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Water Conservation

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> "Conservation, or the reduction of water use through enhanced efficiency, is becoming an increasingly important component of sustainable resource management."
>
> Kelli L. Larson, Anne Gustafson and Paul Hirt, *Insatiable Thirst and a Finite Supply* (2009)

> "If New Mexico intends to get serious about agricultural water conservation in the future, then one of the first steps that should be taken is accurate accounting of basin-wide water use."
>
> Zohrab Samani and Rhonda Skaggs, *Unintended Consequences of Water Conservation,* N.M. Tech, Decision-Makers Field Guide 2007

New Mexico always has had periods of water shortages, some far more long lasting and devastating than others. As warming temperature and changing weather patterns continue to develop, the likelihood that water shortages—like those felt throughout the state from 2010 through 2013—will occur with greater frequency. These changes can and have caused significant economic and environmental damage, and the risk of more harm will not improve unless we improve our water management significantly.

Water Conservation as a Strategy to Meet Growing Demand with Available Supply

When demand exceeds available water supply, there are two options to close the gap between supply and demand: find new water sources or reduce demand. For many decades, New Mexicans have been acquiring new water sources and developing new methods of accessing and increasing water supply: constructing dams and reservoirs, drilling ever deeper wells, pumping groundwater over long distances, desalination of brackish water, and other means. Continuing this search for the remaining unclaimed water sources will be increasingly more expensive, energy intensive, and environmentally challenging.

Reducing water use through conservation on the other hand increases the available water supply. Every gallon saved is a gallon that doesn't have to be found elsewhere. It is also a relatively inexpensive strategy. Thus, water conservation can go a long way toward ensuring that a community has enough water to meet demand.

Current Statutes—History

Because the population focused on meeting demand by finding and accessing new water supplies for much of New Mexico's history, it was not until the 1980s that incentives for water conservation began to appear in state statutes. Even then the first changes were in response to litigation, not water shortages.

When demand exceeds available water supply, there are two options to close the gap between supply and demand: find new water sources or reduce demand.

In 1983, New Mexico's statutory prohibition against out-of-state transportation of groundwater was declared unconstitutional. The *City of El Paso v. Reynolds* court applied the U.S. Supreme Court's holding in *Sporhase v. Nebraska ex rel. Douglas.* In *Sporhase*, the Supreme Court held that a Nebraska statute prohibiting another state's withdrawal and transportation of water out of Nebraska placed an impermissible burden on interstate commerce. The *Sporhase* court, however, upheld a state's right to base decisions regarding exportation of water resources on conservation and public welfare considerations. A state has the right block water exportation on the basis of protection of the health and well-being of its citizens but not primarily on economic concerns.

In 1985 in response to the *El Paso* ruling, the New Mexico legislature amended several statutes in the water code to mandate that the State Engineer consider whether applications for water rights are "contrary to the conservation of water within the state." Significantly, these criteria apply to all new appropriations and transfers—not just interstate transactions.

Two years later, in 1987—again in response to the *El Paso* ruling—the legislature enacted two statutes creating the regional water planning program. The intent was to identify those water supplies that had not already been appropriated and protect them from interstate transfers as well as to bolster the state's ability to keep water in New Mexico by

Legislative History of Water Conservation Statutes

1985

The statutes governing water were amended to require that applications for new appropriations and transfers be denied if they are "contrary to the conservation of water within the state or detrimental to the public welfare of the state." NMSA 1978, §§ 72-5-5, 72-5-6, 72-5-7, 72-5-23, 72-12-3, and 72-12-7.

A new statute was enacted to provide standing for those asserting legitimate concerns "involving public welfare and conservation of water." NMSA 1978, § 72-5-5.1.

1987

The state's regional water planning program was enacted with the requirement that regional water plans include an "adequate review of water conservation and the effect on the public welfare." NMSA 1978, §§ 72-14-43 and 72-14-44.

1991

The water right forfeiture statutes were amended to add provisions for an exception for water rights placed in a State Engineer-approved water conservation program by a conservancy or irrigation district, acequia, or community ditch association. NMSA 1978, §§ 72-5-28 and 72-12-8.

1995

The Subdivision Act was amended to require that county boards of supervisors/commissioners adopt regulations regarding water conservation. NMSA 1978, § 47-6-9.

1999

The Ground Water Storage and Recovery Act was passed to promote conservation of water within the state through aquifer recharge. NMSA 1978, §§ 72-5A-1 *et seq.*

2003

The water leasing statute was amended to require that applications for leases of water be denied if they are "contrary to the conservation of water within the state." NMSA 1978, § 72-6-5.

The Water Project Finance Act added water conservation projects as qualifying projects for applicants seeking grants or loans from the Water Trust Board. NMSA 1978, § 72-4A-1, *et seq*.

demonstrating that the water was needed for the conservation of water and protection of the public welfare within the state.

It was only in 1995 and the years that followed that the legislature began to amend or create new statutes that:

- Protect water conserved by farmers
- Provide a basis for the Groundwater Storage and Recovery Act
- Ensure that conservation was part of the State Water Plan
- Require counties to adopt water conservation requirements for subdivisions
- Include water conservation projects as qualifying for funding from the Water Trust Fund
- Require water conservation plans
- Authorize grey water reuse

For more information, please see the chapter "State and Regional Water Planning" in this edition of *Water Matters!*.

The State Water Plan Act required that the Plan "develop water conservation strategies and policies to maximize beneficial use, including reuse and recycling by conjunctive management of water resources, and by doing so, to promote non-forfeiture of water rights." NMSA 1978, § 72-14-3.1, *et seq*.

This Act also provided that covered entities—municipalities, counties, and water suppliers providing at least 500 acre-feet of water annually for domestic, industrial, commercial, or governmental uses—may submit water conservation plans. It also required that the entity's plan consider the adoption of codes and ordinances to encourage water conservation measures and drought contingency planning. NMSA 1978, § 72-14-3.2 and 4-37-9.1.

The Water Quality Act was amended to allow up to 250 gallons of gray water per day to be used on residential landscaping. NMSA 1978, §74-6-4.

A statute about irrigation water was clarified: "[I]mproved irrigation methods resulting in conservation of water shall not affect an owner's water rights or quantity of appurtenant acreage." NMSA 1978, § 72-5-18.

2007

This irrigation statute was further amended to add language allowing the State Engineer to approve a water rights transfer—a change in the point of diversion, place, or purpose of use—of the quantity of conserved agricultural water resulting from improved irrigation or agricultural practices, provided that the conservation does not impair existing water rights. NMSA, 1978 § 72-5-18.

A new statute authorized municipalities and counties to develop regulations that require site development standards to encourage conservation of water. NMSA, 1978 § 3-53-2.1.

The ABC's of Water Use and Conservation

There are several distinctions between different forms of water use that effect a determination of whether water is considered to be conserved water. The following discusses some of those distinctions.

The Office of the State Engineer (OSE) issues a report on water withdrawals by category —agriculture, public water supplier, commercial, etc.—every five years. Withdrawals include both water that is "consumed," that is, removed from the system permanently, and water that remains in the system to be used again or sent downstream to meet interstate delivery requirements.

A *consumptive use* consumes all the water; the water is no longer available in the system. Most consumptive uses of water occur through absorption by and evaporation from plants including landscaping, crops, and riparian vegetation (*evapotranspiration*) or evaporation from open water in ponds, rivers, and reservoirs or from soil moisture from precipitation or irrigation. The loss of water from the system is also called a *depletion*. The consumptive use component is the only element of a water right that can be sold or leased for non-agricultural uses.

Water that has been *diverted* from a source, but not consumed, remains in the system. Very little water is consumed for indoor domestic uses, for example, much of it goes to waste water treatment plants or septic systems. Often waste water or treated effluent is reused or returned to the river where it becomes available for reuse downstream. Likewise, more water is diverted to deliver water to crops than is consumed by the crop; the excess water returns to the stream or groundwater.

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Agricultural water rights are divided into several components. The *consumptive irrigation requirement* (CIR) is the amount of water consumed by the plant and the amounts evaporated from the plants or the soil surfaces near the plant. The CIR quantity is not the measure of what can be sold as part of a water right for non-agricultural purposes.

A farmer also has a *farm delivery requirement* (FDR) which is the amount needed to get water to the field; it is ultimately returned to the stream system to be used downstream, minus some incidental losses to leakage or evaporation. The FDR cannot be sold as part of a water right for non-agricultural purposes.

Developments in Water Conservation

Water conservation opportunities exist in municipal, commercial, industrial, agricultural, riparian, and open water environments. Of these, municipal conservation is the most discussed and most easily implemented. Ways to conserve water in agriculture are less understood, less easily implemented, and/or more costly. Other opportunities for conservation in riparian areas and storage reservoirs are beyond the scope of this paper.

Municipal Water Conservation: Urban water use is rising in New Mexico as population increases. Population projections indicate that demand will increase dramatically into the future. New Mexico's population was approximately 2,085,538 in 2013, up from 1,819,046 reported in the 2000 federal census. A recent population projection by the Bureau of Business and Economic Research (BBER) estimates that there will be 2,540,145 people in the state in 2020 and 3,710,875 in 2060. The fastest growing regions are those in and around the major urban centers particularly along the middle and lower Rio Grande reaches.

Residential municipal water use is divided into two components: indoors use for domestic purposes and outdoors use for

landscape purposes. Most domestic water is not "consumed" but flows into waste water treatment systems and is reused, returns to a river, or recharges into a groundwater basin. Indoor use is concentrated in the bathroom. Typically, water used by older toilets is the largest source of indoor water use. Installing a highly efficient or ultra low-flow toilet and other water efficient fixtures can reduce average indoor water use by about 35 percent without any change in lifestyle. To promote water conservation, many communities are changing their rate structures to tier or block rates, charging customers more as their water use increases.

Water used outdoors for landscaping is consumed by plants and evaporation. Outdoor water consumption is a large proportion of residential water use, which ranges from 20 percent in Tucson, Arizona (2012), to 33 percent in El Paso (2011), to 60 percent in Las Vegas, Nevada (2012). Albuquerque weighs in at 36 percent (2012). Water conserving landscapes can save significant amounts of water. Savings can be accomplished by landscaping design, plant selection, and watering practices. In some areas, studies have shown water savings ranging from 42 to 57 percent. These savings are significant, because water for urban landscaping is usually completely lost to the system.

Some of New Mexico's larger communities with utilities have been successful in implementing water conservation programs. The two most successful have been Santa Fe and Albuquerque. Santa Fe's use rate of gallons *per capita* per day (gpcd) use has dropped from 168 gpcd in 1995 to 107 gpcd in 2011. Albuquerque began its water conservation effort in 1995 when its water use was 252 gpcd; by 2011, that number had been reduced to 148 gpcd. The strategies employed by the Albuquerque area have resulted in the lowest water use since the early '80s when the population was about 56 percent of today's numbers.

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Gallons per Capita per Day

Measuring municipal conservation efforts has become increasingly important for several reasons. Conservation measures—such as retrofits of fixtures and landscaping—cost money. In order to evaluate and justify the costs, it is important to understand the results. Measurement of conservation progress has also become increasingly important, as the State Engineer has begun to condition permit approvals on meeting water conservation goals, based on the 1985 statutory amendments requiring that use not be contrary to water conservation. Finally, based on other statutory changes, water plans, and applications for funding now give greater emphasis to water conservation measures.

Municipal water use is measured as *gallons per capita per day* (gpcd), which is a common tool for water use reporting. Until recently, however, there was no standardized method for calculating gpcd in New Mexico. In 2009, the OSE developed a standardized method for calculating the measure. A number of cities and utilities now use the new standard, but it is not yet universal. The methodology will be used by the OSE to track municipal use over time and to aid in planning and projecting future per capita needs.

Agricultural Water Conservation

In 2008, the OSE quantified the amount of water withdrawn from New Mexico's water systems for irrigation agriculture as 77.86 percent of total withdrawals between 2000 and 2005. Because such a high percentage of water is withdrawn for agriculture, one might expect that significant resources would be committed to agricultural water conservation. Efforts to promote agricultural water conservation legislatively, however, have not been effective.

As concern about the adequacy of New Mexico's water supply emerged, considerable attention was focused initially on the state's forfeiture statutes. The forfeiture law is viewed as a "use it or lose it" principle and creates a disincentive to save water. New Mexico's constitution and water code base a water right on the beneficial use of water. To preserve a right, water must be put to a beneficial use and cannot be saved and used at a later time. If the water right holder fails to use water for at least four years, the water right is subject to forfeiture, a year after the State Engineer gives notice of non-user. The common law notion of abandonment may also occur. This mechanism results in the loss of a water right if water is not put to beneficial use for a much longer time. The long period of non-use raises the question of an intention to abandon the water right, which a user must disprove. The goal in either case is to free up water rights that are no longer exercised so that others may have access to water. In both cases, there has been a legal disincentive to save or conserve water since it must be continually used to preserve the water right.

As concern about the adequacy of New Mexico's water supply emerged, considerable attention was focused initially on the state's forfeiture statutes. The forfeiture law is viewed as a "use it or lose it" principle and creates a disincentive to save water.

In the agricultural sector, the "use it or lose it" doctrine creates some additional obstacles to water conservation. There have been several efforts to protect conserved agricultural water. In 1991, two statutes were amended to provide a limited exception to forfeiture for water assigned to State Engineer-approved conservation programs. In 2003, another amendment was made to the statute governing amounts allowed for agricultural water use. The amendment provides that conserved water from improved irrigation methods remained as part of an owner's water right.

While these amendments did eliminate the *legal* "use it or lose it" disincentive to conserve water, they did not clarify the complex *technical* issues related to agricultural water conservation or address financial incentives to promote water conservation. In 2007, a second amendment was enacted that was meant to create a financial incentive for farmers to conserve water by enabling them to sell (or change the location or use of) the conserved water provided that there would be no impairment of other water rights. A 2009 House Joint Memorial requested that NMSU conduct a study of agricultural water use methods that could make water available to other users. The study found that better irrigation methods improved the ability of crops to utilize water, thereby *increasing* water consumption and crop yields rather than *decreasing* water use, a result that confirmed what the OSE and others had been saying for some time. The concern is that if "conserved" water was not being "consumed" previously, and then it represents a new consumptive use and the overall consumptive use, or depletion of a stream, is increased.

Since only water that was *previously consumed and subsequently conserved* can be transferred to a new consumptive use, the opportunities for benefits to farmers if they conserve water without entirely ceasing irrigation are limited. Consequently, it may be that the best opportunities for agricultural water conservation may be in reducing the losses in

delivering water to the crop, rather than in reducing the actual amount of water consumed by the crop. However, even this could require distinguishing between water that was being "consumed" (evaporation, for example) and water that remains in the system by returning to a river or other water source.

To complicate matters, the benefits of agricultural water conservation vary depending on crop, soil types, and location. What may benefit one farmer may not benefit another. In addition, some agricultural water conservation measures may cause harm. For example, seepage from ditches in many acequia systems support cottonwood stands and wetlands which could be lost if seepage is reduced through conservation. In addition, agricultural water that is not consumptively used passes through the soils and recharges aquifers relied upon by others. These matters and others must be balanced to avoid unintended consequences.

The State has worked with the agricultural community to develop a list of conservation measures such as laser-leveling of fields, drip irrigation, and more effective head gates, and it has provided some limited funding to support these measures. Some incentives to conserve exist already. For those farmers relying on pumped groundwater, using less water results in reduced energy costs. In water-short years, prevention of incidental depletions enables the farmer to use that water for their crops. And, in a closed groundwater aquifer, increasing the longevity of the aquifer may be sufficient to justify more conservation rather than less.

But many conservation measures cost money. Even the cost of metering water use—a first step toward water conservation—may be too costly for many small farmers. Farmers argue that they should not be required to bear the financial burden of conservation measures without some benefit in return such as increased profits, tax incentives, or cost-sharing provisions.

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Water Conservation Issues

In 1976, the U.S. Bureau of Reclamation issued the "New Mexico Water Resources Assessment for Planning Purposes." The report set forth the assumption that increased needs for municipal, industrial, and other uses would be met by the retirement of irrigated agriculture. Indeed, it was common for past State Engineers to say that a reduction of 10 percent of agricultural water use would be enough to meet the growing demands of cities. In fact, municipalities and developers have been buying agricultural water rights for years.

That assumption is now being challenged on several fronts. People value both agriculture and the open space and the green belt that agriculture provides. More recently there is a growing interest in access to locally grown food and future food security. In addition, the idea that it would only take retirement of a relatively small amount of agricultural land to meet increasing demand may be an illusion in certain areas of the state.

Municipal water conservation makes a difference. Larger utilities can afford to make an investment in conservation measures, but municipal conservation is more problematic in smaller and rural communities because they have fewer resources. Implementing conservation measures costs money, although these measures are almost always less expensive than purchasing or otherwise acquiring new water supplies.

Municipal water conservation makes a difference.

Ag to Urban in the Middle Rio Grande—A Hypothetical Case

There are currently permits for about 230,000 acre-feet per year of groundwater pumping in the middle Rio Grande valley. These permits require offsets for the effects of pumping on the surface water in the Rio Grande. Offsets can and do consist of a combination of return flow credits, vested groundwater rights, San Juan Chama water, and acquired senior water rights (pre-1907 rights). Pumping impacts on the river lag behind the amounts of groundwater withdrawn. In general, the amount of the required offsets will increase long-term as groundwater pumping increases and as the effects of the pumping move to the river.

Current pumping under the permits is on the order of 110,000 acre-feet per year, although it is temporarily decreasing as the Albuquerque Bernalillo County Water Utility Authority brings its surface water treatment plant into full operation. When the full 230,000 acre-feet is pumped in sometime in the future, the offset required of the Water Authority, when needed, will consist of a combination of about 50 percent return flow credits and 50 percent purchased pre-1907 water rights. These water rights will come from 55,000 acres of pre-1907 water right lands, which will have to be fallowed. The Middle Rio Grande Conservancy District is the primary source area for pre-1907 water rights in the middle valley. Since the total amount of irrigated land within the district is between 50,000 and 65,000 acres, only about 10,000 acres will then retain water rights. That scenario assumes all the currently irrigated MRGCD lands are pre-1907 water right lands, which is not the case. In any case, the character of the middle Rio Grande valley would be significantly different than it appears today.

This hypothetical analysis assumes that vested rights and imported water will likely provide a portion of the required future offsets. It is presented here as an example of what could happen if the Albuquerque-Bernalillo County Water Authority had to resort to the purchase and fallowing of agricultural lands. However, the Water Authority has moved away from that strategy. Its future supply plans include reuse in many different forms, conservation, desalination, and aquifer storage and recovery, thus mitigating the effects on the river and the need for retired agricultural lands.

Many communities rely on groundwater. This reliance, combined with drought conditions, is causing water tables to fall, especially in areas where there is little or no recharge. Unless the rate of groundwater depletion is slowed, more and more areas will find themselves without access groundwater. These communities especially need support for water conservation measures. Even those communities with active conservation programs must protect groundwater supplies from further depletion in order to retain groundwater as a drought reserve.

Next Steps

There are a number of steps that New Mexico could take to promote water conservation. Information on water demand and supply is critical. Without measurements and data on water supply and demand, a community cannot know if the gap between supply and demand is a threat in the near future or decades off. Nor can a community justify the costs of promoting conservation without an adequate showing of the benefits. Funding for studies on local water supply and demand is necessary to make conservation programs possible.

Agricultural water conservation needs careful study and reflection. The OSE has cautioned that some practices viewed as viable water conservation efforts, such as drip irrigation, could actually allow plants to use more water and thereby increase depletions on the water system. Additional depletions can reduce the amounts available for senior water rights owners, interstate stream compact deliveries, and endangered species. Given current economic conditions, the greatest need is for funding and technical assistance where resources are inadequate or non-existent. In many communities, water conservation can only happen with state and federal financial support. The New Mexico legislature needs to support conservation efforts for small communities through funding.

By Consuelo Bokum (2011)
Latest Update by Katherine Yuhas (2013)

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