MIDDLE RIO GRANDE WATER ASSEMBLY
POST OFFICE BOX 25862 ALBUQUERQUE, NM 87125-5862 505.454-0555

Submission to the Steering Committee

for the

Middle Rio Grande Regional Water Plan Update

June 9, 2015

Part Four

Summary of the Sixteenth Water Assembly

Summary of the Sixteenth Water Assembly

"Climate Disruption and Our Water Future

Mitigate, Adapt or Suffer: A Call for New Strategies"

Introduction

Researchers studying the 2002 drought that killed millions of pinons in the Southwest noticed that some trees fared better than others. Recently they figured out why: a genetic difference made the survivors more resistant to the hot and dry conditions. Their discovery offers the hope that foundation trees like pinons and cottonwoods, trees on which many other species depend, can be adapted to conditions in a warmer world.

Actions to mitigate global warming and to adapt to the changes already underway are taking place on many fronts, from better batteries to store solar energy to energy-conserving building retrofits. There's much more that can and needs to be done, especially in New Mexico, because global warming is going to hit our state hard. Indeed, it likely already has, as evidenced by this century's record-breaking heat, drought, fires and floods. And without bold and concerted action to reduce emissions of heat-trapping gasses, it's going to get worse. [1]

While global warming will have many social, economic and environmental consequences, in New Mexico an overriding one will be its deleterious impact on already overtaxed water supplies. That's why it's imperative that it be addressed in regional and statewide water plans.

Those plans are now being updated, but the Interstate Stream Commission, which is overseeing and coordinating the process, has said a lack of funding precludes them considering climate change consequences and appropriate responses.

We beg to differ. Enough is known about global warming's impacts in the Middle Rio Grande and other regions to do such planning effectively. In fact, the ISC laid the groundwork for such planning in a 2006 report that recommended incorporating climate change projections into strategic planning and implementing adaptive management capacity. There's no reason to wait. It's time to make global warming a priority in state and regional water plans. [2]

For our part, the Middle Rio Grande Water Assembly held a conference on March 21, 2015 to discuss some of the climate change consequences we're facing and to explore ways of dealing with them. This summary report is based on speaker-provided notes and audience comments. (See "Recent Events: Sixteenth Water Assembly" at www.WaterAssembly.org to see the conference agenda with links to speaker biographies, slides and discussion notes.) The report is intended to inform the ongoing update to the Middle Rio Grande Regional Water Plan, state agencies, and other regions that are updating their respective plans.

---

[1] The American Association for the Advancement of Science has prepared an overview of what we know about global warming and what to do about it. (See http://whatweknow.aaas.org/get-the-facts/.)

[2] New Mexico's on-again, off-again efforts at addressing climate change are documented in a Natural Resources Defense Council report. (See http://www.nrdc.org/water/readiness/files/water-readiness-NM.pdf.) The report calls on the state to create a comprehensive climate change adaptation plan.

Executive Summary

The extreme weather we've experienced of late -- record-setting heat, drought, fires, and even floods – may well be a foretaste of what global warming has in store for us.

Based on a scenario somewhere between business as usual and the agreed on (and increasingly unlikely) goal of limiting warming to 2 degrees Celsius, scientists project a reduction in average river flows of up to fourteen percent by the decade of the 30s, and up to twenty-nine percent by the 80s. While nature has occasionally imposed comparable cutbacks, these global warming-induced declines will amount to permanent changes. Natural variability will still operate but on a much lower baseline, meaning it's likely that in the future wet years will be closer to historic averages, average years like what today we consider drought, and dry years simply off the charts.

Less water will lead to degraded watersheds, as water-stressed trees succumb to insects, fire, or just plain thirst. We see this happening already with the huge number of pinons killed off by bark beetles 10 years ago and the more recent record-setting Las Conchas and Whitewater-Baldy fires. And without trees and other vegetation to hold back water at the top of area watersheds, even small storms will result in increased flooding and erosion.

When rain does come it's likely to be more intense, which will exacerbate an already difficult situation. The late monsoon storm of Sept. of 2013, a storm that led to near-record flooding and disaster declarations in 12 counties, may well have been a harbinger of what's to come.

Such storms, however, will not counter the overall trend of hotter and drier, a trend that may already be evident in the Elephant Butte Irrigation District where since 2003 annual irrigation allotments have dropped from 3 inches to half an inch per acre and groundwater levels have declined 20 feet or more.

These climate change consequences are practically guaranteed to get worse, because even if all fossil fuel emissions were to cease tomorrow the total to date has already committed us to a significant amount of warming. We're just going to have to adapt as best we can. Fortunately, there is much we can do.

Fostering resiliency – the ability to endure and bounce back from environmental stresses -- is key, and by improving the condition of our forests, fields, rivers and cities we can increase their resiliency to climate extremes. We can improve watershed health by thinning overgrown forests, and when fires do happen, as surely they will, we can mobilize for rehabilitation and prepare for post-fire flood mitigation. We can create a mosaic of habitats along the Rio Grande, and in the process establish buffers that will help cushion high water flows and protect vulnerable infrastructure. We can adopt development practices that make the most out of what little precipitation we get.

Most importantly, we can recognize that the status quo is not a viable option and that we need a new approach to water management and the governance structure for carrying it out, one that promotes collaboration over conflict. And while adaptation must focus on our most critical and impacted resource, we must also recognize – and act on – the reality that no amount of adaptation will suffice if we don't take immediate steps to keep the problem from getting worse.

We have choices: to mitigate, adapt or suffer. Let's make the right ones.

Climate Disruption and Our Water Future

Mitigate, Adapt, or Suffer

Climate change is the seminal issue of our time. It will affect everyone and everything, and because it's caused by the combustion of fossil fuels fixing it will entail wrenching changes to our economy and way of life.

On March 21, 2015 the Middle Rio Grande Water Assembly – which, in partnership with the Mid-Region Council of Governments, in 2004 developed the Middle Rio Grande Regional Water Plan -- held a one-day conference to discuss some of the water-related consequences of climate change and to explore means of mitigating and/or adapting to them. This report summarizes the conference proceedings. Our intent is that it serve as a catalyst for action in our region and statewide.

Water Assembly president **Bob Wessely** began the conference with an **Introduction** and overview of the day's agenda and background on the assembly and regional plan. After pointing out the region's importance – nearly half the state's citizens reside here and it accounts for sixty percent of the state's economy – Bob listed some of the reanclusons for updating the regional plan, including improved water conservation and known shortcomings in the original plan. He concluded by noting that the plan's climatological underpinnings were no longer valid and that we must plan for extreme and potentially unprecedented conditions.

Bob was followed by UNM Civil Engineering professor and Water Resources Program director **Bruce Thomson**, who discussed the **Technical Water Supply and Demand Situation**, how it relates to water budgets, and whether captured stormwater flows could constitute a new source of water.

The value of a water budget is that it provides a quantitative analysis of a basin's water inflows and outflows and whether the two are balanced. Scale, Bruce said, is important in preparing a water budget because what works at a household level may not work or make much of a difference on a regional or statewide scale. Using conservation and stormwater capture as an example, he observed that while it could make a difference in a household water budget where keeping the water bill low is a primary concern, at the urban level conservation can lead to decreased revenues and higher rates, while at the state level it may conflict with downstream water delivery obligations. The grand challenge, he said, lies in figuring out what changes can achieve balance in a basin's water budget, who has the authority to make changes and what the incentives are. He concluded that within a basin all water provides an important service to someone, and that there is no new water to be had.

Bruce was followed by UNM professor of Meteorology and Climatology **David Gutzler**, whose presentation was titled **Hydroclimatic Variability and Change**. David said a stable climate does not equal a static one, and he showed how five hundred years of tree ring data documented fluctuations of up to twenty percent in precipitation and river flows. (It seems that coping with large changes in water supply is nothing new in this part of the world!) Those fluctuations, however, were temporary. Global warming, on the other hand, is expected to permanently lower average river flows, and soon. Using a sort of mid-range climate change scenario under which global average temperatures increase between 3 and 3.5 degrees Celsius by 2100, David said average river flows would decrease by up to 14 percent by the 2030s and up to 29 percent by the 80s. (Mid-continent temperature increases would be double the global average.)i

Offering a brief and concise summation of the climate change problem and what it means, David, who was one of the lead authors of the most recent United Nations report on the issue, said “it’s real, it’s us, it’s bad, scientists agree, there’s hope.”

The next speaker was former NM Water Dialogue director **John Brown**, who explored some of the potential policy and management responses to climate change in a talk titled **Scarcity and Water Governance**. John’s contention was that increasing water volatility and scarcity presents the region, which is characterized by many different water users and management agencies, with a choice: a kind of anarchy where every water user, institution, agency and government pursues their own narrow self-interests (to the detriment of the region as a whole), or what he called polycentric governance, which would be based on extensive cooperation and collaboration.

The latter does not just happen, he said, but results from well-researched and documented design principles, including building trust through interaction and focusing first on shared interests.

John also recommended some guidelines for updating the regional plan and ensuring its implementation, such as committing to build on the existing plan and affirming its public welfare statement, including a comprehensive water budget and creating a coordinating body to monitor progress.

John was followed by **Melinda Harm Benson**, an associate professor in UNM’s Geography Department. Melinda’s talk was titled **A Framework of Resilience**.

The subject of resilience comes up often in discussions about climate change, and for good reason. Climate change will subject humanity to environmental conditions we’ve never before experienced. Resilient communities will be better able to withstand those environmental stresses.

Melinda discussed the role of adaptive capacity in making communities more resilient, and, when the limits of resiliency are reached, of the importance of transformability, which is the capacity to create a new system. And, according to Melinda, the concept and practice of sustainability – meeting the needs of the present without compromising the ability of future generations to meet their needs – is no longer relevant because it’s premised on conditions remaining largely the same. That’s no longer the case. What’s needed, she said, is a new paradigm for a world of continual change. A conceptual framework of resiliency can fill that need.

Five Consequences of Climate Change

Susan Rich, Forest and Watershed Health Coordinator for the State Forestry Division, led off the discussion of climate change consequences and possible solutions with a talk on **Watershed Degradation**.

Because watersheds are where our water comes from, their condition is vitally important. Healthy watersheds, Susan said, are characterized by healthy vegetation and soils, an active nutrient cycle and intact hydrology. Unhealthy watersheds are characterized by overstocked, unhealthy forests, invasive plants crowding out native ones, barren, compacted and eroding soils and a disrupted hydrology. Degraded watersheds equal degraded water quality.

Susan said we can counter watershed degradation by taking actions that maximize the function of watersheds to act as “sponges” that store and slowly release water. Keeping soils moist increases their biological activity and ability to serve as natural water filters. Forests can be made more resilient by

thinning, and biodiversity can be increased by focusing on drought and disease resistant species. We also can plan for disruptions, so that when fire does happen we're more prepared for it.

We know what to do to improve watersheds, Susan said, we just need to prioritize it. Emphasizing the connections between watershed health and the water we depend on will help garner the public and political support needed for carrying out these activities.

Michael Jenson, who works with the Bosque Ecosystem Monitoring Program (BEMP), discussed a second consequence of climate change in a talk titled **Intense Precipitation Events and Flooding**.

Michael explained that while global warming's higher temperatures and shifting weather patterns in general will lead to drier conditions in New Mexico, when it does rain it's more likely to come in the form of a downpour because the atmosphere will be carrying more water vapor due to increased evaporation. A recent possible example of that phenomenon, he said, was the September, 2013 storm that rolled through Albuquerque and produced near-record river and areal flooding and led to a disaster declarations in twelve counties.

Fortunately, ongoing Rio Grande restoration and Silvery Minnow projects helped slow and disperse the storm's flood waters, greatly lessening their impact. The lesson, Michael said, is that we need to do more to prepare for the future, and he cited projects such as the Rio Grande Water Fund, the Valle de Oro site plan, and the Albuquerque/Bernalillo County Water Utility Authority's rainwater harvesting pilot program as examples of the kinds of things we need to do. He also recommended the use of something called a Vulnerability Assessment Tool (VAST), for identifying vulnerable infrastructure and other assets so that steps can be taken to safeguard them.

J. Philip King, professor and associate department head with NMSU's Department of Civil Engineering, examined the third and fourth consequences of climate change in a talk on **Drought and Surface Water Shortages and the Decline of Groundwater Flows**.

Phil's essential point was that the cycle of drought, which increasing temperatures have certainly made worse, amounts to a death spiral for the state's major agricultural district.

Making liberal use of charts and graphs to prove his point, he documented the dramatic decline in Elephant Butte Reservoir's water storage and distribution since the onset of drought in 2003, as well as in groundwater levels, which many farmers have turned to in a desperate effort to maintain production and protect their investment. Those efforts ultimately are doomed to fail, Phil said, because of the positive feedbacks that lead to ever-decreasing water supplies, water quality and mounting costs.

Turning to a discussion of the fundamental law governing use of the river, the 1917 Rio Grande Compact, and noting that climate change was not considered when the Compact was authored, Phil said climate change will lead to persistent Elephant Butte Project shortages, and may lead to continuing Compact shortfalls as well.

Prospects are better for the region's booming border and its municipal and industrial water users, assuming nascent plans for a binational desalination plant get off the ground, but the only certainties, Phil said, is that the status quo is no longer an option and that understanding the dynamics of drought and climate change are critical to adaptation.

Kim Eichhorst, BEMP co-director and UNM research associate professor, addressed the fifth consequence of climate change in a talk titled **Ecosystem Degradation**.

The Rio Grande, Kim said, has been altered significantly from its natural state by human intervention. To control flooding, provide water for agriculture and make land available for development, we've dammed it, straightened it and forced it into a single channel. As a result of these and other changes fire danger is increasing, groundwater levels are declining, and up to ninety-nine percent of the river's historic wetlands have disappeared. The loss of the river's natural mosaic of habitats, Kim said, equals a loss of resilience in the face of drought and changing climatic conditions.

Kim said efforts have been undertaken in recent years to undo some of the damage and that the results are encouraging. At sites where flooding has been reintroduced, for example, native trees and shrubs are out-competing the invasives that formerly dominated.

To increase ecosystem resilience, Kim said, we need to recreate the river's mosaic of habitats. As is the case with improving watershed conditions, we already know a lot about what to do and how to do it. We just need to make it a priority.

Conclusion

Climate change is fast emerging as THE major driver of increasing water scarcity and declining water quality, and addressing it is something we can't afford to put off any longer. Water planning or any other activity that fails to take it into account is pointless. We need to take immediate steps to mitigate the problem to keep it from getting worse, and to adapt the inevitable changes that already are underway.

To restate David Gutzler's assessment of climate change, it's real, it's us, it's bad, and scientists agree. Most importantly, there's hope, but only if we cast aside the denial and false hopes that so far have prevented meaningful progress.