need to provide supply during difficult – including drought – periods. Recent efforts to enhance system reliability and capacity include intake modifications, upgrading of distribution systems, additional storage, and measures to increase efficiency.

Despite the general inclination toward engineering solutions, many water systems have implemented non-structural approaches to reduce demand. Public awareness campaigns are used to promote residential water efficiency and year-round conservation and sustainable water practices. While a major initiative on the state level, local management plans and ordinances serve as one item in a water manager's tool box. They have served more as

references to guide monitoring, response, and public communications.

### **State-level Activities: Building Capacity**

To ensure that water resources are protected for essential uses, and managed equitably amongst those uses, the Drought Response Act (2000) was passed. This Act established the Drought Response Committee and required water systems to develop management plans and ordinances with system-specific triggers and staged responses. The Department of Natural Resources provides general support to water systems (and other affected sectors) by assisting in the development of local drought plans and ordinances; working with and through the Drought Response Committee to disseminate drought warnings and related information; and, advancing knowledge of climatic and hydrologic processes through improved modeling and monitoring (SC Drought Response Act 2000, SC DNR 2003).

### **Basin-based Management: “Sharing the Pain”**

In contrast to the system-specific changes occurring at the local level, a risk-sharing approach to drought management has occurred on the basin-level. The Federal Energy Regulatory Commission (FERC) dam relicensing process has served as a platform from which to improve water management in several of the state's watersheds. On the Catawba-Wateree, Duke Energy's recent license application included a Low Inflow Protocol (LIP) which outlines drought triggers and corresponding water conservation actions. The Drought Management Advisory Group (DMAG) consists of Duke Energy, other industries, and public water systems. The group has met regularly during the recent drought to share information, review conditions and responses, and coordinate media releases.

The intent of the LIP is to ensure that all water users “share the pain” of drought impacts; in other words, the severity of drought impacts should be distributed equitably. In implementing the LIP, each DMAG member takes action to reduce water use. This collective approach to drought response emerged from the relicensing process, as participants came to view the Catawba-Wateree as an integrated system and recognize how vulnerable the basin was to drought. The LIP represents a major step toward coordinating drought response – and spreading drought risks – among many and diverse water users within a single basin.

Both participants – and observers – have commended the process and highlight several benefits. First, the LIP provides a managed approach that limits conflict and debate within the group. DMAG members use a common set of data points and triggers, allowing meetings to focus on substantive issues. Second, the LIP has been considered effective in reducing water use across the basin, allowing reservoirs to maintain adequate supplies

during the 2007-2008 drought. Finally, fairness concerns have diminished as all DMAG members have strived to adhere to the LIP recommendations.

### PRELIMINARY LESSONS FROM THE 2007-2008 DROUGHT

The purpose of this section is to discuss lessons emerging from experience with the current drought. Successful endeavors and persistent challenges, as identified by interviewees, survey respondents and meeting attendees, are outlined here. When asked to compare the 1998-2002 and 2007-2008 droughts, respondents have acknowledged the value of developing and using management plans; the benefits of early monitoring and planned responses in minimizing impacts; and, that coordinated actions as outlined by the Low Inflow Protocol can help to ensure that drought impacts are equitably distributed across users and communities.

Beyond these positive responses, however, mixed – and sometimes conflicting – messages emanate from the local level. Some managers voice concerns about excessive state involvement in local decision-making and resource management. Other respondents show support for initiatives best addressed at the state- and basin-levels (e.g., data collection and monitoring, information sharing, and vulnerability and impacts assessments). Meanwhile, the current fragmentation of political and management jurisdictions often inhibit cooperative efforts.

At issue is the question: what level is most appropriate for managing drought preparedness and response? The answer may depend on how different actors at different levels define and practice drought management. Is it a balance between supply and demand or a means to distribute risks and impacts? The lessons of 2007-2008 do not provide a definitive answer but can underscore the emerging issues to challenge water managers in the future.

#### **Challenges to Coordination**

Although not a “new” lesson for water managers, the 2007-2008 drought demonstrated how impacts are a localized phenomenon. From a water system perspective, vulnerability and drought impacts depend upon unique, system-specific factors: location, population and socioeconomic factors, rules and regulations, system capacity to balance supply and demand, and effectiveness of planning and education efforts.

As a result, vulnerabilities and impacts frequently vary across neighboring communities, even those within the same county or watershed. Such diversity does augment the established mindset that drought management and response belongs at the local level. Differences in the implementation and enforcement of local ordinances complicate coordination and confuse the public.

Furthermore, many of the potential impacts of upstream users on downstream users are not always fully examined and well-integrated with one another. Protocol and system changes at one location (e.g., changes to withdrawals or returns) can impact a downstream system’s ability to manage efficiently. Downstream needs can impact upstream users by requiring upstream managers to release minimum flows, contributing to the perception that reservoirs are unfairly depleted to benefit other users.

#### **Communication is Key**

Managers state that communications have improved 1) amongst water managers and 2) with their customers and the public. DMAG participants attribute the success of that group to regular meetings, conference calls, and email updates. In other basins, managers interact with upstream and/or downstream users, state agencies, and reservoir managers (e.g., Army Corps of Engineers, Duke Energy, Santee Cooper). Communications are used to exchange information and monitoring results, notify other managers or systems of protocol changes (e.g., release schedules), and discuss (to a lesser degree) coordination of activities.

Managers of systems that have conducted education campaigns over several years credit those efforts with public willingness to cut water use. One oft-cited difference between 1998-2002 and 2007-2008 is the increased amount of media publicity given to the current drought, which, in turn, has aided water managers in their efforts to promote conservation. However, this increased attention has created confusion where the media has focused on Drought Response Committee classifications without the public understanding that the local plan directs local response. Smaller communities located in media markets dominated by a larger metropolitan area report difficulties in having their locally-oriented drought messages disseminated effectively.

#### **Unwelcome Consequences, New Vulnerabilities?**

Although many of the drought management activities in the Catawba-Wateree have resulted in positive outcomes, the implementation of mandatory water restrictions has resulted in unintended impacts. When public water systems adhere to the LIP, they commit their locales to following basin-based drought triggers. This has led to earlier and more stringent water use restrictions than other communities and has contributed to a loss of financial and decision-making flexibility.

Many water systems rely on the revenue generated during droughts. As customers react to dry spells by watering lawns, demand typically increases. Water systems suffered revenue losses with the implementation of water restrictions. As one system manager stated, it doesn’t make sense “to produce a product and then ask people not to buy it.” For these reasons, responses from managers outside the Catawba-Wateree suggest a

reluctance to implement water restrictions as it works against their financial interests.

The success of local restrictions in reducing water use has adversely affected sectors (e.g., the Green Industry, recreation-based businesses) that rely on the public's ability to use water. These "indirect" impacts have resulted in decreased revenues for these businesses and contributed to local political pressures to rescind mandatory water restrictions. The important lesson here is that "non-essential" uses are essential; they are vitally important to the financial health of the public water systems and to other water-dependent livelihoods.

## DISCUSSION: POLICY IMPLICATIONS

Data gathered from interviews, surveys, and drought management meetings indicate a variety of ways in which water managers have improved drought management. Strategies include minimizing impacts by bolstering local supplies; distributing risks through a collective approach in the Catawba-Watauga; and, building management capacity through state support of planning and improvements to scientific information and data. Recent experiences have also provided new lessons which can be used to inform ongoing drought mitigation activities as well as broader efforts to ensure the long-term sustainability of the state's resources. Preliminary findings from this study can be used to inform the next generation of drought and water management policies.

### Improve Local Consistency

To alleviate confusion among neighboring communities, explore ways in which consistent ordinances, water use restrictions, and education campaigns can be implemented on the local level. To promote fairness and the idea that water is a shared resource, eliminate inconsistencies between public water users and private water users (e.g. subject well users to the same restrictions as the customers of public water systems). Such actions will require that neighboring communities – or users located in a shared watershed – find a common concern or issue to facilitate a dialogue.

### Support Basin-based Activities

To better understand basin-based processes and vulnerabilities, efforts to assess and integrate all activities (including supply and demand management), within a watershed should be promoted. Integrated drought management would entail basin-based drought monitoring, response, public education, and media communications and include all major water users within a particular sub-basin or watershed in decision-making. Such coordination already occurs to varying degrees in some areas and could be expanded. An open, participant-

focused approach may ease local criticisms that the state is the inappropriate level from which to mandate drought response or other water management activities.

### Managing for the Future

Many managers have voiced broad concerns about the long-term sustainability of our state's water resources. Overall demand has increased due to population growth and water-intensive forms of development. Decision-makers fear that growing demands will quickly exceed supply unless we embrace a fundamental shift in how we view water use and conservation. Rather than viewing conservation as merely a means to manage through a supply-demand crisis, an alternate view would consider conservation as an effort to increase overall efficiency of our water systems and to reduce our daily, seasonal, and annual water demand over a longer period of time.

A different mindset, however, will not be enough to protect and maintain our water resources. Innovative policies and tools will be necessary at all levels of management and policy-making. Study results indicate widespread support for surface water permitting legislation. Managers consider this a "tool" that will help ensure that multiple uses (environmental, recreational, industrial, public water supply) can be sustained within a given watershed. Other innovative projects might investigate the use of reclaimed water, water markets, and different water rate structures; integrate water and land use management; and, link development of new supplies to concomitant increases in efficiency. Such activities will undoubtedly require coordination across various locales and levels of decision-making, and, as demonstrated in this study, a commitment to communication, risk-sharing, and capacity building.

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