Legal Implications of Rainwater Harvesting for Existing Surface Water Right Holders: Does Arizona Have a Problem?

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Abstract

A concern about rainwater harvesting that often sees little attention is the impact of water harvesting on surface water appropriators. All states in the southwestern United States allocate surface water according to the doctrine of prior appropriation, which gives priority in water use to the earliest water user. Because rainwater harvesting is a recent innovation and because it captures water before it can runoff and reach prior appropriators, it is possible that water harvesting can interfere with existing surface water rights. Each southwestern state has taken a different policy approach to addressing this conflict.

One of the overriding questions when considering water use within the structure of prior appropriation water rights – and critical when considering rainwater harvesting in this context – is what water is appropriable. Each western state has different statutory language governing prior appropriation water rights. Depending on the wording of these statutes and the way they have been interpreted by the courts and policymakers, certain waters may be considered appropriable or unappropriable. This is especially the case with storm water runoff. Some western states and courts have found that storm water is appropriable, thereby restricting the ability of citizens within the state to undertake certain types of water harvesting. Other states have determined the opposite, somewhere in between, or have yet to establish a clear precedent.

This paper reviews basic water harvesting techniques, briefly presents how water harvesting is being implemented in Arizona through the example of the City of Tucson, considers the approaches of three southwestern states with established rainwater harvesting policies – New Mexico, Texas, and Colorado, and considers how these approaches may provide guidance to Arizona for developing its own rainwater harvesting policy. New Mexico has taken a passive approach, allowing water harvesting, but also reserving the right to take further action if harm to appropriators is demonstrated. Texas has aggressively pursued rainwater harvesting programs, making clear policy statements in favor of rainwater harvesting despite very restrictive statutory language. Colorado has relatively unrestrictive statutory language but de facto has the most restrictive water rights system relative to water harvesting as a result of administrative level policy decisions and support for those decisions by the state court system. Any of these outcomes are possible in Arizona because it has yet to develop a statewide policy toward water harvesting

I. Introduction

One of the easiest ways to reduce potable water consumption and increase the sustainability of residential and commercial development is to implement a rainwater harvesting plan. Rainwater harvesting can be used to meet both indoor and outdoor water demand. The benefits of indoor rainwater use include reduction in potable water demand and reduction in water bills for homeowners. Depending on the amount of rainwater available, it can be used to meet all or part of indoor water demand. Benefits of outdoor rainwater harvesting include on-site storm water management without the use of retention/detention basins, increased landscaping versatility, reduced potable water demand for landscape irrigation, and reduced water bills for the landowner (Lancaster 2005).

A concern about rainwater harvesting that often sees little attention, however, is the impact of water harvesting on surface water appropriators. All states in the southwestern United States allocate surface water according to the doctrine of prior appropriation, which gives priority in water use to the earliest water user. Because rainwater harvesting is a recent innovation and because it captures water before it can runoff and reach prior appropriators, it is possible that water harvesting can interfere with existing surface water rights. Each southwestern state has taken a different policy approach to addressing this conflict. This paper begins by providing background on what water harvesting is and different types of water harvesting. It then introduces the concept of prior appropriation water rights and briefly evaluates the rainwater harvesting policies of New Mexico, Texas, and Colorado in the context of prior appropriation rights. Finally, the law and judicial precedents in Arizona, a state with no defined policy toward rainwater harvesting, are considered and policy recommendations for the state provided.

II. Background

While rainwater harvesting is often discussed generally as if the term has a common, singular definition, there is actually more than one type of rainwater harvesting. It is important to understand the differences between different rainwater harvesting methods because different approaches to harvesting may have different legal implications.

Rainwater harvesting techniques may be divided into two general categories: landscape modification or passive water harvesting and onsite detention and storage for future use or active water harvesting. Within these categories there are different scales of use that may also have legal implications.

Landscape Modification

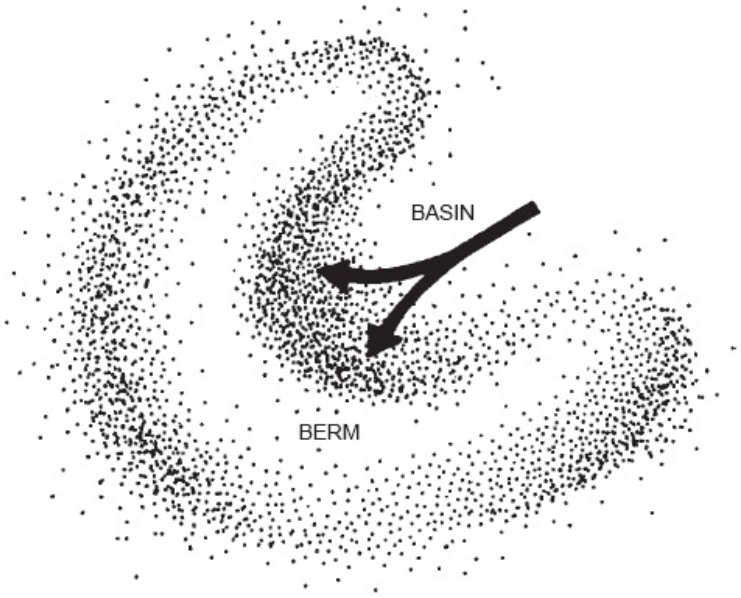
Rainwater harvesting through landscape modification can range in scale from the backyard of a home to large scale use in commercial settings to mitigate storm water runoff from large paved areas. Landscape modification is the easiest type of rainwater harvesting for individual homeowners to implement. It requires little specialized expertise and knowledge, no special tools or materials, and homeowners can easily do the required landscaping work as a do-it-yourself project.

The primary goal of rainwater harvesting for exterior use is to slow storm water runoff and retain as much storm water onsite as possible. The components of a landscape rainwater harvesting system are a catchment area, the area from which rainwater will be collected; a method of distribution to transport rainwater from the catchment area; and a landscape holding area, the area where the rainwater is retained and used for landscape irrigation. Therefore, rainwater harvesting for exterior use is primarily an issue of landscape design. Various surface

features are used to divert, detain, and encourage infiltration of rainwater where it is needed to irrigate landscaped areas (City of Tucson 2006, Lancaster 2005).

The most basic of rainwater harvesting technique is the microbasin or depression. With a microbasin, a shallow basin is dug and the soil from digging the basin is used to build a small berm on the depression's downhill side. The berm slows runoff and allows it to infiltrate into the soil. A depression is the similar concept, but with no berm. Plants and trees are planted in the depression or basin. Basins should be larger than the canopy of trees and shrubs to encourage root growth of desert plants. To aid in infiltration, a surface layer of mulch or rocks may be placed in the depression. Microbasins and depressions can be placed in series so overflow from the uphill basin or depression feeds those downhill. They are best used in areas with gentle slopes and low velocity runoff, such as directly around structures. They can also be used to catch runoff for raised walking paths, roads, and other paved areas when placed on either side of the path. This is one of the most commonly used rainwater harvesting techniques (City of Tucson 2006, Lancaster 2005).

Figure 1: Microbasin (City of Tucson 2006)



Another common technique is swales. Swales can be used to capture runoff from roads and trails, to slow runoff as it approaches a downhill road or trail, and to slow runoff as it flows

downhill. Swales look and function like a shallow, wide ditch. Vegetation can be planted in the swales to shade roadways and paths and to slow runoff. Berms can be constructed perpendicular to the direction of flow within the swale to further slow runoff. To increase infiltration and durability, the swale may be lined with rocks and gravel. When used along roads, the road should be crowned slightly to encourage runoff into the swale. Alternatively, curb cuts may be used. Curb cuts are a gap in a contiguous section of curb to allow water following in the gutter to enter the swale. Curb cuts are used along roads and in parking lots to allow utilization of large amounts of storm water running off of paved surfaces (City of Tucson 2006, Lancaster 2005).

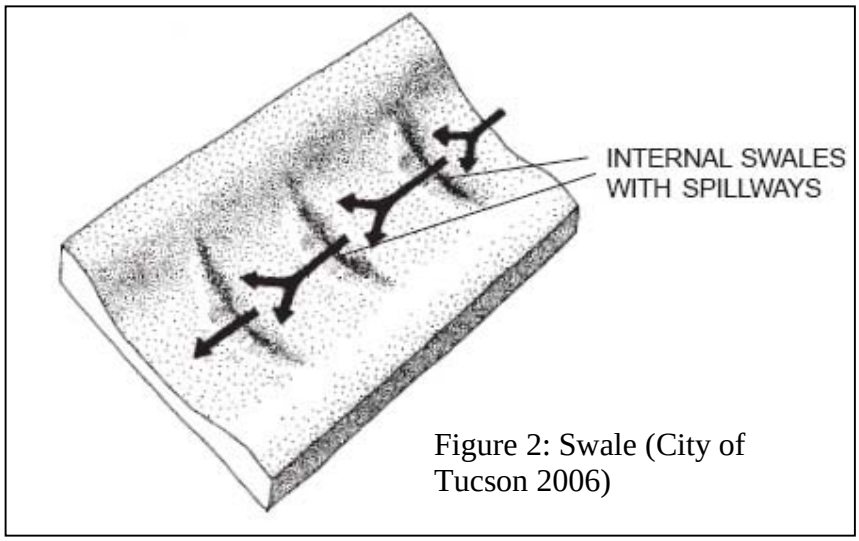


Figure 2: Swale (City of Tucson 2006)

The final common technique used to capture rainwater for irrigation is French drains. French drains are trenches filled with gravel to create an infiltration column. French drains can be used in a wide range of circumstances. They can be placed at the fringes of microbasins and depressions to aid

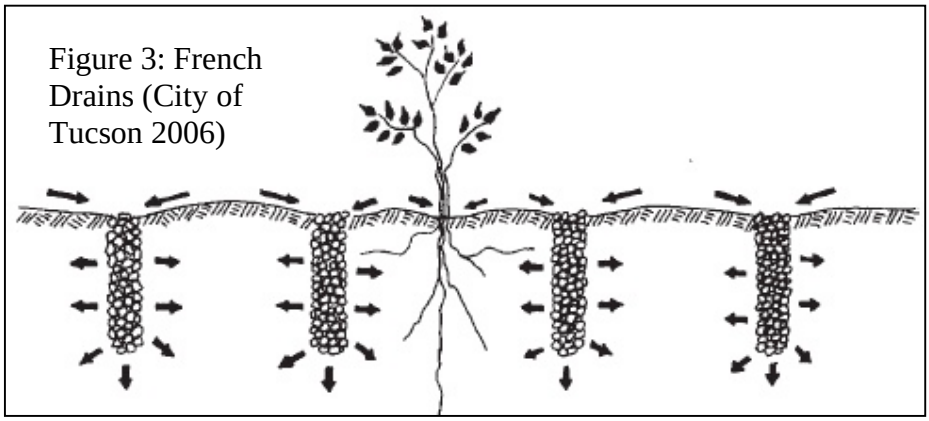


Figure 3: French Drains (City of Tucson 2006)

in infiltration; as channels to direct water to basins and depressions; and where drainage channels cross pathways, for example when a swale is used up gradient from a walking path and an overflow channel is needed (City of Tucson 2006, Lancaster 2005).

Importantly, none of the landscape modification rainwater harvesting techniques involves complete detention and storage of storm water flows. Rather, they attempt to retain storm water flows onsite for a longer period of time than would otherwise be the case. The patterns of storm water flows across the landscape are modified, but the volume of flows is unchanged. The result is a longer period of time for water to infiltrate into the soil for productive use by vegetation. Well designed landscape modification rainwater harvesting systems always provide for overflow to prevent the creation of standing water (Lancaster 2005). The purpose of landscape modification is not to capture all rainwater, but rather capture an amount of rainwater that can be productively used onsite. In nearly all cases, there will be excess runoff that is not retained onsite.

Onsite Detention and Storage

Use of rainwater to meet interior water or ongoing irrigation needs is accomplished using a cistern or water tank to store water. Untreated water with basic filtering can be used to meet interior water needs that do not require potable water – toilet flushing, clothes washing, and showers. Rainwater is generally very high quality. With on-site treatment and filtering, rainwater can be used for potable needs as well (Lancaster 2005, TWDB 2005). However, because of the limited amount of available rainwater in urban central and southern Arizona (the three county Central Arizona Water Conservation District service area), it is not possible to meet all interior water demand with water harvesting.

Detention and storage for irrigation use ranges from simple residential systems using rain barrels to capture rooftop runoff, to complex systems used at commercial sites to store large amounts of runoff from rooftops, parking lots, or even large portions of urban areas. The advantage of storage in the southwest is that it provides a reliable supply for the long dry periods between the winter and summer rains. Detention and storage also reduce the total amount of runoff from a given site and therefore can aid in meeting the requirements of storm water and flood control regulations (Audrey 2008, Lancaster 2005, Texas Rainwater Harvesting Evaluation Committee 2006).

Cisterns collect water runoff from impervious surfaces such as rooftops and large paved surfaces such as parking lots. They should be sized to a capacity that will allow for consistent turnover of water. For example, if a rooftop produces 1,000 gallons of rainwater per year, the cistern should be sized smaller than 1,000 gallons so there is not standing water in the tank for an extended period (TWDB 2005). An alternative method of detention and storage is large, lined basins such as those found at the Kino Environmental Restoration Project in Tucson, Arizona. This project stores massive

Figure 4: Cisterns harvesting roof water (Lancaster 2008).

amounts of runoff from a large portion of urban area in southern Tucson. Water is used for irrigation of a spring training complex and to sustain an artificial wetland (Fonseca 2008).

Depending on the sizing the cistern and the catchment basin, there is the potential to detain and store very large amounts of water, especially from commercial sites. For example, in Tucson, an average of 12 gallons of water per square foot of catchment area (rooftop or other impervious surface) may be captured each year, assuming a runoff coefficient of 85% and average rainfall of 12 inches per year (Daily 2008). Depending on the size of the cistern or other storage mechanism and catchment area, the amount of rainwater captured may exceed the pre-development amount of runoff from a given site. This may have important legal implications.

Implementation – Tucson

Tucson provides a good example of the range of implementation strategies for rainwater harvesting through the use of regulation and education. The City of Tucson has developed both formal regulatory and ad hoc requirements for rainwater harvesting for commercial sites and an educational program for both residential and commercial landowners and developers interested in rainwater harvesting. The regulatory programs of the city serve to emphasize the potential conflict between surface water rights and rainwater harvesting.

The City of Tucson's regulatory requirements for rainwater harvesting are contained in the city's landscaping regulations. The city may also start to implement a de facto regulatory approach by requiring more extensive rainwater harvesting than what is required by the landscaping regulations as a condition of rezoning. The latter effort is at the prerogative of a single city council member and for the time being will only be implemented in his ward (Audrey 2008).

The landscaping regulations apply to all new development within the City of Tucson with the exception of single family homes and duplexes. In effect, this leaves out traditional subdivisions but includes apartment complexes, commercial development, and industrial uses. Also included is common open space within clustered subdivisions. The landscaping regulations require, "maximum use of storm water runoff for supplemental on-site irrigation purposes" (Tucson Land Use Code 1995). This regulation requires the capture of runoff from a development, in part through the use of rainwater harvesting techniques. This is a departure from traditional storm water regulations, which typically call only for retention of runoff in basins to achieve balance between the water entering the sight and the water leaving the sight. Most storm water regulations do not require that the runoff be put to beneficial use for irrigation (Audrey 2008; for an example of traditional storm water management regulations see the City of Phoenix's Storm Water Policies and Standards Manual). In conjunction with the requirement to capture runoff, the City of Tucson landscaping regulations require the use of runoff to supplement the irrigation system. When submitting a landscape plan, an applicant must also submit an irrigation plan showing how rainwater will be used to supplement the irrigation system (Tucson Land Use Code 1995).

While these requirements have been in place since 1995, Tucson did not develop a guidance manual to assist developers in the implementation of rainwater harvesting until 2005. This delayed the effective implementation of the 1995 regulations (Audrey 2008). The *City of Tucson Water Harvesting Guidance Manual* was developed specifically to educate developers in the process of designing a rainwater harvesting site plan. It is also available to the general public as a resource for homeowners seeking to implement rainwater harvesting on their property and home builders interested in incorporating rainwater harvesting into new development even

though it is not required. The manual provides a comprehensive review of design principles, the site design process, and common rainwater harvesting techniques at a variety of scales (City of Tucson 2005).

The City of Tucson is currently in the process of developing a new rainwater harvesting ordinance for commercial development, public rights of way and buildings, and subdivision common areas. The new ordinance will require the use of cisterns for storage and beneficial use of rainwater. This goes a step beyond the current ordinance, which requires storage but not use (Audrey 2008). In addition, City Council Member Rodney Glassman has indicated that he will begin request mandatory use of rainwater to meet *all* landscape irrigation needs beyond initial demand for establishment of vegetation as a condition on all commercial rezoning cases in his ward (Audrey 2008). While such a condition is subject to the approval of the rest of the city council, if implemented, the impact may be significant. As the city continues to expand its rainwater harvesting regulations, the need to clarify the relationship between surface water rights and the capture of rainwater becomes more apparent.

Prior Appropriation

Surface water rights in Arizona and most other western states are allocated under the doctrine of prior appropriation. This system is often simplified as allocating water on a basis of "first in time, first in right" (Wilkinson 1992). While this simplification is generally correct – the first user to appropriate water from a stream has the right to its use – there is also an important second test of the validity of a water right: beneficial use. In order for a water right to be legally valid, the user claiming the right must have actually put water to beneficial use and the use of water must not interfere with the right of a prior user (Wilkinson 1992). Beneficial use, among

other things, includes the purposes for which harvested rainwater is typically used – domestic and irrigation use.

One of the overriding questions when considering water use within the structure of prior appropriation water rights – and critical when considering rainwater harvesting in this context – is what water is appropriable. Each western state has different statutory language governing prior appropriation water rights. Depending on the wording of these statutes and the way they have been interpreted by the courts and policymakers, certain waters may be considered appropriable or unappropriable. This is especially the case with storm water runoff. Some western states and courts have found that storm water is appropriable, thereby restricting the ability of citizens within the state to undertake certain types of water harvesting. Other states have determined the opposite, somewhere in between, or have yet to establish a clear precedent. The remainder of this paper will consider briefly the status of rainwater harvesting relative to prior appropriation rights in New Mexico, Texas, and Colorado, all of which have established interpretations of the law, and then more specifically in Arizona, which has not addressed the issue specifically.

III. Three Approaches to the Prior Appropriation Question

New Mexico, Texas, and Colorado all have similar prior appropriation statutes. However, these statutes have been interpreted to allow different degrees of rainwater harvesting in each state. New Mexico has elected to take an approach of limited acceptance. Texas is permissive toward water harvesting, taking the most liberal approach of the three states while at the same time having perhaps the most restrictive statutory language. Colorado, as a result of judicial interpretation, falls on the other end of the spectrum. The state has interpreted its prior appropriation statute to allow very little rainwater harvesting. These three states were selected

for review because they represent the full range of possible outcomes for Arizona, a state that has yet to formally address how it will interpret its prior appropriation statute with respect to water harvesting. The diversity of the policy approaches of each of these states in the context of the same basic legal framework has important implications for Arizona.

New Mexico

In New Mexico, prior appropriation is both constitutional and statutory law. The language of the New Mexico State Constitution, Article XVI, §2, states: "The unappropriated water of every natural stream, perennial or torrential, within the state of New Mexico is hereby declared to belong to the public and be subject to appropriation for beneficial use, in accordance with the laws of the state. Priority of appropriation shall give the better right." The constitutional language is implemented by Chapter 72, Article 1, §1 of the New Mexico Statutes. The statutes expand on the constitutional language somewhat: "All natural waters flowing in streams and watercourses, whether such be perennial, or torrential, within the limits of the state of New Mexico, belong to the public and are subject to appropriation for beneficial use. A watercourse is hereby defined to be any river, creek, arroyo, canyon, draw or wash, or any other channel having definite banks and bed with visible evidence of the occasional flow of water" (New Mexico Statutes 2008). Appropriable water is defined by these passages as water in "streams and watercourses." This would seem to exclude water that is flowing on the surface of the ground, but that has yet to enter a defined channel. This argument is strengthened by the definition of watercourse, which requires a bank and streambed and evidence of flow.

Based solely on the statutory and constitutional language, it would be fair to assume that harvesting storm water runoff from roofs, landscaped areas, parking lots, etc. is legal as long as the water has yet to enter a streambed. However, the State Engineer of New Mexico, the person

responsible for the administration of surface water rights, has taken a somewhat more nuanced view of the law. The official policy of the Office of the State Engineer states:

> The New Mexico Office of the State Engineer supports the wise and efficient use of the state's water resources; and, therefore, encourages the harvesting, collection and use of rainwater from residential and commercial roof surfaces for on-site landscape irrigation and other on-site domestic uses.
>
> The collection of water harvested in this manner should not reduce the amount of runoff that would have occurred from the site in its natural, pre-development state. Harvested rainwater may not be appropriated for any other uses (New Mexico Office of the State Engineer 2008a).

While rainwater harvesting is allowed, landowners are not allowed to capture more rainwater than would have been generated in a pre-development state. This policy protects surface water appropriators from decreased stream flows despite the fact that the statutory language for prior appropriation does not provide a right to water until it reaches a channel. In effect, this policy expands the statutory language to include diffuse surface flows, thereby limiting the amount of rainwater that may be harvested. In support of its policy statement, the Office of the State Engineer provides access to rainwater harvesting materials on its website. It generally endorses harvesting by homeowners, but encourages larger commercial projects to contact to office for a water rights determination (New Mexico Office of the State Engineer 2008b).

New Mexico's approach might be considered passive, permissive, and ad hoc. The State Engineer's office has an official policy, but does not have any stated intent to enforce that policy. Residential water harvesters are encouraged to proceed without worry of conflict with appropriators and the State Engineer's Office does not require or even encourage homeowners to contact it to ensure there are no conflicts appropriators. Commercial sites implementing rainwater harvesting are encouraged to contact the State Engineer's office to ensure there are no water rights conflicts, but there is no actual requirement to do so (New Mexico Office of the State Engineer 2008b). With no incentive to work with the State Engineer's office, it is likely

that water harvesting issues will only be addressed after a conflict arises. This results in a policy that may result in an adversarial process and require expensive litigation when conflicts do occur. Because of the expense of litigation and difficulties balancing the public interest between water conservation and sustaining water rights, the New Mexico policy may be unsustainable.

Texas

Texas may have the most restrictive statutory language of the three states reviewed here. Despite this, the state has also taken the most permissive approach to rainwater harvesting. The Texas statute defining waters subject to appropriation is found in Chapter 11, Subchapter B, §21 of the Texas Statutes. It reads:

> The water of the ordinary flow, underflow, and tides of every flowing river, natural stream, and lake, and of every bay or arm of the Gulf of Mexico, and the storm water, floodwater, and rainwater of every river, natural stream, canyon, ravine, depression, and watershed in the state is the property of the state.

The Texas statute covers a lot more ground than New Mexico's. Important for those interested in water harvesting, the statute specifically states that "the storm water, floodwater, and rainwater of every river" is subject to appropriation. In isolation, this would indicate that rainwater harvesting is never allowed in Texas without a water right. In practice, the state has taken aggressive steps to enable and encourage rainwater harvesting.

In Texas, state level water conservation efforts are led by the Texas Water Development Board (TWDB). The TWDB has a wide-ranging mission that includes providing "leadership, planning, financial assistance, information, and education for the conservation and responsible development of water in Texas" (TWDB 2008). Through its Innovative Water Technologies initiative, the TWDB provides significant amounts of educational materials to the citizens of Texas about the benefits of rainwater harvesting and approaches to implementation. Among the resources available is the detailed *Texas Manual on Rainwater Harvesting*, which provides

information on the benefits of water harvesting, basic information on rainwater quality, detailed instructions for constructing harvesting systems for interior and exterior use, and cost estimates for harvesting systems. The TWDB website also includes maps of the rainwater harvesting potential for the entire state of Texas, a system sizing calculator, and an extensive FAQ on water harvesting (TWDB 2008).

Beyond the efforts of the TWDB and perhaps more indicative of the presumed legality of water harvesting despite the Texas prior appropriation statutes is the explicit support for water harvesting from the Texas Legislature. The Legislature has passed a number of bills to encourage the implementation of water harvesting in the state. In 2003, House Bill 645 was passed. This bill prevents covenants and home owners associations from banning rainwater harvesting in the state. It specifically states that rain barrels for the storage of rainwater cannot be banned (HB 645 2003). Clearly, this indicates legislative support for rainwater harvesting generally, and onsite storage of rainwater specifically.

In 2005, the Texas Legislature passed a second bill, further indicating its support for rainwater harvesting in the state. House Bill 2430, which passed by the Texas House of Representative and Senate by a unanimous vote, established a Rainwater Harvesting Evaluation Committee. The mission of the committee is to determine "the feasibility of using rainwater as a source of water supply" (HB 2430 2005). Importantly, the bill presumes that rainwater is a potential source of water – the goals of the committee do not include evaluating the legality of rainwater harvesting relative to existing water rights. In fact, one of the duties of the committee is to provide recommendations on "ways that the state can further promote rainwater harvesting" (HB 2430 2005). Other tasks are related to treatment of harvested water and enabling its use. The final report of the committee makes no mention of any conflict between large-scale

implementation of water harvesting and surface water rights or the need for a water right to conduct water harvesting. Instead, it emphasizes the enormous amounts of water that can be generated by broad implementation of water harvesting in the state (38 billion gallons or approximately 117,000 acre-feet if 10% of rooftops are utilized) and recommends funding to provide matching grants to fund water harvesting projects (Texas Rainwater Harvesting Evaluation Committee 2006).

The statutory language of Texas's surface water laws provide for public ownership and appropriation of all waters within the state, including storm water. The wording of the laws clearly indicate that storm water is appropriable before it reaches a stream. In isolation, this is extremely problematic for the implementation of rainwater harvesting in the state. However, the state legislature seems to have taken a different view. The legislature has on several occasions endorsed water harvesting and encouraged its use on a statewide basis. The legislature has clearly stated its intent to allow water harvesting in the state. However, there is a significant gap in the policy framework in Texas – the state legislature has not explicitly stated that water harvesting is either exempt from its appropriation statutes or that water harvesting is presumptively legal under the existing framework. As the state continues to aggressively pursue widespread use of water harvesting techniques, this gap in policy may lead to conflicts with water right holders.

Colorado

While Texas shows how a state can fully embrace rainwater harvesting in the context of prior appropriation water rights, the State of Colorado provides a counter-example to this approach. In Colorado, the standing policy of the State Engineer, the person responsible for the management of water rights in the state, and judicial precedent severely restrict the ability of

individuals to undertake water harvesting. It also looks as though this precedent will be maintained for the foreseeable future – an effort to pass legislation to enable limited water harvesting using cisterns failed to receive traction in the Colorado legislature during the 2008 session. The bill was opposed by both water rights holders and the environmental community (Long 2008).

Like New Mexico, in Colorado prior appropriation is both constitutional and statutory law. The constitutional provisions are specifically implemented by Title 37, Article 82, §101 of the Colorado Revised Statutes: "The water of every natural stream, as referred to in sections 5 and 6 of article XVI of the state constitution, includes all the water occurring within the state of Colorado which is in or tributary to a natural surface stream but does not include nontributary ground water…" (CRS 2008). This statute is far less specific than the Texas law and very similar to that of New Mexico.

The Office of the State Engineer has interpreted the law to mean that, "Practically speaking … a person cannot divert rainwater and put it to beneficial use without a plan for augmentation that replaces the depletions associated with that diversion" (Colorado Division of Water Resources 2003). This means anyone capturing rainwater will have to augment the stream the water would have flowed into with an equal amount of water. As a result, water harvesting in Colorado cannot, under the current interpretation of the State Engineer, actually conserve water. All the water used would have to be replace by some means, so the conservation benefit is nil.

The courts in Colorado have also supported an interpretation of the law restricting water harvesting. In *Cline v. Whitten* (1962) the Colorado Supreme Court ruled in favor of Whitten, then the Colorado State Engineer, supporting the State Engineer's interpretation of Colorado

prior appropriation law. The Supreme Court's decision contains a number of important points related to the ability to conduct water harvesting. Cline, a private citizen, had constructed a dam to contain the runoff from a spring and floodwater. The water from the spring and flood flows did not flow in a defined channel and was therefore considered diffuse surface flow. The waters from the spring, prior to the construction of the impoundment, soaked into the soil before reaching a defined channel. Believing the impoundment was a legal use of water, Cline sued Whitten for a declaration permitting the storage. Whitten disagreed, arguing the impoundment violated existing surface water rights. The Supreme Court agreed with Whitten (*Cline v. Whitten* 1962).

The court's decision relied on two points. First, legal precedent in Colorado holds that in all cases, water, both surface and subsurface, is influence by gravity and flows downhill. In this case, the Cline impoundment was uphill of the creek providing the surface water rights. As a result, it is assumed as fact by the court that the water from the spring flows downhill and is tributary to the creek. The fact that the water is not in a defined channel does not influence this fact. This rule can be overcome, but it is the obligation of the of the party impounding the water to prove that the water is not tributary, not the State or the person claiming their water right has been impaired. Second, once waters have been established as tributary to a stream, they are subject to the laws of prior appropriation.

Taken together, the two components of this ruling essentially foreclose the possibility of capturing rainwater using any sort of constructed detention system in Colorado. Essentially all water has been ruled tributary to a stream, allowing no room for rainwater harvesting without a surface water right. However, water harvesting by landscape modification is likely still legal because this method does not permanently detain water; landscape modification simply changes

the way water flows over the surface and where it infiltrates into the ground, but does not actually prevent it from doing either (Miller 2008).

In an attempt to address this issue and allow for some use of cisterns for rainwater harvesting in Colorado, State Senator Chris Romer introduced Senate Bill 08-119 in 2008. This bill sought to allow limited collection of rooftop runoff at residential sites using cisterns. Cistern size was held to a maximum of 5,000 gallons. The bill authorized collection only by homes not connected to a domestic water system. Collected water could be used for domestic purposes and to irrigate up to one acre. The bill also called for a study that would, in part, quantify the impacts of water harvesting on surface water appropriators (Senate Bill 08-119 2008). The bill failed to advance out of committee and was opposed by both appropriators and environmental groups who are comfortable with the rules as they are now (Long 2008).

Colorado has the most stringent water rights system of any of the three states reviewed. All runoff, regardless of its location in or outside of a streambed is considered subject to appropriation. Rainwater harvesting is allowed in the state only under very limited circumstances and only by passive landscape modification (Miller 2008). Importantly, the origin of the restrictions on rainwater harvesting in the state come not directly from the statutory language, but from the interpretation of the statute by the courts and the State Engineer.

While Colorado's policies are the most stringent, they are also the soundest of the three states reviewed. Because of Colorado's broad definition of appropriable water and clearly defined, explicit restriction on active, onsite detention type water harvesting, there is no doubt as to the legality of a specific water harvesting project. These policies are also well entrenched. Though water harvesting was not a major issue when the policies were established in the 1960s

and they prevent most water harvesting, stakeholders are committed to the status quo because they know what to expect (Long 2008).

Summary

The most important thing to be learned from reviewing the approaches of New Mexico, Texas, and Colorado to interpreting their state surface water statutes relative to water harvesting is that the statutory language is not necessarily the most important indicator of policy outcomes. New Mexico has taken a passive approach, allowing water harvesting, but also reserving the right to take further action if harm to appropriators is demonstrated. Texas has aggressively pursued rainwater harvesting programs, making clear policy statements in favor of rainwater harvesting despite very restrictive statutory language. Colorado has relatively unrestrictive statutory language but de facto has the most restrictive water rights system relative to water harvesting as a result of administrative level policy decisions and support for those decisions by the state court system. Any of these outcomes are possible in Arizona because it has yet to develop a statewide policy toward water harvesting.

Also evident from the policy approaches of New Mexico, Texas, and Colorado is that only rainwater harvesting involving onsite detention raises significant legal issues. In Colorado, the state with the most restrictive water rights policy, landscape modification is accepted (Miller 2008). It is onsite detention that has resulted in varied policy responses from each of the states. The next section presents an analysis of the Arizona statutes related to surface water rights and the case law related to them. This analysis indicates existing trends in policy towards water harvesting based on legal precedent. The section will conclude with policy recommendations based on these trends and the approaches taken by New Mexico, Texas, and Colorado.

Water Harvesting in Arizona

Arizona currently has no formally stated state-wide rainwater harvesting policy in either legislative or administrative form. The ability to legally conduct water harvesting – or lack thereof – currently rests on the interpretation of the state surface water statutes. An analysis of statute and judicial precedent indicates that both landscape modification and detention forms of water harvesting are presumptively legal in Arizona. However, as was seen in the review of New Mexico, Texas, and Colorado, absent a firm administrative or legislative policy direction, there is a wide range of potential outcomes.

Arizona's prior appropriation statute is similar to New Mexico's. It states:

> The waters of all sources, flowing in streams, canyons, ravines or other natural channels, or in definite underground channels, whether perennial or intermittent, flood, waste or surplus water, and of lakes, ponds and springs on the surface, belong to the public and are subject to appropriation and beneficial use as provided in this chapter (ARS 2008).

Like the New Mexico statute, Arizona's is limited to include water in defined stream channels. Considering only the statutory language, prior appropriation should not be an impediment to either landscape modification or detention water harvesting in the state of Arizona. Water harvesting techniques capture water before it becomes stream flow, the point at which water becomes appropriable and subject to surface water rights. Even a complete capture of all runoff from a given sight may be permissible.

Judicial precedent in Arizona supports this interpretation. In 1926 the Arizona Supreme Court in *Pima Farms v. Proctor* defined "natural channel" as "the floor or bed on which the water flows and the banks on each side thereof as carved out by natural causes" (*Pima Farms v. Proctor* 1926). Waters must be in such a channel in order to be subject to appropriation and in order for a user to receive a water right for their use. In *Brewster et. al v. Salt River Valley Water Users' Association* (1924) the Arizona Supreme Court held that drainage waters are not

subject to appropriation. While this case dealt with surplus irrigation water in the Salt River Project area, the logic would seem to apply to water harvesting as well. Water harvesting uses storm water runoff that is not a part of a channel as defined by the court in 1924 and is therefore not subject to appropriation. In 1969 the Arizona Supreme Court defined "stream" more specifically as "a watercourse having a source and terminus, banks and channel, through which waters flow, at least periodically" (*England v. Hing* 1969). In the same decision, the court noted that water from springs is appropriable only if the waters are the "basis for streams or creeks" and not if they diffuse into the soil prior to contributing to a channel (*England v. Hing* 1969). Specifically addressing the issue of the appropriation of storm water, in 1972 Division 1 of the Arizona Court of Appeals defined surface waters as distinct from waters in a channel and found them not subject to appropriation:

> Surface waters are those waters which fall on the land from the skies or arise in springs and diffuse themselves over the surface of the ground, following no defined course or channel and are lost by being diffused over the ground…. Since ARS §45-101 does not provide for appropriation of 'surface waters' they are not appropriable (*Espil Sheep Company v. Black Bill & Doney Parks Water Users Association* 1972).

Arizona's statutory language and more importantly the interpretation of that statutory language by the Arizona courts appears to be unambiguous: surface water outside of defined stream channels is not subject to appropriation. A water right is not required to use diffuse surface water under this framework. Therefore, water harvesting in the state is relatively unrestricted at present. This stands in contrast to the Colorado and New Mexico approaches to water harvesting. Those states, both with similar prior appropriation statutes to Arizona, have made policy decisions to either restrict water harvesting altogether in the case of the former, or to at least reserve the option to restrict water harvesting in the latter case. Arizona on the other hand has made no policy decisions at the state level about how the state will approach water

harvesting, even as local jurisdictions such as Tucson begin to implement statutes requiring capture of runoff. While the current judicial precedent supports these efforts, it is also important to note that the courts have not ruled on a case specifically addressing water harvesting. In addition, the current impacts of water harvesting on surface water flows in the state are likely to be minimal because the practice has not been implemented on a large scale. It is impossible to know how the courts might rule if actual damage to water rights holders as a direct result of water harvesting is shown.

Policy Recommendations

With the rising popularity of water harvesting in Arizona – the current activities of the City of Tucson are a good example – there is a clear need for the state to develop a specific policy toward water harvesting that is defined through legislation. In the absence of a state-wide effort to define a policy, the most likely result is something similar to what has occurred in Colorado. There, a policy was defined not through the policymaking process but as a result of administrative and judicial interpretations of the law. There was no opportunity for public input into the development of the policy either through a formal stakeholder process or the legislative process. Today, Colorado has an entrenched policy that some may not like, but that is accepted for fear of opening the issue of water rights and changing the rules (Long 2008). While the specific policy outcome for the state of Arizona is likely to be different from that of Colorado if the issue of water harvesting is left to the courts, the policy will be defined in the absence of a public debate on the issue.

Arizona has several examples of policy approaches to rainwater harvesting available to it, as outlined in this paper. Each of these approaches has its strengths and weaknesses. New Mexico's policy is permissive of water harvesting, but leaves the door open to conflict and

administratively or judicially imposed change in the future. Texas strongly supports water harvesting through statewide policies, but has failed to make a specific policy declaration relative to appropriation and existing water rights. Colorado has the most clearly defined policy, but at the expense of water harvesting and its potential contribution to water conservation. Because of the weaknesses of these approaches, Arizona should not adopt any one of them out of hand. Instead, Arizona should learn from their weaknesses and use these lessons to build a policy of its own. Such an approach would move Arizona from its current status as a laggard in the development of policies towards water harvesting to a position of leadership in the western United States.

Because of the importance of surface water rights to the holders of those rights, a public, participatory policymaking process is important. The state has a number of examples of statewide participatory processes that have resulted in tangible policy changes. The Statewide Water Advisory Group is the most recent example. This group, which was focused on water issues impacting rural counties, successfully developed several bills that were passed during the First Session of the 48th Legislature in 2007 (ADWR 2008).

Among the issues that must be addressed during a policymaking process is to what extent the state should be involved in regulation of water harvesting relative to local jurisdictions. While statewide legislation is required to address the surface water rights issue, the extent to which the state needs to otherwise be involved in regulation of water harvesting is an open question. Local jurisdictions like the City of Tucson are familiar with local conditions and have already begun the process of formulating regulations requiring water harvesting. It may be best to leave specific regulation with local jurisdictions rather than attempting to develop a statewide regulatory approach.

Finally, if the state develops a policy embracing rainwater harvesting, the impacts of reduced water deliveries from large municipal providers must be considered. One of the purposes of water harvesting is to reduce potable water use. If implemented on a large enough scale, water harvesting could have an appreciable impact on total water deliveries by municipal providers. Lower water deliveries translate into decreased revenue, with potential impacts on water rates or the ability of the municipal provider to maintain system infrastructure.

IV. Conclusion

Rainwater harvesting is an effective means of reducing water demand from municipal water providers. Benefits of water harvesting include decreased use of potable water for outdoor irrigation, lower water bills for consumers, and decreased groundwater pumping as a result of displacement of demand. But rainwater harvesting raises important questions relative to prior appropriation water rights. Several western states – New Mexico, Texas, and Colorado – have addressed these questions with different policy approaches. Arizona, however, has not. And while these states policies are examples of how to address the prior appropriation issue, none of them meet all the needs of Arizona. Instead, Arizona should use these policies only as a guide and develop its own approach through a multi-stakeholder, statewide process.

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