12.10. QUANTIFYING FUTURE WATER DEMAND

12.10.1. Introduction

A basic question to be answered in regional water planning is "what is the region's projected water demand?" Often that is answered by projecting population trends, recognizing population to be a driving force. Future demand can be a function of future activities. For example, if paving Highways 550 and 26 brings more tourism to the subregions, the water usage may well increase. Visions of how a region might grow are important considerations in projecting future water usage. Scenarios were created by teams in each watershed envisioning how it might look in 50 years (see Section 3 for more discussion on Scenarios).

Population increases, likely as they are to occur, will increase demands on water. Since all of the water is allocated, and demand exceeds supply already, over and above conservation measures from what sector or location will that water come? In order to best plan for increased demands, population trends also play an important role. From where might the population increases come? What types of usage might they be able to have? Will those be different from today? What types of tools might need be used today in order to arrive at that future goal? If the population increases are happening elsewhere, what additional measures might be necessary for local water plans to meet their missions and goals?

Future water use projections are necessary to show the need for the water in the region. A common practice is to estimate future water demand based upon recent levels of water use and population growth. Many subregional water planning participants questioned the rationale of *having* to grow merely to shown a need for water in the future. Anecdotal evidence is that current supply does not meet current demands. The lack of water for *acequias* and the need of communities to already augment their supplies buttress this. Given that there has been a "shortage sharing" agreement on the Río Jemez for several years, the sense was that that alone should indicate the lack of extra water to send downstream to other users. Additionally, the Pueblos and non-Pueblo residents in the subregions do not have the *per capita* water usage that residents in Albuquerque and elsewhere have -- so that curtailing that usage further could create hardships. Concern exists that pumping downstream and transfers from the Río Jemez are already affecting the water table and long-term viability of several communities. The rallying cry, especially in the Río Jemez, was to retain the water so it would be available in the future in the subregion so that the residents can plan for and use it wisely.

12.10.2. Projections

An initial attempt has been made to project water demand to the year 2050 based on current water use and estimated growth. Two other avenues are proposed to be utilized, with the caveat that these all need more baseline information and more analysis. Given the paucity of data for the subregions, applying any of the conventional formulas will not provide an accurate

projection. Perhaps when the results of new studies, some which have already begun as part of the *Abousleman* settlement (see Section 13 for details) are available, projections based upon other criteria will be possible, enabling the region to better plan for the management of its water. For now, the assumption was made that current water demand equals current water supply.[1]

12.10.2.1. Based upon subregional population trends

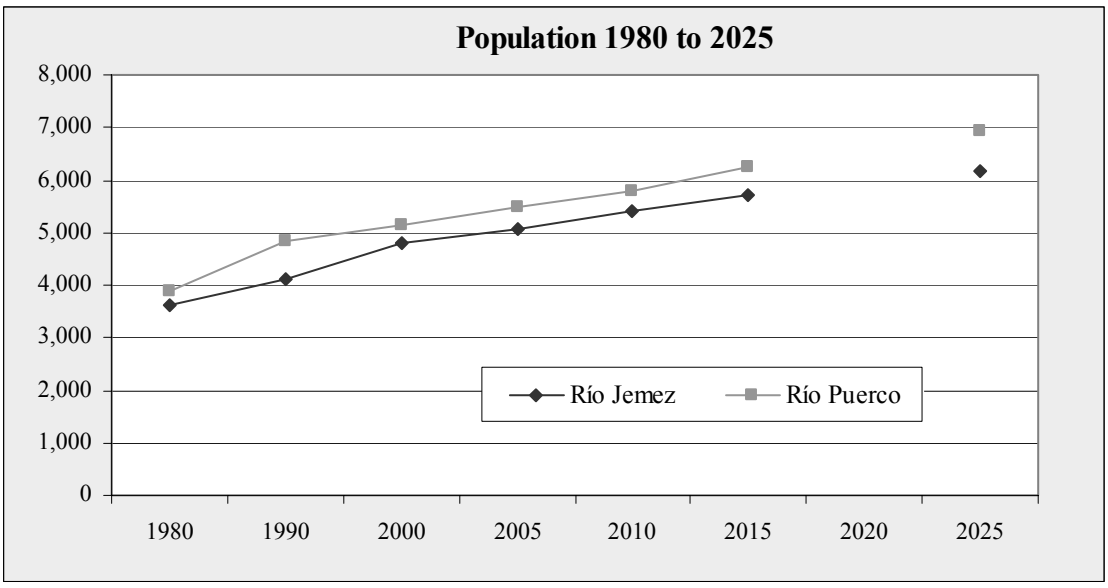
Population projections are a science, applying various methodologies. A discussion of several methods is set out in the appendices. Population projections to 2025 for the data analysis sub-zones (DASZs), discussed in Section 9, have been prepared by the Mid-Region Council of Governments (MRCOG) and are shown in Table 12.10-2 and Figure 12.10-1.

Table 12.10-1 Subregional Population Trends and Projections, 1980 to 2025

	1980	1990	2000	2005	2010	2015	2020	2025
Río Jemez	3,605	4,129	4,805	5,078	5,392	5,726	--	6,177
Río Puerco	3,877	4,846	5,153	5,495	5,787	6,254	--	6,922

Source: US Census Data, 1980, 1990, 2000; DASZ Projections, Mid-Region Council of Governments, January 2003

Figure 12.10-1 Subregional Population Trends and Projections, 1980 to 2025



[1] While the imprecise data included in the Sections on Water Use and Water Supply may not show this result, the lack of water for *acequias* and the need of communities to already augment their supplies do. As with the other data needs for the subregions, specific data was not readily available for this section. Typical of instructions as to how to proceed is this relevant excerpt from a memo dated March 13, 2003 from Mike Trujillo, then Administrative Services Director of Mid-Region Council of Governments, stating that "[i]t is not impossible to complete a plan for management of water resources in any given area if you assume that future water supplies may be limited, population and development may increase the demand for water, and water resources may be vulnerable to contamination. Therefore, the Plan should be focused on implementing water use efficiencies, drought contingency planning, water pollution control, protection of watershed recharge areas, etc." (correspondence is found in appendices)

According to this projection, both regions will grow by approximately twenty-five percent in the next twenty-five years. Current water use is shown in Table 12.10-2, being a summary of water use in the two watersheds from Section 8.

Table 12.10-2 Water Use for Río Jemez and Río Puerco in 2000 (acre feet)

Category	Rio Jemez			Rio Puerco		
	Total Withdrawal	Total Depletion	Total Return Flow	Total Withdrawal	Total Depletion	Total Return Flow
public	209.48	84.64	124.84	150.98	75.49	75.49
domestic	258.62	258.62	0.00	256.08	256.08	0.00
commercial	77.99	77.99	0.00	3.54	3.54	0.00
industrial	0.00	0.00	0.00	0.00	0.00	0.00
mining	3.00	3.00	0.00	1.40	1.40	0.00
livestock	163.49	163.49	0.00	334.93	334.93	0.00
agriculture	4,566.00	1,821.00	2,745.00	5,733.00	2,303.00	3,430.00
Totals	**5,278.58**	**2,408.74**	**2,869.84**	**6,479.93**	**2,974.44**	**3,505.49**

Note: Does not include Jemez Reservoir evaporation or riparian & open water usage in either watershed.
Source: Table 12.8-9 and Table 12.8-17, based upon Wilson, "Water Use by Categories in New Mexico Counties and River Basins, and Irrigated Acreage In 2000," Technical Report 51 (2003), New Mexico State Engineer Office, Santa Fe, NM.

Future water use is calculated by multiplying the total amount depleted in 2000 in a linear fashion to the increasing population within the two watersheds, as shown in Table 12.10-3.

Table 12.10-3 Projection of Water Use in Río Jemez and Río Puerco 2000-2025 (acre feet)

		2000	2005	2010	2015	2020	2025
Río Jemez	Population	4,805	5,078	5,392	5,726	--	6,177
	Water Use af	2,409	2,545	2,703	2,870		3,096
Río Puerco	Population	5,153	5,495	5,787	6,254	--	6,922
	Water Use af	2,974	3,172	3,340	3,610		3,996

Source: Population Projection from Table 12.10-1 (MRCOG); Water Usage in Table 12.10-3 (Wilson)

If the water usage and population projections were mature enough to use, then they could be applied for certain purpose such as:

> (1) Public Water System Demand - Demand for public water systems could be calculated by multiplying population figures by a weighted average gallons per capita daily rate [2]

[2] Region 6 did this, concluding that 203 gpcpd would be assigned to Cibola County and 136 for McKinley County (Wilson, 1997; see Appendix V - B of Region 6's Report for calculations). Of further note, this was done using both BBER-derived population projections and community-derived population projections.

(2) Domestic Self-Supplied Demand - Demand for domestic self-supplied use could be calculated by multiplying population figures by a given rate of gpcd.[3]

An assumption could be made that all other uses would stay at the same levels if not increase, even with conservation practices implemented. This would provide another rough estimated total projected water demand.

Prior to making such calculations, a number of caveats should be kept in mind. As noted in Section 9 on Population Yesterday and Today, growth seen in the subregions does not seem to have been adequately portrayed. Likewise, the water use data is not complete, as discussed in Section 8. Certain uses --such as riparian and open water-- are not included in Table 12.10-2 and thus in the linear projection. Before being projected, such data really needs to be more robust, or such deficiencies will be compounded. Another important component would be to know from where the growth is coming and might be coming. As growth occurs, water may be transferred from one use to another rather than use increase, which is not captured in the above projection.

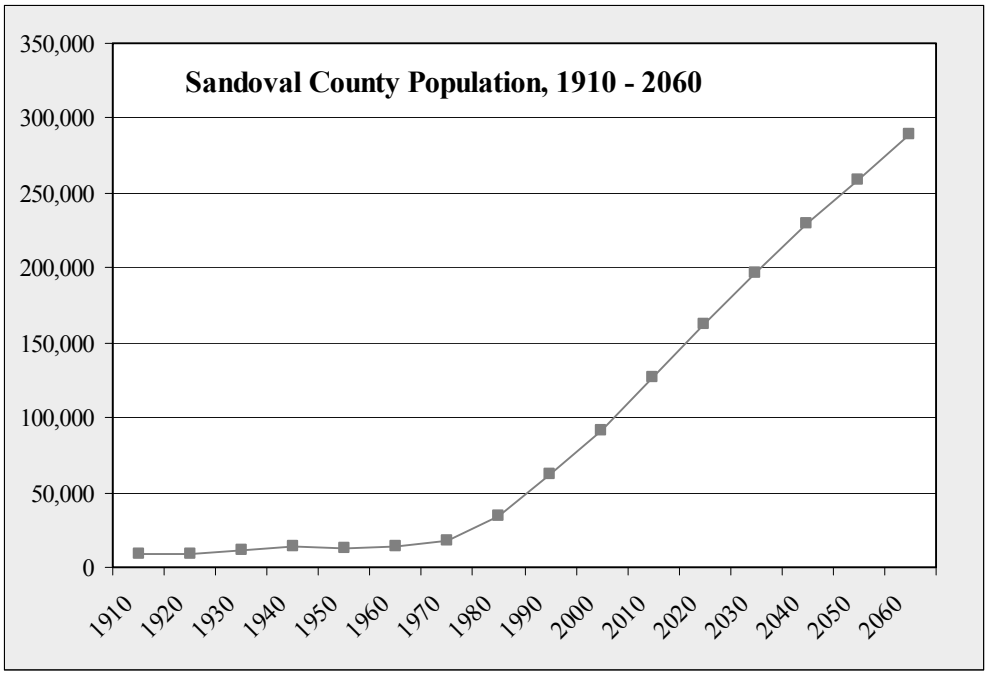
12.10.2.2. Based upon regional population trends

Not only are there new uses and users in the subregions, but growth along the Río Grande Corridor presents challenges to the subregions, particularly the Río Jemez. While outside the subregions, these additional demands will continue to put pressure on them.

According to the MRCOG projections --DASZs from 2000 to 2025--, the population for Rio Rancho will increase from 52,282 in 2000 to 114,979 in 2025, or more than double. For the Interstate Stream Commission, BBER calculated population trends and projections to the year 2060 for counties in New Mexico. As shown in Figure 12.10-2, Sandoval County population quintupled from 1970 to 2000 and is projected to more than triple by 2060, to approximately 290 thousand people, as shown in Figure 12.10-2. During this same time period, Bernalillo County is projected to increase from the 2000 population of 558,437 to 819,024 in 2060. In 1970, Sandoval County contained 5% of the three-county population. By 2000, that had become nearly 13%. By 2060, it is estimated that Sandoval County will contain over 22% of the regional population. Furthermore, the ongoing trend from rural to urban is expected to continue. Whereas the three counties have roughly 39% of the State's population now, they will have 41% in the next thirty years. Figure 12.10-3 graphically illustrates the increased population density and its location to 2050.

[3] Region 6 used the OSE-supplied rate of 70 gpcd. Of further note, this was done using both BBER-derived population projections and community-derived population projections.

Figure 12.10-2 Population Trends and Projections in Sandoval County, 1910 to 2060



Source: Alcantara (BBER), 2003

Applying the water usage for Sandoval County, discussed in Section 8, with the above BBER projections, water usage within the County would triple as shown in Table 12.10-3.

Table 12.10-4 Population Projection and Water Use for Sandoval County, 2000-2060 (acre feet)

Sandoval County	2000	2010	2020	2030	2040	2050	2060
Population	90,775	126,216	162,112	196,538	228,929	259,321	289,258
Water Used (af)	44,935	62,479	80,248	97,289	113,323	128,368	143,187

Source: BBER Population Projections (2003); Wilson, (2003).

This projection is to show what could occur should there be no reduction in usage, nor transfers from one usage to another. Given that the Middle Rio Grande is over-allocated, the likelihood is small that this will occur. More likely is that transfers will take place. While some transfers will come from water users within the Rio Grande Valley, it is likely that some will also come from the subregion as well.

Being at the confluence of the Río Jemez and the Rio Grande, the growth of Town of Bernalillo and Rio Rancho gives rise to concern that pumping to serve the needs of these communities is already drawing down the water in the Río Jemez.

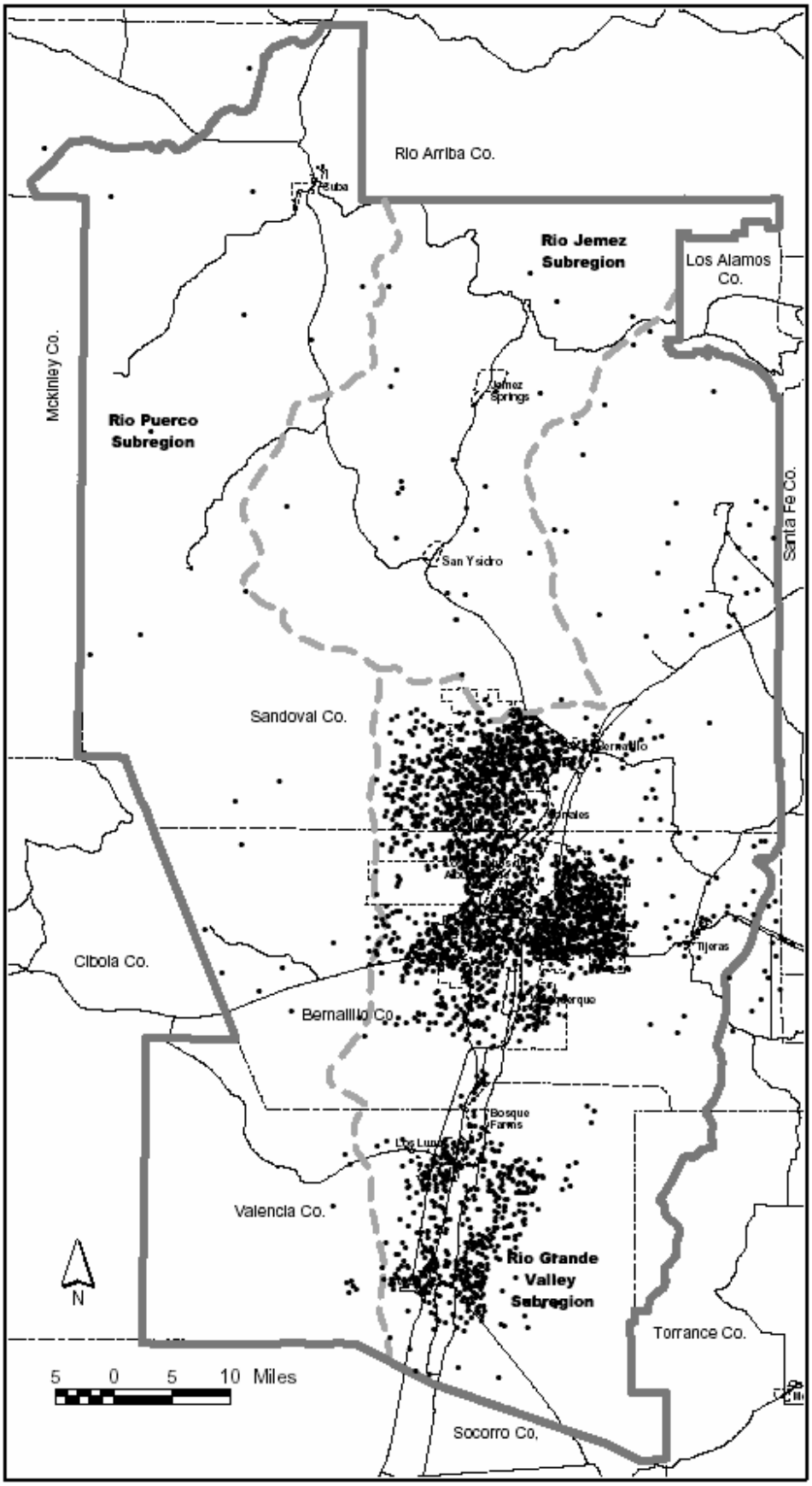


Figure 12.10-3
2050 Forecast Population
Dot Density Map

Legend: One Dot = 500 Persons

Population data for Sandoval, Bernalillo and Valencia Counties

Source: Focus 2050 Trend dataset, MRGCOG, 1999

Map Projection: Transverse Mercator
Datum: NAD 83
Date: 5/4/01

Map compiled by:

Map compiled by:
Mid-Region Council of Governments
Albuquerque, NM 87102
505-247-1750

> The Jemez River is in hydraulic connection with the aquifer system over most of its length in the basin, so changes in water-table altitude in the aquifer system adjacent to the river can influence seepage between the river and the aquifer system. (McAda & Barroll, 2002)

To offset the effects of pumping, there is a need to acquire surface water rights to serve these increasing needs. To satisfy downstream users, water is currently being transferred out of the basin and this trend may well continue. Those additional usages may in turn affect the Río Jemez system, and perhaps even the shortage-sharing agreement in the *Abousleman* case (see Section 12.8 on Water Use). While the pressure is more readily seen in the Río Jemez subregion at the present time, but residents in the Río Puerco subregion have commented that they will be next.

As noted in Section 9, a current example is provided by Rio Rancho's application to transfer water rights from San Ysidro to offset it's increased pumping. The Office of the State Engineer has authorized Rio Rancho to double its current pumping of 12,000 acre feet per year to serve expected growth in the community with the additional criteria that Rio Rancho had to find the water rights prior to pumping. (Appealed, this criteria is subject to settlement negotiations.) Toward that contingency, Rio Rancho is engage in purchasing the 196 acres of land and 172 acre feet of water rights needed for future city growth and development (*Albuquerque Journal*, March 28, 2003) The request to transfer the water rights states that it will be retired to offset the depletion effects on the Jemez River above the Zia Supply Canal.

Whether the offset is sufficient has yet to be determined. That additional usage may in turn affect the river and aquifer, and perhaps even the shortage-sharing agreement in the *Abousleman* case. If the transfer is allowed, the nearly 200 acres will necessarily be fallowed and most likely developed for housing --with domestic wells and septic tanks--, adding more pressure on the scarce resource. This new housing would irrevocably alter the course of development for San Ysidro.

That example may not be unique. "The population of the City has continued to grow from 9,985 in 1980 to 51,765 in 2000, making Rio Rancho one of the fastest growing small cities in the United States. If the current pace of growth continues at an annual 3.5% growth rate, Rio Rancho is anticipated to double its current population in twenty years, and have 100,000 residents by 2020." (http://ci.rio-rancho.nm.us/Departments/Finance/BudgetReports/HISTORY%20OF%20RIO%20RANCHO.pdf) "The City of Rio Rancho, when it becomes fully developed, will be one square mile LARGER than the city of Albuquerque!" (ci.rio-rancho.nm.us/CityHall/CityStory.HTM) Rio Rancho may well continue its phenomenal growth of the past thirty years, particularly with the recent annexation of Quail Ranch, some 6,700 acres in Bernalillo County, which is planned to house more than 50,000 people. This growth may well place additional demands on the subregions. Drawdowns in the Middle Rio Grande aquifer may likewise affect the Río Jemez, and offsets may well require water rights from both subregional watersheds.[4]

[4] Drawdowns in the Rio Rancho area of 90-100' in the years between 1960 and 2002 are noted in the USGS report, "Declines in the Santa Fe Group Aquifer System in the Albuquerque Area, Central New Mexico, Predevelopment to 2002," By Laura M. Bexfield and Scott K. Anderholm Water-Resources Investigations Report 02-4233 (December 2002). USGS performed various scenarios to 2040, showing additional declines in the Rio Rancho area, particularly

Other projects are or have been proposed, such as Rio West for 17,458 acres of land in the Río Puerco Valley of Sandoval County. Numerous subdivisions have been platted in both basins and if built out would certainly require water resources. Many of these were platted prior to the requirement that ability to provide water be shown prior to development, and it is unclear as to the impact that these subdivisions might have on the regional resource.

The following article from Jemez Area Residents Association newsletter expresses local residents' views of current change and summarizes many of these concerns.

http://www.j-a-r-a.org/
http://www.ram-design.com/jara/#WhatsDrivingtheJemez

Welcome to the official web page of the
Jemez Area Residents Association

What's Driving the Jemez?

What's going on here? Highway 4 has been nominated as a National Scenic Byway. Highway 126 may be paved. The Baca may become part of the National Forest.

The Jemez is probably experiencing more change now than it has since the Spanish entered the area hundreds of years ago. To evaluate and deal with these and numerous other changes we need to understand what's driving them.

First, we know that the area population has been growing and changing over the past twenty years. Thirty years ago most residents were born and raised here and relied on the land and its resources to make a living. Today, a large percentage of area residents moved here from other areas. They are retirees, commuters, tele-commuters, local business owners, or work for local businesses. Vacation properties are now permanently occupied and property values have risen dramatically. This change in the character of the area is not widely understood or appreciated by officials and agencies outside the area.

Second, the changing nature of the area population has also changed the nature of tourist oriented businesses in the area and slightly increased their number. These businesses, mostly in Jemez Springs, attract some additional tourists, support a few area residents and provide tax revenues. They also provide some services and recreation for area residents. The jobs provided by these businesses are mostly low paying. Finding and keeping good employees is a problem for them, especially since the work can be seasonal.

Fifth, the rapid growth of Albuquerque and Rio Rancho has dramatically increased the pressure on area resources and infrastructure. Casual observation suggests that visitors from these cities are the cause of most of the traffic. Their contribution to the local economy is not proportionate to their numbers, they place the greatest stress on emergency and law enforcement services, and they generate the greatest amount of noise and visual pollution.

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since there are no plans to utilize surface water. "Simulation Of Ground-Water Flow In The Middle Rio Grande Basin Between Cochiti And San Acacia, New Mexico," by Douglas P. McAda, and Peggy Barroll, Water-Resources Investigations Report 02-4200 (2002).

> More significantly, much or most of the character of the area is influenced or directly determined by people who are not area residents. We cannot completely control or remove the influence of outsiders. Our sole recourse appears to be to educate both locals and outsiders about the nature of the Jemez and the wants and needs of the people who, having given up the advantages of living elsewhere, live here. The survey in this issue is your opportunity to do so.
>
> Bruce Crozier, Spring 1998

12.10.2.3. Based upon watershed conservation

Population increases, likely as they are to occur, will increase demands on water. If all of the water is allocated, and demand already exceeds supply, where will that water come from? Conservation measures, while important, may not be enough. One strongly supported goal for the two watersheds was to:

> Restore and manage the watersheds on public and private land to enhance water production, retention, and quality, to reduce the threat of wildfire, and to preserve natural systems dependent on water.

Will such a goal require water or will it produce water? A unifying theme, as expressed in the Public Welfare Statement, was the desire to have the ability to plan for the future with water available for that future. The present lack of water in ditches and wells underscores the fears that already the water budget is overdrawn. If the budget is to be fixed, the prevailing wisdom was that the watershed would need to be restored. Restoring it would not necessarily result in increased stream flow as much as springs would be replenished which could satisfy needs of growing local communities in the subregions.

Two projects in particular have the goal of restoring the watershed

(1) The Río Jemez (Abousleman) Indian Water Rights Settlement Proposal For Investigation dated February 12, 2001 and set out in Section 13 lists several tasks which have been funded. Two that may directly assist with future water demand projections are:

> Task 2: Jemez Basin Surface Water Operations Model
>
> The Jemez, Zia and Santa Ann Pueblos are in the process of establishing their water rights in the Jemez River Basin. The three Pueblos have agreed to cooperate to determine the impact of current and future water resources development in the basin on the water supply of the Jemez River. This will require the development and application of a hydrologic computer operational model for the basin. The model will be used to examine the effects of specific development scenarios of interest to the Pueblos, the United States, upstream non-Indian water users, the State of New Mexico, and other stakeholders.
>
> Results of the operational studies will be used to assess implications on water rights and water resources development of the Pueblos and non-Indian water user. The Jemez River

Operation Model will serve as the basis for developing a water management plan, which will comprehensively address future basin operations including water rights, water management and mitigation of adverse impacts.

Task 7: Groundwater Model Upgrade

The SEO has issued an administrative model and guidelines for state water permits in the Jemez Basin. The model is not adequately calibrated in the Jemez area for use in protecting in-basin users from effects of external or in-basin uses. A groundwater-model enhancement in the Jemez basin of the SEO water right administrative model (Barroll, 1999) for use in administering the effects of wells inside and outside the basin is needed. Field data and testing will be integrated into the administrative model.

Additional transfers, made without such calibration, may have long-term negative impacts for the subregion.

(2) The Rio Puerco Management Committee (RPMC) "is a congressionally mandated committee formed in 1997 to tackle the many environmental problems facing the watershed. Extending for 120 miles in north central New Mexico, the Río Puerco Watershed suffers from serious erosion problems on what once was grazing land. Too much dirt and sand washing down the Río Puerco threatens both the Rio Grande and the Elephant Butte Reservoir downstream. The Río Puerco Management Committee is the largest such group in the south central states, including members from EPA-Dallas and nine other federal agencies, seven New Mexico state departments, six native American pueblos and tribes, four soil and water conservation districts, a growing number of business and environmental groups, and private landowners and individuals. Funding from EPA's Watershed Initiative will enable the committee to move forward with projects like stream restoration, altering channel flow and topography, implementing livestock grazing management practices and programs to educate the public. The EPA Watershed Initiative has set aside $700,000 to support the Río Puerco." This award is to augment work underway by the RPMC and funded separately (see Section 13 on Example Projects for more on the RPMC).

Efforts such as undertaken by the Río Jemez Settlement Proposal and the RPMC are aimed at restoring the watershed. That goal, consistent with the subregions' goals, should enable water users and land managers to better curate the watershed. Unknown is the best approach to quantify the future demands of a restored watershed. While being researched, unintended consequences should be avoided.

12.10.2.4. Based upon other criteria

Projecting future demands solely on population growth was not deemed sufficient by participants in the planning process. Suggestions for alternative methods included the following considerations:

(1) No extra now exists now; the subregions are already experiencing shortages. The Steering Committee grappled with the concept of needing to grow as the only variable to show future need, or even the concept increasing the demand at all. Depending on the perspective of a

workshop participant, there was "barely enough" water," not enough," "none" or "enough." Never was there "plenty." Shortages are already observed in the Río Jemez, as can be seen by the agreement to address irrigation in times of varying shortages:[5]

> WHEREAS, the parties hereto state as follows:
>
> A. The Pueblo Of Jemez and the Pueblo Of Zia and the Jemez River Basin Water User's Association (Jemez Springs Ditch Association, Nacimiento Ditch Association, San Ysidro Community Ditch Association, Cañon Ditch Association and Ponderosa Ditch Association), rely on the surface waters in the Jemez River Basin for irrigation purposes, and the Pueblos also rely on the Jemez River stream flows for religious and cultural purposes.
>
> B. The Jemez River does not always have sufficient water to fully meet the irrigation requirements of the Pueblos and the Associations, and the religious and ceremonial requirements of the Pueblos.
>
> C. The Pueblos and San Ysidro Ditch Association are at the end of the Jemez River system, and thus are often water short even in years of average moisture.
>
> D. The Pueblos have certain water rights, which, although not declared by final court decree, are senior in priority to any other irrigation right in the Jemez River basin.

Acequias in the Río Puerco rarely get water past July. Small mutual domestics have resorted to the State for help in supplying their customers. As such, new uses, whether they be in-stream flow or out-of-basin transfers, may affect water usage in each acequia.[6]

(2) No extra later, even if watershed restoration does result in increased water production, since the region is already in need of it, and there are no further amounts now or in the future available for transferring. This sense was reinforced by comments of farmers, foresters, ranchers and observers in general. Restoring past uses of land may result in water retention.

(3) Locals need water for development and to provide economic opportunities to keep families intact and to encourage new development. In the comprehensive plan presently being produced by MRCOG for Cuba, hopefully the water resource will be carefully considered. Part of the La Jara community envisioned a dynamic interaction with Cuba -- growing herbs, organic crops or raising wool, for example--, which would be packaged and sent from Cuba. Such regional enterprises would necessarily consider the water implications. As the region above Jemez Springs continues to be built up, new wells and septic systems will draw on the stream system.

(4) No category exists for cultural and spiritual water usage, so no calculation is included in future water use projections. Relevant goals of the two watersheds are to:

---

[5] This agreement was entered into on July 2, 1996 and renewed in 2002. It is a part of the *Abousleman* case and may well affect future transfers.

[6] It remains to be seen what the effect will be of granting the acequias some approval of transfer power (§73-3-4.1, effective March 1, 2004).

* Support the cultural and spiritual values of water, and the universal need for and importance of water.
* Ensure treaty, water and acequia rights to preserve and protect local agricultural traditions.
* Retain land use patterns that support and ensure a rural lifestyle and economy.

(5) Other participants felt strongly that the river had a right to have water, a usage not considered in projections based upon population. While no water rights have been allocated to the perennial streams, the riparian areas in both watersheds are seen to be important. This is consistent with the state-wide survey, with additional sampling for the Middle Rio Grande Water Planning Region, done by UNM in 2000, on attitudes and preferences of residents with respect to water. The values assigned to various uses of water are set out in Table 12.10-5.

Table 12.10-5- Values Assigned to Various Uses of Water
(Scale: 0 = "don't care whether water is available for that use;
10 = "want to be sure water is available for that use")
(All results reported are "means," i.e. average responses)

Use	Result
Indoor use in existing homes	8.17
Preserving the native cottonwood forest and vegetation along river banks known as the bosque, that creates habitat for a variety of different animal species	7.69
Irrigation for farms	7.59
Providing food and refuge for fish, birds, and other animals	7.54
Indoor use in new housing developments	6.62
Cultural and religious uses in some villages and pueblos	6.38
Recreation, such as fishing and rafting	6.14
Community parks and sports fields	5.66
New industrial uses, such as manufacturing processes	5.29
Watering existing yards and landscaping	4.40
Use for yards and landscaping in new developments	3.82
Watering golf courses	3.18
Swimming pools for individuals homes	2.68

Source: Brown, et al, 2000

(6) If the reported uses are incorrect (for example, in the FWUP, irrigated acreage was reported to be 586 in the Río Puerco watershed, while the NMOSE reports it to be 1590 to 2040 in the same time frame), benchmarks established to judge future needs may be likewise incorrect.

(7) Another consideration for the regions is the unquantified water rights and future water rights of the Pueblos. Although the rights of the non-Indians have been adjudicated with respect to the Río Jemez (see Section 8 on Water Use), there is uncertainty as to what will the final amounts be and how will adjustments be made. Careful planning should consider these uncertainties.

(8) Widening and straightening US 550 is making the region more attractive to people who want to live in the country and work in the city. Second home residents, not included in the census, nevertheless are water users. Paving Highway 26 and acquiring the Valles Caldera as public open space, will bring tourism and increased water usage, another potential driving force. In general, the continued expansion of trade, services, construction, government, and recreation in both watersheds will require additional water. None of these additional uses have been captured in the projections, since they are based upon past trends.

Applying the above considerations to the already scarce resource would provide an alternative or an additional method to calculating future water use projections. At any rate, such should be considered prior to making additional demands upon the resource. Only by being conservative in future planning can these considerations be managed.

12.10.2.5. Future Water Use Projections for the Middle Rio Grande Water Planning Region

As discussed in Section 5 on Land use, one of the regional water planning products is the *Future Water Use Projections for the Middle Rio Grande Water Planning Region* (FWUP) produced by the Mid-Region Council of Governments (MRCOG) in January 2002. MRCOG prepared a regional land-use map with 18 land-use categories. In 1996, MRCOG produced a future land-use map for the year 2050 reflecting the continuation of existing growth trends and a projected regional population in the year 2050 of approximately 1.47 million people. Using Shomaker's water use categories, as reported in "Historical And Current Water Use In The Middle Río Grande Region" (2000), for the year 1995, water withdrawal and depletions coefficients were derived for the land use categories. Projections of future withdrawals were calculated by combining withdrawal with the map of future land uses. Depletion coefficients were determined to be a function of withdrawals, and were thus calculated, with several caveats set out in the report. While Section 5 includes the information for existing land uses and water withdrawals, the two tables show the conclusions for future land uses and water withdrawals for the subregions. Table 12.10-6 shows this for the Río Jemez and Table 12.10-6 for the Río Puerco.

As noted in Section 5, withdrawals alone may provide a skewed picture, since many uses are credited with a return flow. Calculating depletions as a factor of withdrawals, rather than separately, may compound any data deficiencies. The major difference in the two watersheds is the large usage attributed to riparian vegetation in the Río Jemez. Given that it is the smaller of the two watersheds, this is apparently indicative of the lack of data on the Río Puerco. As noted in Section 5, the discrepancy between sources for irrigated agriculture may well be compounded in such projections.

Table 12.10-6 Future land-use areas and water withdrawals - Río Jemez Subregion

Land-Use Category	Land Use (acres) Table 5	Adjusted Withdrawal Coeff. (gpa/d) Table 8	Calculated Withdrawal in 2050 (ac-ft/year) Table 14	Adjusted Depletion Coeff. (gpa/d) Table 17	Future Depletions (ac-ft/ year)
Single-family residential	4,263	1,026	4,899	559	2,669
Multi-family residential	0	2,372	0	850	0
Major retail commercial	0	1,967	0	1,361	0
Mixed and minor commercial	187	1,967	412	1,361	285
Office	30	1,967	66	1,361	46
Industrial and wholesale	86	623	60	431	42
Institutions	117	685	90	474	62
Schools and universities	7	685	5	474	4
Transportation and major utility corridors	8	685	6	474	4
Irrigated agriculture	491	6,709	3,690	2,227	1,225
Rangeland and dry agriculture	428,923	0	0	0	0
Major open space and parks (with water use)	0	685	0	474	0
Major open space and parks (no water use)	207,838	0	0	0	0
Natural drainage and riparian systems	6,965	3,109	24,256	3,109	24,256
Urban vacant and abandoned	92	0	0	0	0
Landfills and sewage treatment plants	6	685	5	474	3
Other urban non-residential	78	685	60	474	41
Totals	**649,091**		**33,549**		**28,637**

Table 12.10-7 Future land-use areas and water withdrawals -Río Puerco Subregion

Land-Use Category	Rio Puerco (acres) Table 5	Adjusted Withdrawal Coeff. (gpa/d) Table 8	Calculated Withdrawal in 2000 (ac-ft/year) Table 15	Adjusted Depletion Coeff. (gpa/d) Table 17	Future Depletions (ac-ft/year)
Single-family residential	3,008	1,026	3,457	559	1,883
Multi-family residential	0	2,372	0	850	0
Major retail commercial	0	1,967	0	1,361	0
Mixed and minor commercial	376	1,967	828	1,361	573
Office	91	1,967	201	1,361	139
Industrial and wholesale	89	623	62	431	43
Institutions	0	685	0	474	0
Schools and universities	46	685	35	474	24
Airports	37	685	28	474	20
Transportation and major utility corridors	0	685	0	474	0
Irrigated agriculture	554	6,709	4,163	2,227	1,382
Rangeland and dry agriculture	1,273,367	0	0	0	0
Major open space and parks (with water use)	0	685	0	474	0
Major open space and parks (no water use)	69,625	0	0	0	0
Natural drainage and riparian systems	126	3,109	439	3,109	439
Urban vacant and abandoned	36	0	0	0	0
Landfills and sewage treatment plants	1,395	685	1,070	474	741
Other urban non-residential	241	685	185	474	128
Totals	**1,348,991**		**10,469**		**5,372**

*Adjusted to Shomaker report (ac-ft) Source: FWUP, Tables 5, 8, 15 and 17

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