New Mexico Decision-Makers Field Guide No. 1

Water, Watersheds, and Land Use in New Mexico

Impacts of Population Growth on Natural Resources

Santa Fe Region 2001

Peggy S. Johnson, Editor

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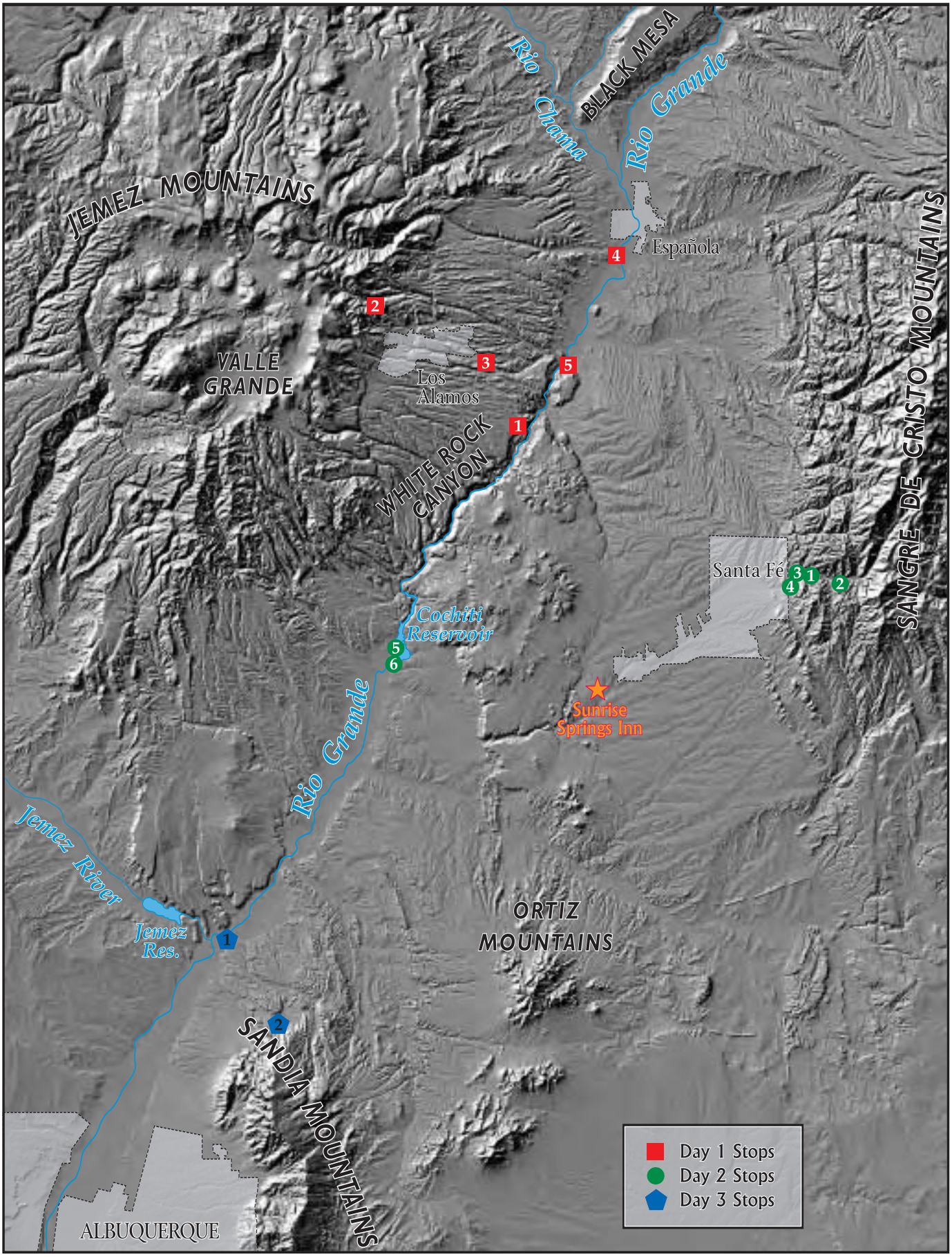

An Introduction from the State Geologist

by *Dr. Peter A. Scholle*, Director, New Mexico Bureau of Mines and Mineral Resources and State Geologist

Welcome to the inaugural Decision-Makers Field Conference, the first of a series of annual meetings dealing with geoscience issues in New Mexico. These conferences are designed to provide New Mexico decision makers with the opportunity to see, first hand, the influences and impacts of natural phenomena and human actions on our resources and landscapes. This year's meeting, on water and watershed issues in the Santa Fe–Los Alamos region, highlights some of the most important and contentious issues for New Mexico's future. Ecologists commonly speak of a limiting nutrient—the single element that controls the size of a species' population. Iron, phosphorous, and nitrogen are common limiting nutrients for plants, which is why we often apply these materials in our gardens as fertilizers. In a broader sense, water is the limiting nutrient for humans in this region. Essential for agriculture, for domestic needs, for many industrial processes, and for sustaining the natural flora and fauna of the state, water is our "life blood" (often and accurately summed up in the Spanish phrase "agua es vida").

How to deal with the conflicting demands of the many and rapidly increasing users of water is a social problem that you, New Mexico's decision makers, must wrestle with constantly. The major points of this field trip, however, deal with the science that lies (or should lie) behind those decisions. We will try to present the most up-to-date information from the state's scientific community; to show how that community agrees or disagrees on basic facts and principles; and to show that we can and should be a valuable resource for decision makers. The trip is specifically NOT designed to lobby for any point of view or pending legislation. Rather, it is an educational effort to show what is known, what isn't known, and perhaps what should be known in order to make rational decisions.

Non-scientists often expect scientists to fully agree on the "facts" that underlie societal issues and are surprised and dismayed when that is not the case. Thus, a goal of this conference is to show the reasons for those honest disagreements. Science after all represents a method for gathering knowledge, setting up and testing hypotheses and theories, and working ever closer toward a full understanding of the world around us. It is a complex world, however, one filled with multifaceted interactions in which information gathering is not always simple. Some things are easy to measure and understand, whereas others are not. We can easily measure rainfall and produce information on distribution of rain throughout the state, but it is much more difficult to predict future climate change and how it might affect water supplies. We know how much rain hits the ground, but how do we measure how much evaporates, how much is taken up by plants, how much descends as ground water, how fast and where such ground water moves in the subsurface, and when and where it picks up pollutants? We will need to do hundreds of detailed studies in many different areas before we can answer most of those questions, and the most complex of them will almost certainly defy answer in our lifetimes. Often we think we know the answer, but additional data will surprise us and cause substantial changes in our conclusions. Thus, part of the purpose of this conference is to help us all to "know what we know" as well as to "know what we don't know." That, too, is a fundamental process of science.

We should also recognize that, whether we like it or not, we either manage or greatly influence most things in nature. Earthquakes and volcanic eruptions remain beyond man's control, but most other processes do not. Our fire suppression and forest management policies, predator-control activities, agricultural practices and other land-use measures, our diversions of natural water supplies, and our urban growth patterns all profoundly affect natural systems. If we are going to influence the world around us so substantially, we should at least understand how and why that is happening so that we can make rational decisions on management plans. That will also be a focus of this conference.

One more thing is on the agenda—providing realistic solutions to the problems we discuss. For many of the issues that we tackle in this conference, we will attempt to present potential solutions that make scientific and technical sense. Whether these solutions can be worked into the complex political realities of New Mexico is your call. But we will strive to show that with careful planning, workable solutions (or at least approaches to solutions) are indeed possible.

Making this conference happen was no small organizational feat. We are deeply grateful to the many financial sponsors listed on the credits page; we are equally grateful to the many speakers and to the agencies that allowed them to speak and covered their expenses. The organizing skills of Peggy Johnson, Paul Bauer, and Susie Welch of the New Mexico Bureau of Mines and Mineral Resources will be clear throughout; the help of many others, from the bureau and from other agencies, may not be as immediately evident, but was critically important. We are very grateful to them all!

We ask of you, the attendees, only that you participate fully—ask hard questions of the speakers, contribute to the discussion, enjoy the entertainment, and when all is done, give us your honest opinions on what worked well and didn't work—so that we can make next year's conference even better and more useful to you.

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Peter Scholle has had a rich and diverse career in geology: 9 years of Federal governmental work with the U.S. Geological Survey, 4 years directly employed by oil companies (plus many additional years of petroleum consulting), 17 years of teaching at two universities, and now a career in state government at the NMBMMR. His main areas of specialization are carbonate sedimentology and diagenesis as well as exploration for hydrocarbons in carbonate rocks throughout the world. He has worked on projects in nearly 20 countries with major recent efforts in Greenland, New Zealand, Greece, Qatar, and the Danish and Norwegian areas of the North Sea. A major focus of his studies dealt with understanding the problems of deposition and diagenesis of chalks, a unique group of carbonate rocks that took on great interest after giant oil and gas discoveries in the North Sea. His career has also concentrated on synthesis of sedimentologic knowledge with the publications of several books on carbonate and clastic depositional models and petrographic fabrics. His wife and he have published numerous CD-ROMs for geology, oceanography, and environmental science instructors, and they currently are developing computer-based instructional modules and expert systems in carbonate petrography.

What Are the Challenges?

by *Dr. Frank B. Titus*, Middle Rio Grande Water Assembly

As Peter Scholle states in his introductory remarks, this Decision-Makers Field Conference focuses on the science that lies behind socio-political, water-related, and environmental decisions that you, the decision makers, will ultimately make. I suggest to you that your decision process is unavoidable; decisions will be made either by action on your part or by non-action. In fact the process rolls on as we speak and meet.

In this article I offer my perceptions on what the scientific realities of New Mexico's water future are likely to be. Obviously, this goes beyond science. Scientific reality in this process gets mixed with elements of politics, water management, philosophy, state law, and speculation about future conditions. So be it. Two points that I have made freely and often are: (1) the time to proactively take hold of the decision process is now, not later; and (2) we already understand the workings and complexities of our water systems quite well enough to make smart fundamental decisions.

What kinds of decisions are needed? Simple: How we are to manage our water resources in the future. Up to now we have been demanding that a Rio Grande water resource, which is of fixed and finite size, supply our ever more-expansive water needs. Because the natural flow of the river could not do it, we've imported water from the San Juan–Colorado River system that New Mexico owns and we've dramatically mined our ground water—in essence drawing capital from our savings account and spending it.

The Current Reality

For the past three decades we have been able to meet water-delivery requirements of the Rio Grande Compact at Elephant Butte Dam for three main reasons: (1) precipitation and runoff of native water in the Great River has been above average; (2) 96,000 acre-ft/yr average of water is brought out of the San Juan River headwaters and added to the Rio Grande system through the San Juan–Chama Diversion Project; and (3) the city of Albuquerque has been mining up to 120,000-plus acre-feet of ground water per year, evaporating half of it, and adding the remainder to the flow of the Rio Grande.

Nevertheless, the reality is that we are depleting from the river all of the water we are permitted under the compact, and there is no way we can force any change to that compact. Add to that three additional realities: (1) it is unlikely we will find any more water to import; (2) as we mine ground water in our river valleys the aquifers demand payback in the form of induced seepage out of the river (instead of seepage into the river that was the pristine process); and (3) droughts happen in New Mexico with some regularity. We dare not ignore droughts. Some are long and general; some are short and local; but they always come. The infamous one in the 1950s, quite within the memory of older residents, was severe, but we know of others in earlier centuries that were as bad or worse.

This discussion should force us toward the conclusion that if we are to live within our means, we must do it through a process of learning to manage better what we already have. We clearly have some decisions to make.

Some (but not all) Questions for the Future

Here, just to keep us flexible and somewhat humble, I'll toss in a near-random mix of questions that we'll have to answer sooner or later. There are many more where these came from. I'll leave the task of answering them to you in some future (possibly near-future) time. (Note that these are all reality questions, and some of my prejudices may be on display in them.)

- How Can We Keep the Rio Grande from Being Put in a Concrete-lined Channel?
- When the river fails to supply enough water to make compact deliveries below Elephant Butte Dam, what should we do?
- What would Santa Fe do if its reservoirs in the Sangre de Cristos Mountains were unusable? (Say from a fire, a priority call on the water, or for any other reason.)
- We've been cutting salt cedars for five decades then watching them grow back in a few years; will we get frustrated enough to find some truly innovative solutions?
- In recent years Elephant Butte Reservoir has been losing nearly 200,000 acre-ft/yr of water to evaporation; why aren't we searching for ways to reduce this?
- Should farmers' water rights be the only place we look for added municipal supplies?
- If litigation is used to define New Mexico's water future, will we all be sorry? (Court decrees produce winners and losers, not fair, balanced, complex tradeoffs.)
- Should acequias be included in the protection of water rights from being sold out of their service area?
- Why aren't state representatives having direct discussions with the Indian pueblos over ways to define Native American water rights?
- Are thinking people not aware that on the middle Rio Grande we will be forced to decide many water-rights and water-management issues before adjudication can even begin, much less finish?

Priority Calls—A Toothless Ultimatum

Let us hypothesize—for the purpose of illustrating a crucial point—a serious water debt at Elephant Butte Dam. Let's say we accrue a compact debt that is two and a half times the maximum debt that is permitted (as actually happened in 1956). What could we do? In simpler times past, when our laws were written and we only used surface water, the state engineer could issue a priority call, shutting down junior water right holders, and leaving more water in the river to flow to senior right holders downstream. Tough. But everyone understood how it worked.

Today a priority call in the middle Rio Grande valley would be quite impossible. To put it pithily, it would be both worse-than-useless in the short term and stupidly impolitic. The junior water rights on this reach of the river are mostly rights to pump ground water by the cities of Albuquerque and Rio Rancho, whereas most of the more senior rights are for surface water for irrigation. The cities' cones of depression, those that suck water out of the river, developed during decades of pumping the wells. The cones are extensive, coalesced, and deep. Shutting off the pumps would not reduce water loss from the river until the cones at least partially filled back in with water, possibly taking years. But shutting off the pumps would be even worse than useless, because it would stop the flow of mined ground water, through circuitous city routes to the water treatment plant and ultimately back to the river. That's the useless part. It would actually stop this contribution to the river. The impolitic part is that it would be unimaginable for the state engineer to try to shut down the only water supply of the people living in the largest metropolitan center in the state.

Santa Fe would fare no better in this totally improbable scenario. A priority call might well require that water stored behind Santa Fe's two dams in the Sangre de Cristo Mountains be drained into the Rio Grande. And so far, years of discussion have failed to produce any way for Santa Fe to get its San

Juan–Chama water from the river to the people.

What Are We Doing Now to Help Ourselves Later?

Fortunately, in spite of general nervousness over whether a drought might be in the offing, there is no water crisis right now, and New Mexico had a credit of about 170,000 acre-feet at Elephant Butte Dam in its water-delivery account at the end of 1999 (Annual Report of the Rio Grande Compact Commission). Wonderful news.

But during this period of calm, are we doing anything to help ourselves in the future? The answer isn't encouraging. Well, we are talking more and more about water, and that's healthy. The legislature last year was fairly generous in providing funding for the Office of the State Engineer and the Interstate Stream Commission. And a useful study was completed last year that compiles water data for the middle Rio Grande valley so it is more widely available. But did we make progress in heading off water crises in the future? Not much that is of substance, I'm afraid.

Vision? What Vision?

What is our vision for our state's water future? Where are we going? What are our aims and goals? What are our specific problems? And what are our future water priorities? Should our future priorities be the same as those of our past? Why is no one asking, or attempting to answer, these questions?

The following words summarize the official interpretation of the authority granted to the Office of the State Engineer and to the Interstate Stream Commission by state laws and the constitution. The state engineer "…is charged with the administration of the rights to use New Mexico's water, which the state's constitution declares to be the property of the public. As Secretary of the Interstate Stream Commission, [the state engineer assists] that body in investigating, protecting, conserving, and developing the stream systems of the state. The goals of [the Office of the State Engineer] have not changed since the offices were created…." (OSE/ISC 1998–1999 Annual Report, p. 4.)

Notice that nothing is said about planning for the future. Neither is it suggested that there be "management" of the state's water resources. Much of New Mexico's water laws, I am told, were written in and around the 1930s. The statements above seem to place us near the core of the reasons that few proactive moves are apparent in state government to bring New Mexico's control of its own destiny face-to-face with the wet-water shortfall looming in the future. The apparent resistance to change probably stems both directly and indirectly from a political climate reflecting fear of any change among many of the state's water-right holders.

The Way Out

One—and only one—path leads out of this complex, and that is to begin proactively planning for what we New Mexicans want our future to be. In the absence of an explicit plan, how can order be brought to the present arena wherein actions range from uncoordinated individual initiatives to unspoken acceptance of the no-action philosophy? Here is a task for you decision makers. You can begin to insist that planning must start now.

Here is how your insistence might be played out. The Interstate Stream Commission should be given explicit instructions by the legislature and the governor that it is to begin the process of developing a State Water Plan. At a minimum this new plan should be based on or incorporate:

- A comprehensive, balanced review of all existing state water laws and regulations
- A recommitment to the basic principle of priorities: first in time is first in right
- Introduction of the concept that the state's waters are to be managed (not just administered) for the benefit of all
- Recognition that physical conditions governing exploitation of ground water and surface water differ, hence priority enforcements cannot be identical for the two
- A workable concept of "public welfare," to replace the present undefined generality in water law that is so universally ignored
- Making conservation an incentive-based concept for all, but especially for agriculturalists

This is just a start, and most is process, not the plan. There will be a great deal more to it than is outlined here. But once started, maybe it will develop momentum of its own. One thing is especially important: it must explicitly be funded. This activity must not allow itself to be bureaucratically buried by those who would use the excuse that it was not funded.

There remains one critical central question, and it is this: What vision should guide development of the State Water Plan? The issue of where we need to go is, in my view, easy to address. In the following paragraphs of this guidebook introduction, Lisa Robert summarizes a statewide poll of New Mexicans on their understanding, their values, and their preferences about water (UNM Institute for Public Policy). You will find our citizens' opinions on water fascinating for their wisdom and for their usefulness as we plan for our future. The most obvious answer to the vision question is that we should go where the citizens of New Mexico want us to go. Thus, the guiding principle for defining our vision and our aims should be to ask the people (not their agents, not the marketplace) what they want New Mexico to look like 50 or 100 years from now. They have already given us an opening view of a vision that is thoughtful, workable, and might even help preserve our quality of life.

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We New Mexicans have an opportunity right now to plan intelligently for our water future, adjust our water management to the hard realities of today and those of the predictable future, and perhaps to mitigate some of the hugely costly conflicts that loom in the future. We should not ignore the many wake-up calls we've received, not least of which is our lawsuit loss to Texas on the Pecos River, which has cost more than $85 million since 1988 (State Engineer/ISC 1999–2000 Annual Report, p.10–20), and it isn't over yet.

A New Mexican Perspective on Water

by *Lisa Robert*, Editor, New Mexico Water Dialogue

In the spring of 2000 the University of New Mexico's Institute for Public Policy conducted a statewide survey on attitudes and preferences about water issues. The institute, which generates a Public Opinion Profile of New Mexico Citizens twice each year, polling a state and a national sample each fall and a New Mexico sample in the spring, surveyed a random sample of 1,391 state residents—including 589 residents living in the middle Rio Grande survey area—on a variety of water-related topics. At the same time, under a contract with the Middle Rio Grande Council of Governments, the institute administered the same survey to an additional "over sample" of 567 residents in Sandoval, Bernalillo, and Valencia Counties. The survey results offer some useful and perhaps surprising insights into the New Mexican psyche.

Survey questions were roughly divided into four categories: general views about water and the environment, knowledge and perceptions about water issues, personal values in relation to water, and water policy preferences.

Asked to agree or disagree on a scale of one to seven with statements about water and the environment, statewide residents gave top billing to the importance of "coming to an agreement soon on a plan for managing our water to avoid increasing conflict over water in the future." Next they agreed that "keeping water in rivers to provide a green corridor and protect habitat for wildlife and vegetation is important." The third statement with which residents strongly concurred was that "farmers shouldn't be put out of business just so cities can grow." At the other end of the scale, those questioned did not feel that water is too complicated a subject for the average person to have "much say in how to manage it well." Neither did they believe that "farmers waste a lot of water irrigating fields," or that things will "work out" even if New Mexicans can't agree on how to manage the state's water.

Respondents were asked to rate the importance of several specific water issues. At the top of everyone's list was having quality water for drinking and bathing. This was followed (in decreasing order of importance) by keeping enough water in the river for vegetation and wildlife, the increasing rate at which we are mining ground water, the imbalance between economic growth and available water, New Mexico's needs versus Rio Grande Compact obligations, attracting high tech industries, and maintaining residential lawns and gardens.

Asked to choose among various water uses, state residents ranked indoor household use first, irrigation for farms second, and providing food and refuge for fish, birds, and other animals third. Residents in the middle Rio Grande survey area placed preserving the native cottonwood bosque above water for irrigation, but ranked irrigation for farms slightly above providing food and refuge for birds, fish, and other animals. Second tier choices for both groups included use for new housing, cultural and religious uses, recreation, community parks and sports fields, and new industry. Water uses given the lowest ranking were existing landscaping, outdoor use for new development, golf courses, and private swimming pools.

In their replies to questions about specific policy issues, around 74% of respondents in the middle Rio Grande survey area and 70% of respondents in the rest of the state indicated they would rather keep more water in the river between Cochiti and Elephant Butte Reservoirs to protect the bosque than to use it to promote jobs and economic growth. More rural residents than urban dwellers favored leaving water in the river. More than half the residents (both in the middle Rio Grande survey area and statewide) strongly agreed with the idea that development should be "contingent on demonstrating that a long term water supply is available." More than half of those surveyed agreed that all water use should be metered. They also agreed with requiring limits on water use and setting rates so that the biggest users pay the highest rates. Opinion was mixed on the question of raising the price of water for all businesses and households. Seventy percent of the "rest of state" respondents and 65% of middle Rio Grande survey respondents felt we may be entering a period of extensive drought. A majority felt Indian and non-Indian water rights should be treated the same when developing water management plans. Finally, respondents were largely opposed to the buying and selling of water rights, and specifically to transfers away from the community of origin.

Some Conclusions

New Mexico is a desert state, and green space—whether agricultural lands or ribbons of riparian vegetation along precious waterways—provides respite for all who live here. In other places, farming, riparian, and endangered-species needs are perceived to be mutually exclusive, but New Mexicans are beginning to comprehend the connective tissue between those water uses.

John Brown, one of the principal authors of the IPP survey, offers this thought: "New Mexicans appear to value more than personal income growth and the creation of jobs—the kinds of things we've come to associate with development. There are cultures in this state that basically say, "appreciate what you have." They recognize that if they do some of the stuff that everybody says is important, they'll lose what they have that is important. Thanks to both Native American and Hispanic traditions, New Mexicans apply a different weighting system to things than people do in other places. And it's not only those who are native to the state—it's people who come here and buy into the philosophy. There's just another set of values at work here. Seeing environmental and social values consistently set above economic values in the survey suggests this about us."

To obtain a copy of the survey, contact the MRGCOG at 247-1750, or visit the MRG Water Assembly's web page at www.waterassembly.org.

(This article was adapted from "A New Mexican Perspective on Water," New Mexico Water Dialogue, April, 2000.)

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Robert grew up in the Rio Grande valley, and spent her childhood riding horseback on its ditches, drains, riverbanks, and mesas. A basic geology course at UNM (back when continental drift was a hotly debated subject!) attuned her to the endless stories New Mexico's landforms tell. As a storyteller herself, she is in awe of their message: nothing is permanent, and the story is never finished.