How Santa Fe Plans to Meet its Growing Water Demands

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Claudia has been working as a Water Resources Coordinator with the City of Santa Fe Water Division for over seven years, bringing her total years working in water resource management to sixteen years. Her main focus is implementing the City's Long Range Water Supply Plan, reviving a living Santa Fe River, managing the City's water portfolio, and developing a sustainable groundwater management program. Claudia received her MS degree from UNM's Department of Earth and Planetary Sciences in 2002, and a BS degree cum laude in geology from Amherst College in 1990. Her work passion is having 'difficult' conversations with various water users to find out-of-the-box solutions.

As I look around the room today and as I participate as an audience member, I'm always amazed at the vast amount of knowledge, the experience, the talent, and the good-naturedness of our audience. I am both honored and humbled to be able to speak to you today about our water picture. In most ways my presentation will be the same as lots of the other topics that are covered. Mostly what Santa Fe does is stretch available water resources, we protect and conserve our current supplies, our cultures, our environment, and our identity and quality of life; and we figure out how to accommodate for change such as growth, climate change, demographics, and often unknown change.

I am a firm believer that you have to look back in order to move forward; we have to be cognizant of our past. There is a quote on an old state archive building in Santa Fe that says, "Those who forget the past have no future." So today I am going to combine looking at the past and looking forward. I'll first cover some accomplishments, our plans for the next decade, and a little bit to address what I think is a very important question, the theme of this conference, which is how have institutions evolved and how they need to evolve.

Figure 1 provides our historical water use in Santa Fe. We are celebrating our 400-year anniversary this year, but this graph actually reflects usage from the beginning of a water utility. The city grew up around the Santa Fe River, which met the community's entire needs until it ran out by the 1940s and the city started using groundwater, which is true of most municipalities. In the 1990s, two-thirds of our water came from two groundwater sources, the city wells and the Buckman wells. Part of what I'll be talking about is just how dramatically that is changing for us in the future.

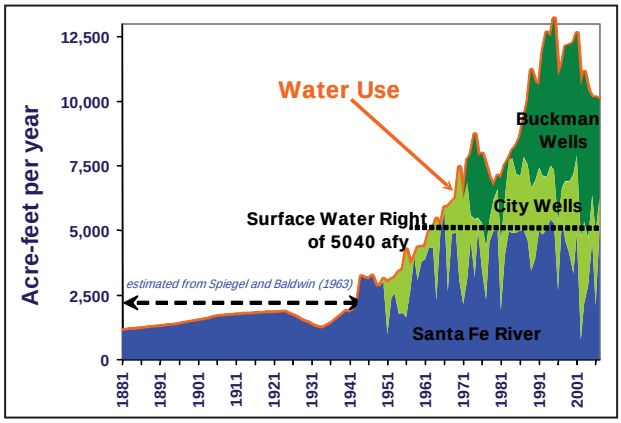

Figure 1. Historical water use in Santa Fe

Out of the vast uncataloged and mostly forgotten files that we have in our own organization, many of them inherited from the Public Service Company of New Mexico (PNM) or Sangre de Cristo Water Company, I looked at two documents that give a view of our past. One is, *People and Water*, 1984, and the other is from 10 years ago, the proceedings from this conference that was entitled, *Water, Growth and Sustainability: Planning for the 21st Century*. I looked at these references to see what kind of ideas people had suggested in the past. I sometimes get the sense that we are doing the same thing over and over

again and ideas have been around for a quarter of a century and we are not actually moving forward. The handout that has been passed around (Appendix A) provides a tally of what we have accomplished in Santa Fe. I will also say that it is not that Santa Fe is in any way unique in what we have accomplished. Accomplishments have been made throughout the state and as you look at the handout, there are similar kinds of accomplishments that you can think about for your own organizations. We are also not unique in creating solutions by ourselves. Through collective efforts, we have made significant progress, both the City of Santa Fe itself and while working with others. I am going to highlight five that I think are our most important five accomplishments of the last ten years.

The first is demand reduction (Fig. 2). Everyone talks about the need to use water more wisely. I feel like we have done a good job of that. When we tracked our own numbers, we have gone from 168 gallons per capita per day (gpcd) in 1995 down to around 100 gpcd today. Using the Office of the State Engineer (OSE) methodology (which is in green), we started around 136 gpcd in 2003 and we are at around 109 gpcd now for total use. As you can see, our population continued to grow so we have been able to reduce our demand quite dramatically.

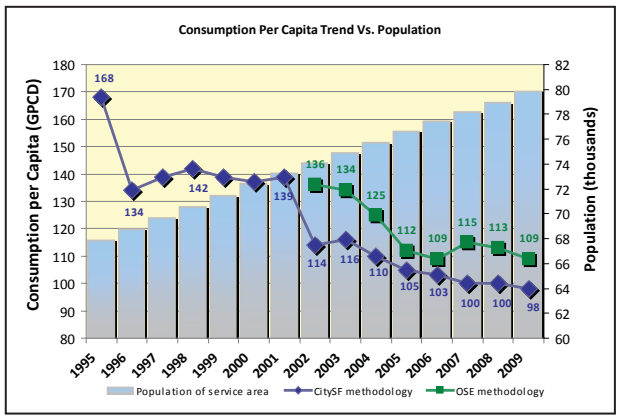

Figure 2. Demand reduction

Also, I feel that water supply planning is really important because you have to understand the beast with which you are dealing (Fig. 3). If you don't know what you are dealing with, you don't know how to solve your problems. We initiated a water supply planning process in 2003. Figure 3 is a chart from 2005 and shows our groundwater dependence and the transition zone between historical and projected use. First, you can see the huge amount of savings into the future that conserved water gives you. We will be bringing surface water online with our San Juan Chama water next year, and by using the Santa Fe River, we will greatly reduce our reliance on groundwater. We do still have a gap and I will talk a little bit about how we plan to bridge that gap. So water supply planning has been important for us.

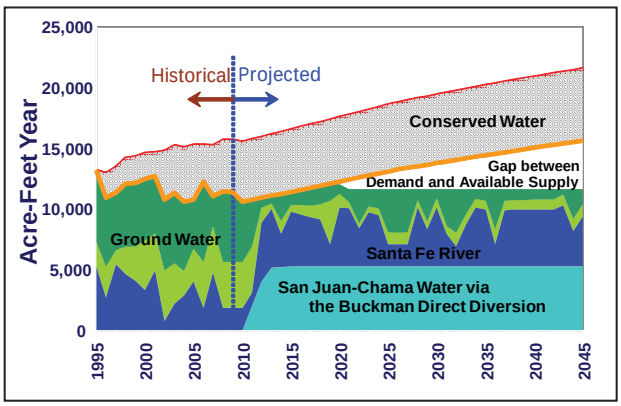

Figure 3. 2005 Water supply planning

The Buckman Direct Diversion Project, which many of you probably already know about, will allow us to use our 5,230 acre-feet of San Juan-Chama Project water. What's really key here is that right now, in a good year, we can use up to 50 percent surface water; next year and for the next ten years, we will be able to use, in an average precipitation year, around 90 percent surface water. That will be a huge change from our heavy reliance on groundwater. The other accomplishment that I feel makes a big difference for us is the management of our upper watershed. Together with the Forest Service, we thinned over 7,000 acres through mechanical and hand-treated fire reduction methods. We have reduced tree density from about 1,000 trees per acre to about 60-100 trees per acre. Obviously the reason we do that is to help protect our water supply from the vulnerability of fire. We have adopted an Upper Watershed Management Plan, received $1.3 million from the Water Trust Board to implement the Plan over the next three to five years. Part of the implementation is to look at "ecosystem services" as the mechanism to help pay for the continued maintenance of that watershed.

Finally there is stewardship of the environment, particularly, in our case, the Santa Fe River. It was declared "America's Most Endangered River" in

2007. For the last 3 years, we have been releasing or bypassing water from our water supply to the Santa Fe River (200-800 acre-feet a year). I don't know exactly where this will lead. I don't know what kind of river we may get with that amount of water, but our mayor, in particular, and elected officials and the citizens of Santa Fe, are committed to trying to keep the Santa Fe River from going dry.

So what are we going to do next? Figure 4 is a chart similar to what we saw earlier, although Figure 3 was done in 2005 and I have updated this one for 2010. We are in a very fortunate position now because of our planning work, especially the Buckman Direct Diversion coming online. Our gap as I project it, now doesn't appear until about 2030. The gap in Figure 3 was actually appearing in 2015, but the gap has now been pushed out another 15 years because of our continued conservation. It speaks so much to the value of conservation. We have the next 10 or 15 years to continue to decide on our plan. We also have breathing room to decide to do the kinds of things that we know are of value in progressive resource management, such as conjunctive use. We can use the surface water when it is available, and save our groundwater for drought and for climate change emergencies, for example. We have the luxury of looking at what we can do for our ecosystem.

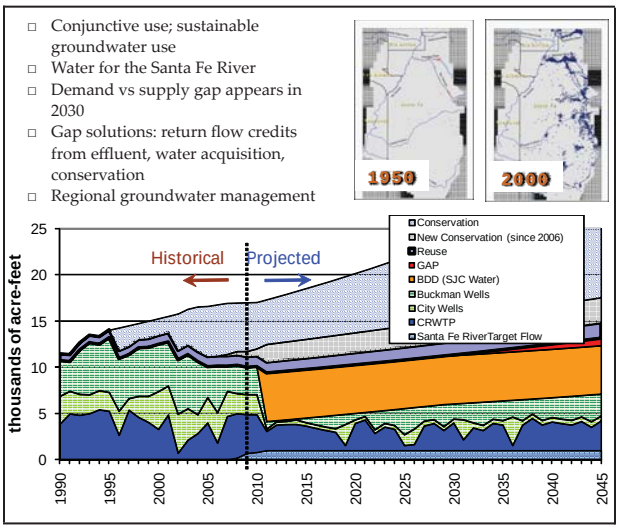

Figure 4. 2010 Water supply management

We have time to decide what the best thing is to do with our gap. The current thinking is that we can get return flow credit for some of our wastewater by sending it back to the Rio Grande and divert an equal amount. We also have a water acquisition program but it is fairly modest I think.

And we can do more conservation. Something we do have to start working on right now is regional groundwater management. The maps at the top right of Figure 4 are from our regional groundwater model and they show the amount of domestic wells that were in this basin area in 1950 versus the amount of domestic wells now in 2000. If Santa Fe and our regional partners are going through the great expense of preserving the aquifer for future use or for emergency use and drought use, then we have to figure out how to incorporate domestic wells in regional management.

We have talked about additional conservation (Fig. 5). We are considering trying to have targets of either reducing one or two gcpd targets per year over the next ten years. Storm water hasn't been discussed too much here today but obviously, it is still a resource that we need to look at and will be discussed later in this conference. A vast amount of water flows from a given thunderstorm, a circumstance that is supposed to be exacerbated by climate change conditions. Figure 6 is the Santa Fe River flowing at probably 100 cfs, 10 times its average during this period. On the right is a local arroyo that has an outfall from the arroyo Mascaras where there has been some work where the water jumps around from pool to pool, slowing it down, and allowing it to infiltrate. It is a small example of what we need many, many more of throughout the basin.

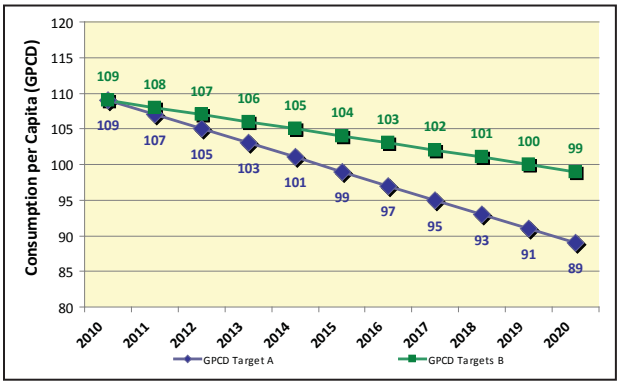

Figure 5. Possible City of Santa Fe gcpd targets

Figure 6. The Santa Fe River flowing at about 100 cfs

Another thing we have to work on now since we aren't in crises mode is to secure our water rights. I feel it is easier to plan and share if you know how much you have. We are particularly working on securing our pre-basin city groundwater rights of 4,865 acre-feet. We are participants in all kinds of settlements and agreements and want to do more of that because we feel like that is the way to go. It's been a theme you've heard here this morning. Adjudications are not necessarily the most effective way to work things out. We also monitor local water right transfers and protest as necessary.

We will continue to have and put effort into the Santa Fe River. Maybe you heard about the event that was held the Saturday before Thanksgiving called "flash flood." It was an action using art as a way to highlight the dire needs of the Santa Fe River. A couple thousand people lined up in the river and at some given cue they flipped over their cardboard from brown to blue. The photo in Figure 7 is what it looked like from satellite images, a small token of water for the river.

Figure 7. Satellite view of "mimic hydrograph"

We are currently trying to figure out how to put more water into the Santa Fe River and elected officials are considering allocating 1,000 acre-feet to the river. The tricky thing is 1,000 acre-feet does not create a sustaining living river, any more than what the art activists did. With the 1,000 acre-foot budget, we have to figure out if we want year-round flows for a short distance, do we want to have larger flows throughout the downtown but only during the summer, do we want bi-monthly pulses that allow the vegetated corridor to become more riparian, and how does the idea of mimicking a hydrograph fit into all that?

Then there is climate change: assessing, adapting, and mitigating. We need to evaluate our supply vulnerability. We acquired a 700+ year stream flow record reconstructed from tree ring data and we need to figure out how we can use that in our water planning, as well as reasonable consideration of climate change models. We need to consider how to use dual supply systems of surface and groundwater, and we need to go green. We need to reduce our own emissions. We are working on how to use our wells and our energy efficiently. I think the Albuquerque Authority has a program like that. One-third of the Buckman Direct Diversion Project electrical needs will be supplied by a nearby solar PV array. We are installing hydroelectric generators in some of our transmission lines. We need to continue our efforts to go greener with our energy supplies and use.

The last concept here is the idea of institutional evolution. How has our institution evolved in the last couple of years to accommodate our current conditions? A big one was that the City purchased the utility from a private entity, PNM, in 1995. Publicly owned water supply was a reoccurring theme that, as I look back in the documents, has been important since the 1880s when the utility was first established. Throughout Santa Fe's history, the city council and the people of Santa Fe tried to get local control of their water.

We have also set up a water bank that allows water conservation and acquisitions to go into the water bank and then either be applied toward development or resold. The City of Santa Fe is buying some of those water rights. We feel like markets are important for being able to have the water go where it needs to go, provided that growth is linked to a sustainable supply. But that is a whole other topic that I won't go into today.

So what is it that I feel the City needs to do in the future? We need to make local decisions in the context of the whole. I think Bruce Thomson talked about this too, earlier. We need to consider the concept of cradle-to-grave, which means going beyond only the cost of a project. Decisions need to consider energy impacts, economics, the food production impact, the efficiency impact, the social, the cultural, the ecosystem, and the sustainability impacts of any project or action. And it is really hard to incorporate all those considerations into making a decision.

We also need to increase intra- and inter-agency conversations. I am amazed about how often I found out about a project that's going on by the engineers who work down the hall from me, where a little bit of a conversation could provide mutual benefits. Another example is the shift at the OSE these days to have stream gaging become more of an OSE function as opposed to a USGS function. Traditionally stream gaging has been under USGS domain, but if we could all get onboard and have all stream data go to one place and have it managed collectively, I think we could all benefit.

I think we are in an era where we have an obligation to the community to include them more and to be more responsible and transparent to them. That is sometimes hard. All these things I'm suggesting take time and we all know that we are strapped for time, but we really need to evolve. We excel at technical solutions, but I think now it is the human solutions that we need to move toward. Part of that is also encouraging creativity and entrepreneurial opportunities.

Here is an excerpt from the 2000 proceedings from Nelson Cordova who gave this quote at the end of his talk. "How water problems created by generations of confrontations are addressed will depend on the ability, the vision, the compassion of persons given the awesome responsibility of coming up with solutions, but they must be resolved if we wish to live in harmony." I would just add to that part of how we do that is having those hard conversations that people don't like to have. I'm working for a municipality and we will need more water. I feel like we have been very responsible about managing and stewarding the resources we have, and if you have suggestions on how we can continue to grow and meet your needs too, we need to have that conversation. It is not about giving and taking. It is about finding the solutions together.

Thank you.

APPENDIX A

WATER-RELATED ACCOMPLISHMENTS FROM THE PAST DECADE CITY OF SANTA FE AND COLLABORATORS

Supply Management

- Provide safe, reliable drinking water supply
- Drilled additional Buckman wells to match production capability to groundwater right (3)
- Secured permanent City SF San-Juan Chama contract in 2005; previous expiration date of 2016 (3)
- Maximize San Juan-Chama surface water use via a surface water division structure, online in April 2011 (2) (3)
- Leased 3000 acre-feet/year of Jicarilla Apache tribal water rights (4)
- Initiated water acquisition program
- Cooperate with local pueblos and acequias (1) (4)
- Treated 6,000 acres of forest in the Santa Fe River Upper Watershed to reduce risk of catastrophic fire in SF Upper Watershed
- Monitor water right transfers; intervene if necessary to protect City's or the region's senior water rights; eg. Anaya, Aamodt, Hyde Park Estates (1); (4)

Demand Management

- Reused water demand (e.g. conservation, emergency and drought management ordinances) (1)
- Adopted tiered water rates

Ecosystem

- Provide for ecosystem needs: Santa Fe River, Buckman Direct Diversion operations, Santa Fe River Upper Watershed (5)
- River restoration projects

Green

- Designed and installing a 1 megawatt (mW) solar facility at the Buckman Direct Diversion
- Designed and installing a 100 kilowatt (kW) hydroelectric within the City's gravity transmission lines, which will generate about 400 kW of electricity annually

Future Supply

- Purchased water utility (1)
- Linked growth to water demand (1) (3) (5)
- Established water bank
- Completed Jemez y Sangre regional planning process (2) (3) (6) (7)
- Plan for ways to meet gap between existing supply and future needs (return flow credit, stored San Juan Chama water, relinquishment credits, water acquisition)
- Adopted Upper Watershed Management Plan to continue progress made

Fiscal Responsibility

- Received $60M from state and federal sources for water projects (1) (3)
- Adopted tiered water rates
- Increased water rates
- Cost Share with US Forest Service on maintenance of upper watershed

Measurement and Water Resources Science

- Increased understanding of water resources in our basin (OSE, USGS, NMBGMR, CitySF, SFCounty, NMED, USFS, Reclamation) (1) (3)

Sources:

People and Water, 1984 (1)

Proceeding from NM Annual Water Conference, 2000: (2) Eluid Martinez, (3) Tom Turney (4) Fidel R. Lorenzo, (5) Nelson J. Cordova, (6) Peter C. Chestnut, (7) Stan Bulsterbaum

City of Santa Fe Water Division 12/01/2010