An analysis of Economic issues

regarding water management and planning in Washington County, Utah

by

John D. Groesbeck, Ph.D.

Professor of Economics

Westminster College

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Introduction and Executive Summary.

Like the rest of the nation, Utah has faced an economic slowdown. This slowdown has pushed some to ask significant questions regarding how we pay for, manage and plan water projects. While the downturn has led many to question more closely how we spend our funds on all activities, it is also important to remember some of the foundations that have led us to adopt current practices in the first place, within the context of trying to understand if the same conditions and theoretical underpinnings continue to hold today. This report provides an analysis of several issues facing water management and planning in Utah, and is by no means the definitive study on each of these issues individually. The intent of the report is to raise awareness of some of the economic as well as financial and in some cases public policy aspects of these issues from the perspective of what constitutes both an efficient and reliable water system for the citizens of the State of Utah.

This paper makes the following points:

- Using the property tax in Utah to assist in paying for water is not a subsidy. It is a form of split payments from the same household or business. The total cost is borne by those same households and businesses, but paid by them into two funds: rates and property taxes. It is incorrect to call a split payment by a single individual or firm into two separate funds a subsidy. The individual or firm in that case would only be subsidizing themselves thus the assertion is incorrect.
- Retaining the property tax for water is an important aspect of the financing process. Property Taxes, Rates, and Impact Fees provide an important diversified portfolio that helps reduce risk. This diversified portfolio approach has been very beneficial in helping Utah pursue larger projects with better economies of scale.
- Improving price signaling for water to the consumer does not require that we eliminate the property tax to help pay for water. Creating a more unified billing system that reflects payments made into property taxes for water, as well as current rates due monthly will go a long way toward clarifying price signals. This is a much better alternative than eliminating the entire mechanism of water finance that has served this state so well.
- Water is a public good in most respects that matter, and as such it needs to be managed as such. Trying to impose a strict framework that applies to private goods is misguided and could result actually not just increasing the price of water, but the development and legal costs as

well. It is better to have non-profit entities such as a water district have a monopoly position than it is to fragment the market and lose economies of scale.

- Intergenerational equity is more than satisfied by financing long term water projects . Current generations assisted in paying for some of the costs of significant water projects, and we now greatly benefit as a result of those, even though the decisions to build them were made by forward looking generations in the past.
- Households and firms have preferences for water uses that give them benefits, both monetary and aesthetic. These practices constitute the revealed preferences of the vast majority of the citizens of the State.
- It is unreasonable to expect households to reduce water significantly even if we have cost effective supplies available.
- Using the water to fulfill our preferred goals is fully acceptable, and should be embraced. Certainly, no one is advocating waste. No one wants to harm wildlife in the process. But the legacy of water use in Utah comes more from the localized watersheds and the plentiful nature of the resource in concentrated places, than it does by a disposition to be wasteful. Utah is unique in enjoying this possibility. This benefit is a result of good past planning, not lack of good sense.
- Growth caps as a mechanism to block out change typically run afoul. They tend to cause sprawl, as households and businesses leapfrog to the adjacent areas, and simply build there. They tend to drive up property values excessively and drive out the poor. This kind of outcome is not generally reflective of the values of the State of Utah.
- Interdependence and cooperation will yield far greater net benefits than attempts at protectionism through growth caps.
- Smart growth, planned growth, and growth within our capacities as we develop them are fully reasonable approaches and represent the current efforts of state and local officials in Utah.
- Water is a basic building block of our society and economic life. It is a perfectly reasonable choice to decide that we prefer stable prices and surplus capacity instead of volatile prices and increased shortage probabilities. Nearly all, if not all communities in America echo that same sentiment with respect to water. There is no single case where a spot market pricing system is used for water in this nation. Water is critical to life, and is indeed a critical foundation to economic life. Social life, and every living thing on this planet.
- Development of water must occur before growth occurs. We must stay ahead of the growth of population and economic diversification toward any increasing water intensiveness. Since populations increase in a smooth pattern over time generally, and water projects happen in large blocks, it is inevitable that we will have surplus waters that we have to grow into. This reality is much preferable to developing small water projects with higher costs per unit of water. Economies of scale dictate that we proceed in this manner.
- Water does not cause growth, but when water in a certain area is constrained by engineering needs to hedge risks in the water system and other strategic choices to preserve a minimum capacity reserve, water does have a positive shadow value, even if no single household is going dry.

- Shadow value is the net contribution to regional benefits due to adding one more unit of water. This is simply stating that waters that are in possible shortage, either due to demand growth, or reductions in supply, have a positive shadow value.
- When waters have positive shadow values, those values represent significant benefits that are being forgone by not having enough water. Thus, these positive shadow values justify additional water developments and represent a broad look at social benefits associated with future water projects.

Issue 1. Property Tax: a Subsidy to Water?

A subsidy is typically defined as an assistance payment by one entity, typically government, to some other group or individual. The idea that property tax is subsidizing water is absolutely flawed, and the term is being purposefully misused as a rhetorical device, but in reality nothing could be further from the truth. In reality, the same people, citizens of the state, are making split payments for water projects into three funding pools: Property Taxes; Water Rates; and Impact fees. This is a split payment by a given household or business, and it is not a system of subsidy.

To the contrary, the existing system of paying for water is quite purposeful, with the intent to create a diversified funding mechanism using three pools of money to pay for capital facilities, system expansion to stay ahead of population growth, and direct water costs. When property taxes were levied for water projects, it was made clear to property owners what the money was going to. Those same property owners were also making payments for water in the form of rates, and many of those same property owners paid for a portion of water project costs through impact fees as well when they purchased their property. From an individual household's point of view this system constitutes a split payment by that single household into two annual, or three overall separate funding pools. This is not a subsidy system.

Water districts operate like private firms which charge a set of prices on the customer side to obtain revenue for operations, and raise funds beyond sales revenue to pay for large capital investments through issuing bonds, and charging other primary service connection fees. Unlike private firms, water districts are not able to issue equity, or issue commercial paper or other means of short-term debt. The closest corollary to equity available to water districts is the property tax, but only in the sense it provides a funding mechanism that is more permanent in nature, and assists in creating a more diverse funding portfolio that may reduce financing costs.

Property tax for water, as part of the split payment by households and firms, has an interesting benefit to the customer as well. Property taxes and some impact fees are tax deductible. Property tax and impact fee payments are deductible on state and federal tax forms, whereas water rate payments are not. This effectively gives households a discount to the extent of whatever their marginal tax rate is, which is dependent on other deductions and adjusted gross income. So if the annual contribution toward water through property taxes is $100, and the household is in the 20% tax bracket, the effective cost of the property tax payment after the deduction would only be $80. If the same payment were made in the form of a water rate, the effective cost would remain at $100.

While a diversified funding mechanism for water projects which includes rates, property taxes, and impact fees, has many important and positive effects financially, it does not lend itself to singular price signaling without some additional management initiative. This is not a severe issue however, and the need to create better price signaling should not compel the state destroy a very important feature of Utah water finance, to achieve modest price signaling benefits. Utah does not need to eliminate the split payment made to property tax to improve market information flows. The problem can be addressed quite simply by providing water users with summarized bills that list the imputed total payments into all funds for water and water services. All this would require is a merging of the property

tax database by address with the water billing cycle, and computing the monthly payment for water embedded in the property tax and putting that on the bill along with the monthly use charge. If price signaling is the problem, we can figure out a way to create a unified price signal without eliminating the portfolio funding approach that has served us so well. This can be accomplished as a demonstration project that should run for some period of time to allow the statement process to be refined and for the market to adapt to this information.

Any possible benefits of better price signaling are constrained by the elasticities of water, which are quite low (very inelastic) to begin with. The suggestion that improved price signaling be experimented with administratively through improved billing systems is a much lower cost alternative to experimenting through destroying the diversified portfolio method that we use for financing.

An important field in finance and economics is the study of "Real Options." The outcome of a real options analysis is a recommendation whether or not to retain flexibility given the current cost of money, the probability of future outcomes of multiple event scenarios, and the amount of time that may pass before potential payoff occurs. Application of real options analysis to this decision regarding whether or not to retain property taxation and funding portfolios or not is relatively straightforward. If you have a choice to clarify price signaling through providing exact information regarding total costs paid by users in their monthly bill with minimal or no additional cost for providing that information, while retaining flexibility in funding mechanisms that will potentially save taxpayers and rate payers tens of millions of dollars over time in financing costs, the payoff of retaining the option versus the cost will always provide a positive real option value. Thus, in every case in the scenario described, retaining flexibility of funding methods, while making relatively low or no cost improvements in price signaling should always be preferred to making improvements in price signaling and losing that funding flexibility, while at the same time increasing the risk that some other activity will come along and capture the property tax capacity that is vacated by the water districts. [1]

In addition, all citizens in this state should be very concerned if property tax payments for water are eliminated, and rates increased, without an absolute guarantee that some other use for the resulting property tax savings will not take its place. Ever. If the freed up property tax is absorbed elsewhere, the total bill for government services will rise. Any proposal that is considered for eliminating water district access to property taxes should likely assume that some other use for the taxing capacity will take its place and the total cost of government services will rise in Utah. Under this condition, Utah households will pay a higher total bill for government services if this is passed, and this proposal will end up being nothing more than a tax increase for all intents and purposes.

Issue 2. Water is a Public good.

Public goods exist on a continuum along with all other goods and services. Most definitions of public goods are from the point of view of the consumer, but in practical reality, a good that is public versus purely private may need to be defined from the supplier side as well. From the consumer perspective,

[1] *Real Options: Managerial Flexibility and Strategy in Resource Allocation*. Lenos Trigeorgis, 1998.

all goods can be characterized by the extent to which there is rivalry among consumers of the good, which in its absolute form (perfect private goods) does not allow for either simultaneous or sequential consumption. This means that one and only one consumer can consume the good, exactly one time. Another dimension is the extent to which the good is excludable, which simply means that only those who are willing and able to pay the price are allowed to enjoy the benefits thereof. Put together, a pure private good would be that one consumer can consume one good, only one time, and only if they pay the full value of the good. There would be no spillover benefits to others, and the good would completely perish after one use. Pure public goods are the opposite. They allow for both sequential and simultaneous consumption, provide significant spillover benefits, and thus make it very difficult to charge for the full value of the good.

From the producer perspective, a strong candidate for a "public" good is defined in the economically rational outcome when it is better for society to support non-rival production in the supply of the good due to the economies of scale needed to provide it. What this means is that the entry costs to even begin production of the good are so high, that most firms simply will not enter the market because they do not have the resources to do so. The high entry cost provides a natural barrier to entry. The high entry costs are driven by the reality that the only way customers in a region can begin to be served is if there are very large capital expenditures to create both the sourcing, transmission and distribution infrastructures to get the good to the households. Increasing economies of scale means that the larger the concentration toward a monopoly, the lower the possible cost per unit made available to the customer, which is preferable to higher prices and more competition. Of course this outcome depends on whether or not the monopolist is a private unregulated profit seeking firm or a non-profit entity such as a water district or local government. This reflects reality both in the past as well as now, and there are still many situations wherein it makes sense for only one producer to provide the good. These situations are particularly concentrated in the regional utilities, including electricity, water, sewer, and natural gas. Each of these sectors of the economy have extremely high up-front costs involved, and the efficiency gains that we in society gain by actually promoting either government, or a monopoly to provide the good because of the additional economies of scale that are achieved. This then becomes a situation wherein it makes sense to have non-rival production of the good, meaning no it is rational to support the regional production by one entity, which will naturally have no competitors.

Water has many dimensions of being a public good. It does allow for simultaneous enjoyment in many respects, and it certainly allows for sequential consumption as it is used, treated, and then sent downstream, or as groundwater is regenerated, and is ultimately cleaned and re-used naturally several times. Water is also a public good from the supplier point of view, in that non-rival production needs lead us to forming regional monopolies or government provision of the resource, because of increasing returns to scale for new water developments. This means that having smaller, competitive water companies is much less efficient than one large one, or government provision.

Another contributing factor leading us to view some goods as being a public good can be seen from the producer point of view. In the event there is a good that has significant simultaneous or sequential use (non-rival) and provide significant external benefits that make it difficult to charge for the full value of the asset, private market suppliers will characteristically not desire to produce the good unless they

secure a monopoly position. Even then, the notion of water markets do not fully exist, nor likely could they given that water moves and that multiple users have a right to the same unit of the commodity in different regions and localities. Water crosses state boundaries, and is subject to required return flows that must be honored, and any transfers to other users within a locality are highly constrained, and can only apply within a very limited context. The complexity of this situation is another compelling reason why it is typical that government entities and monopolies dominate the provision of water in any level of scale, which is the supply side response to the fact that water is fundamentally a public good. The history of water developments in the West is always based on developing collective action, and no single person or company was able to fund the scale of projects needed to create the burgeoning West that we know today.

Water is different in another important respect. It is absolutely critical to all life. It is not just strategically important. Water is life. Fresh water should be defended as THE most critical resource we have. A critical difficulty with applying private good market economics to water is that it is mobile, and subject to use, return flows, and reuse as it steadily crosses county and state boundaries. Water is best viewed as a public good first and foremost, and then use market forces where possible within that context. Attempts to treat water as a fully private good have not ended well historically.[2]

Because water has so many dimensions of a public good, we in Utah have delegated the authority over water to government entities that we expect to act as public entrepreneurs with the role and function of promoting efficient use of water, and developing new systems and sources to keep our infrastructure reasonably ahead of the population growth curve. An important dimension of this activity also includes hedging against the inherent volatility in the annual precipitation we receive, so that all enjoy a constant, uninterrupted source of water, and thus avoid threats to life and the wellbeing of the state. This risk taking and vision by water districts and others who went before us, and the reservoirs they built, as well as the pipeline systems is precisely the reason why Utah has stable water supplies

From a practical standpoint, interstate water flows are so heavily watched and regulated by Federal law, with numerous layers of constraints imposed by case law as well, that pursuing fully market based systems within a particular state becomes very difficult at best, especially when the internal systems have to reconcile with our interstate agreements and obligations to provide downstream flow. Given this reality, it is best to treat water as a public good, and understand the process of its management within that context, using market based concepts where they add to the quality of management of this scarce resource to be sure, but avoiding ideology as the motivating factor.

Issue 3. Intergenerational Equity: Then, Now, and in the Future.

Over the past decades those who went before us wanted to insure that we had sufficient water resources to maintain low, stable rates and an uninterruptable supply. Over the decades we have paid the costs of those projects both in terms of tax payments as well as fees in order to amortize the debts incurred. Of course we appreciate their efforts and foresight. It was through their planning that we

[2] *Transboundary Water Sharing and the Need for Public Management.* J. Dellapenna, Journal of Water Resources Planning and Management, September/October 2007.

have the situation we have today, where we do not have to worry so much about where the next glass of water will come from. They created big projects based on big dreams which came true. They understood the importance of having projects that were large enough that the per unit cost of water provided was low. They understood the need for stabilizing the precipitation cycle by having an adequate system of reservoirs and pipelines. We enjoy the fruits of their planning today, and we in part shared in that cost. The rate of return on having this water security has been enormous all along the Wasatch front, and further to the south along the I-15 corridor all the way to St. George. An important question we should be asking is, how would we feel if they failed to plan, and left us in a mess with shortages, rationing and fewer recreational venues such as the reservoirs now enjoyed by millions?

One of the more important aspects of efficient water resource development is the idea of economies of scale. Water developments needed to serve significant populations are very expensive. This is to be expected, and is simply a manifestation of one of the reasons why water is so often viewed as a public good. These high entry costs are a very important reason why governments or regulated monopolies are the typical providers of water resources.

Another issue in intergenerational equity is that of using financing mechanisms that match up with the project being funded. There is a rule in finance and accounting that assets should never be financed for longer than 80 percent of their useful life. This insures that if there is variability in the useful life of an asset, that future generations will not be excessively asked to bear the costs of useless assets. This rule is strictly abided by in Utah, which is traditionally one of the best financially managed states in the United States.

A natural result of these high entry costs is that the facilities must be financed over time in order for the projects to cash flow. Our current generation benefits from the foresight and planning of generations that went before, and current generations are assisting in paying for the costs of those facilities through tax and rate payments that flow through to pay off bonds and any other forms of long term debt. Using debt is a useful way to spread costs among those who benefit from the water project in both past and present.

An important rule in economics related to intergenerational equity is the idea of interdependent utility. What this implies is that we are as concerned about our children as we are about ourselves. Their joys are our joys. Their pains are our pains. And so on. By insuring that we have improved risk hedging for water in the State of Utah in the face of populations that will definitely grow in the state, we need pipelines to allow for better risk pooling across the state in much the same way that electric utilities are part of regional power pools. We need reservoirs to insure that water flows are stable and uninterruptable for both current and future generations. These projects were not inexpensive then, and they are not inexpensive now, and they will only be more costly in the future. But they were, are, and will be worth it when those who come afterward look back in gratitude.

Issue 4: Is it Government's role to re-engineer preferences?

Most would agree that it is not the role of government to re-engineer preferences for water use, or decide who can and cannot live in a region. Such efforts have absolutely no constitutional foundation, and are to many, a decidedly un-American concept. A fundamental question in the case of water planning in Utah relates to the preferred use for water as manifested by the citizens of the state. Citizens in Utah generally want a lawn for their children and grandchildren to play in. They want parks. They want golf courses. They like reservoirs for boating, fishing and other recreational activities. They reveal that preference by their behavior, as do the many tourists from out of state who enjoy those as well. One could assert that enjoying the benefits of water is part of the legacy and culture of the state. Most in Utah would probably view telling households in Utah that they must rip out their lawn in order to conserve water, especially when the means of providing the water is readily available for both current and future generations from existing resources within our own state, while still maintaining appropriate in-stream flows to preserve wildlife, and riparian habitat that we also enjoy. Saying all of that, of course we should not waste water within that set of social preferences. We need to use water efficiently and provide the information and incentives to do so; adopting useful technologies that are developed along the way. But to suggest that median citizen preferences in Utah are inherently wasteful and uninformed is insulting and completely out of line with the essence of civil rights in this nation.

The choice to use water or not to achieve a set of preferred amenities, is a pursuit that, when done responsibly, provides tremendous benefits directly to households as well as through positive externalities to others in the form of more green space and aesthetic appeal in neighborhoods. Pursuing technologies and practices that help water users achieve their desired planting patterns in the most cost effective manner is important, and this is the primary goal of conservation efforts of water districts statewide. No one is in favor of wasting water beyond what is needed for us to achieve our goals. However, governing what people desire or are allowed to have for green spaces in their yards is far beyond the scope of legitimate government control. The role of government in a democratic nation is to create and preserve policies that facilitate the pursuit of goals and outcomes by its citizens when those pursuits are within the limits of the law. People in Utah are and should always be free to choose within the context of protections of zoning, etc. Using our legal state allocation of water for socially preferred uses does not impose uncompensated costs on others, or on wildlife that need to be preserved. Therefore, facilitating the greening of Utah complies with the Kaldor-Hicks criterion, if not full Pareto optimality in welfare economics, which deals with the idea that it is acceptable to make at least one person better off, as long as no one else is made worse off in the process. So, where Utah has abundant water available due to concentrated mountain snowfall, creating regional watersheds along the I-15 corridor more similar to the Southeastern US[3] than the desert Southwest, why should our citizens not enjoy that? We should enjoy the situation as a benefit of good planning by those who went before us, and emulate the efficient and thoughtful manner in which they worked and planned.

There are some who have advocated that since Utah is growing, and we will eventually run out of additional water capacity, we should simply allow prices to rise now by not pursuing new water

[3] *The Cost of Water in Utah: Why are our water costs so low?* Utah Division of Water Resources, October 2010.

developments, and promote more xeriscaping and demand side management efforts in order to increase prices on purpose, so we can have a softer landing into higher prices a century or so from now.[4] While I agree we can and should provide an accommodating rate structure for those who want xeriscaping and other more extreme bare dirt measures, there is really no basis for insisting that the option be institutionalized at this point creating a system over time wherein people are at first rewarded for pursuing very low water use, and then eventually punished for not doing so because of the social agenda of certain environmental groups attempting to wield disproportionate power. Further, actively seeking to increase prices today and refusing to develop new sources of water in an economically beneficial manner which are legally and lawfully available to us, could in many minds be viewed as a violation of the public trust. The thought appears to be conspiratorial and abusive to the revealed preferences of the median citizen of Utah, and what we expect our elected and appointed government officials to be doing.

To the contrary, responsible economic planning suggests that if we do all we can to develop our legal water allocations in Utah in a cost effective manner, staying ahead of our population growth curve, we will be better positioned to accommodate growth in an orderly way and extend our current quality of life for a longer period, for our children and grandchildren and beyond. In the process of doing so, yes, prices will rise as we are forced into higher and higher cost waters at the margin. The idea that prices will not naturally rise without creating a conspiratorial artificial shortage of water is absolutely false and is driven by an extreme agenda to undermine the current choices of typical Utah citizens. We will experience orderly price increases along the way if we continue on our existing path; we will adapt, and we will not suddenly hit a pricing wall that will choke our future generations. There is absolutely no need to artificially deprive ourselves of efficiently grown lawns, trees, flowers, parks and golf courses, while maintaining environmental quality for fish and riparian species as we are presently doing. These things generate tremendous net benefits to households above that available through extreme alternatives such as xeriscaping, and that is why most people in Utah want them, based upon what we observe in nearly every neighborhood in the state.

Regarding limitations on who can, and cannot live in a region, the concept appears to be on the verge of prejudice and discrimination, and brings to mind the idea of tyranny of the majority. Can or should local citizens decide to close the doors to a city by popular vote? From a practical point of view, the extent to which a particular municipality passes such a limitation, and requires water officials to limit water hookups as the primary implementation tool, people who want to live in the region will probably build outside the city limit, and the limited city adjacent to that area will get the traffic and congestion, but not the tax base to do anything about it.

Additionally, this type of policy may in fact promote sprawl, rather than containing growth within a particular space of land[5]. This is a very interesting problem with multiple dimensions, not the least of which is how some have proposed to use a constraint on water hookups to block newcomers and others from building new homes and thus expanding local population. Making water the center of such a

[4] *The Proposed Lake Powell Pipeline: A Report on Its Effects on Socioeconomic Resources*. David Tufte, 2008
[5] www.growsmartmaine.org

policy is clearly a spread of mission for water officials, making an alleged lack of water the reason to not allow new construction, even if cost effective waters are reasonably available. To the extent that such officials are officials of the State of Utah, purposefully withholding efforts to fulfill the specified duty to provide and conserve water for a region would be violated.

In the end, such caps will be futile attempts unless they can be implemented at the county-wide, or multi-county level, which is highly unlikely. Even then, growth will simply proceed just outside of the cap region. This process has been observed in Maine, as well as Maryland, in spite of guided efforts to concentrate growth within particular towns. Indeed within the capped areas, prices for property have dramatically increased, and there are some that these caps are simply a veiled attempt to keep the poor from living in some areas. Economics would predict that the integrated nature of communities will likely make such barriers to entry irrelevant, just as it would be illegal to constrain traffic from entering the area from neighboring towns, when people choose to live just outside of the capped area. More importantly the positive benefits associated with growth and interdependence far outweigh the desire to maintain exclusivity. Trade, interdependence, and cooperation are the hallmarks of cities in America, and this practice tends to benefit much more than protectionism and barriers to entry. We see this regionally, nationally, and globally.

Saying this, it is of course wise to have growth that is well-planned, and orderly such that existing qualities of life persist as much as possible. Growth has benefits and costs. Costs can be managed, in terms of building better transit systems to overcome congestion, maintain social values and inclusiveness, fighting crime, and managing the extension of essential services in ways that insure consistency in education, essential services, recreation and public amenities. Cities in America redefine themselves over time. This is the nature of our society. Not one place in this country is able to lock itself at a point in time, and perhaps for good reasons. The benefits associated with growth include better access to health care, more connectivity with worldwide transportation, a higher qualified labor pool, and all of the other elements associated with developing an external economy of scale in a particular place.

Issue 5. Which is better: Larger reserves of supply, or volatile prices and higher shortage risk?

Prices are important. In true markets, with competitive forces fully in play in both supply and demand, prices are the mechanism we depend on to improve efficiency. However, when we think about water, and basic infrastructure depending on fundamental public goods for a regional economy, it is better to have these in abundance, along with adequate reserves such that there are only modest pricing movements. Trying to implement a complete spot market pricing system would likely destabilize the strategic goals associated with regional development that are, to many, more important than allowing full pricing swings in those public goods sectors. Given that demand is quite inelastic, price volatility to create equilibrium would be quite extreme in the face of supplies that are shifting up and down with the precipitation cycles. The amount of pricing movement needed to alter quantity demanded increases as demand elasticity is reduced.

Prices can and do adjust behavior slightly, but universally in the US, the change in water use behavior with respect to changes prices is inelastic, with ranges between -.2 and -.5. A particular research study that shows the impact of stepped, or block pricing was completed in Santa Cruz, California.[6] This study shows predictably that when the price is low, the elasticity response is lowest, in the -.26 range, and when the price is three times higher during a severe drought period, the elasticity response rises to -.53. What this implies is that when prices were relatively low, a one percent increase in price led to a .26% reduction in quantity demanded. In the block of prices that are three times higher than the starting point, a 1% price increase reduces .53% of a decrease in quantity demanded. If we consider a situation wherein we need to reduce demand in a particular year by 30 percent and this range of elasticities hold, it may be necessary to increase water prices in a particular year in the range from 60 to 120% depending on the elasticities associated with the starting price.

This and other studies demonstrate that changes in price do have some limited power in reducing demand. However, any belief that pricing is the most powerful tool in long term water management is likely misguided. Most providers of water have tended toward preserving price stability, and reserve more aggressive pricing for periods of drought. This was the compelling reason for increasing the block pricing in the referenced Santa Cruz, California case. It appears that stable water prices are preferred to volatility, thus creating a stable building key building block upon which to build a regional economy, and society. Nearly every private water company, as well as public service company reveals a preference for relatively stable prices and insuring that there is an uninterruptable supply of water, regardless of precipitation. Certainly, some of these entities do have block pricing to charge higher prices for additional use if their supplies are seriously constrained or their existing capital facilities simply do not have the economies of scale that we enjoy here in Utah. But the idea that there should always be aggressive pricing blocks regardless of availability would actually constitute a form of predatory pricing by a monopolist. Is that really what we want our water providers to become? I don't believe Utahns want that in any form. A recent article by Kallis, et al[7], evaluates the differences in conservation outcomes from public versus private water companies, and concludes that there is no significant difference between the two. However, it also chronicles the story of research with direct interviews and shows that customers of private companies are much less trusting, and believe that those companies are abusing their monopoly power, and become much more negative when asked to conserve during drought, or for any reason. One of the conclusions of their work showed that "privatizations and their associated reforms can reduce conservation potential by exhausting the willingness of users to cooperate (pg. 189)." This is a consistent theme among respondents and it should serve as a warning as we contemplate any sweeping reforms here in Utah.

Given the public good nature of water, and the critical role it plays in sustaining life, we as a society may prefer to limit pricing volatility by developing drought hedging systems (reservoirs, pipelines, etc) that provide stable supplies of water under the vast majority of precipitation cycles. This is a social choice

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[6] *Do Residential Water Consumers React to Price Increases? Evidence from a Natural Experiment in Santa Cruz.* Agricultural and Resource Economics Update. S. Nataraj, Jan/Feb, 2007.

[7] *Public versus private: Does it matter for water conservation? Insights from California.* Environmental Management, 45: 177-91. Kallis, G.; Ray, I.; Fulton, J.; and McMahon, J.

that people in Utah made previously. Living at risk of either shortage or pricing volatility has not been part of contemporary history. This level of pricing changes in a community, cycling from year to year may not be acceptable for water. Water is essential to life in all forms. Questions related to ability to pay and public health would require complex systems of subsidy in addition to any pricing strategy, and generally, volatility in water prices that reflect volatility in precipitation cycles may be completely unnecessary if we have the technology and capital to build sufficient hedging capacity to create smooth delivery, stable prices, in a manner that also cash flows debt needed to create these things, we may choose collectively that we prefer stability to a cyclical rollercoaster on something like water, upon which all life relies. Stability in pricing for water generates benefits for businesses planning their capital facilities, general economic and environmental stability in a region, improved public safety with respect to fire control, and improvements in public health as there is better cleanliness and lower in a region.

Issue 6. Does new water cause growth?

Water is critical to life. Nothing happens without water for any life form on this planet. Minimal amounts are necessary to sustain human life and civilization. Saying that, there are ways to deal with less water as long as basic needs are met, although subsistence water availability does very little to promote any degree of economic prosperity, and out-migration for the region will likely occur if there are better options elsewhere. The methods of coping with less water in a condition that is still positive both aesthetically and in support of typical Utah preferences, include conservation within the limits of preferred recreation, planting and green space. Conservation, or increasing the efficiency of water use to meet preferred goals, and to an extent modifying those preferred goals to a level still acceptable to households and firms can be induced by several factors, including implementing new technologies and better practices, adapting to different types of plants and grasses, and to some degree changes in the price of water. However, if water flows are so severely constrained the region loses appeal to the median households in the area, not to mention those who may be considering acquisition of property in the area, water does become an important issue for the region economically.

One difficulty in predicting when a region will hit a hard constraint in water supply is the fact that precipitation is received in varying amounts from year to year. This variation is particularly severe in the desert Southwest regions of the US, making a general lack of water made worse by fairly wide swings in precipitation, at least in percentage terms. For example, consider an area that typically gets ten inches of precipitation per year, and but then has some years with 7 inches. The loss of three inches in this case represents a 30% reduction in water for the year under what is typical. Compare that with a region that normally receives 40 inches per year. A three-inch reduction in that case would only be a 7% reduction, and would be much easier to hedge against at much lower cost.

The only way to smooth water supply over time in the more water-volatile desert region is to build expensive reservoirs and create diverse systems including both surface and ground waters along with appropriate water pipeline systems. However, in spite of construction of pipelines and reservoirs, there are still periods of drought wherein our best efforts of hedging can be simply overwhelmed by a basic lack of water in a severe multi-year drought. Like electricity and other essential utility services, there must be a reserve requirement that is kept at a minimum for contingency purposes. Unlike electricity

however, where volatility in the amount sold is primarily due to demand volatility, with a relatively stable supply, water utilities face a double source of volatility in the amount of water sold. In dry hot seasons, demand rises, and supply falls, both in response to the weather cycle. Thus the planning process for water facilities must take this difference into consideration.

But like electricity and other foundation utilities, pricing stability achieved through using buffer stocks of supply, or excess capacity under most circumstances, has been preferable to reduced supply and no buffer stocks, with wide pricing swings. So in this discussion, what constitutes a shortage depends on what the preferred strategy is. If we want relatively stable prices for water, even more so than other utilities because of the special role water has in supporting life, then a shortage of water could be defined as a lack of water to maintain the strategic target of relatively stable prices at some minimum percentile outcome of the precipitation distribution over time.

Water shortage probabilities, and/or excess demand probabilities, are accounted for in typical water management processes. Most of the standards in this regard center on operating rules of what the utility imposes with respect to mandatory restrictions if water demand is expected to exceed a certain percentage of expected flows. These are often referred to as exceedence values, which relate to the idea of reserve capacity rules. Often, the exceedence value number for planning is 80 percent. What this measure does is evaluate the probability of actual precipitation and thus capacity in water sources currently developed received being exceeded 80 percent of the time. The reason for the conservative number is precisely because of the wide volatility in the precipitation cycle here in the West. The planning rules make it such that surplus waters may in fact occur most of the time, which has traditionally been viewed as a good thing in that it is preferable to the alternative. When additional sources from different locations are developed in a region, the total exceedence value rises, because the total flows under consideration rise as additional watersheds are utilized.

However, with an exceedence value of 80 percent as the planning baseline, this assumes that a shortage may occur up to 20 percent of the time if all planned waters are utilized. Mandatory controls become triggered as the water utility is forced to manage to the possible scarcity of flows below that level. When defined in this approach, within the context of the social strategic choice of pricing stability, a shortage becomes a function of the strategic choice to make water a stable foundation upon which to build a regional social economy; the probability distribution associated with the precipitation cycle; and upon the summation of infrastructure choices already in inventory, and the timing of when new developments come online. Where there is less supply than what is needed at the strategic price set, at the given capacity reserve requirement, there is a shortage that starts to accumulate in terms of probability. This probability can then be multiplied against existing capacity for the system to derive the expected value of acre feet in shortage. Of course that expected shortage may be addressed by bringing additional capacity to the system, or by increasingly aggressive mandates, pricing changes and other mechanisms to curb water use. In any case, this expected shortage value, when it exists, can be used to compute the implicit shadow values of water to a regional economy. This concept is discussed in more depth in the paragraphs below.

Two questions come into play here: 1) When are we justified in stating that a water constraint is binding? and 2) How should we value a potential shortage in terms of regional analysis?

1) The answer to the first question, regarding when we are justified in stating that a water constraint is binding is quite complex. The supply of water in any future year is subject to probabilities associated with variation in the precipitation cycle from year to year as discussed above, but much more than that. A shortage of water within the context of the strategic choice to have relatively stable water prices is a function of not only the probabilities associated with the precipitation cycle, but also with the number of consumers (population), the level of water developments already in place in the region, and the water use preferences that firms and households manifest. A shortage in this context is driven by the combined probabilities of increasing population and the probability of reduced flows in the precipitation cycle below needed levels, and inversely related to transfers of water from agricultural use toward culinary use, increases in conservation through technology, prices, or other reasons, and a reduction in preferred water use patterns. These variables can be modeled to generate probability adjusted shortages, or the need of increasing the water supply at the margin. During this planning process, it is typical with national organizations to have a minimum reserve requirement of the resource. In electricity planning this is called a reserve margin, which is typically an additional 15 - 20% beyond peak electricity demand (depending on the power pool in which the utility participates)[8]. For water policy planning, there is also a minimum capacity requirement which was discussed above in regard to exceedence, but to clarify, the exceedence targets are limiting only on the supply side if the water transactions in an area. Demand growth, preferences for planting, commercial and industrial mix, and a host of other factors also contribute to creating a shortage, so it is typical that water utilities define total capacity within their systems based on exceedence of the larger flows in the watersheds they tap into. To be safe within that maximum planning number, water providers also try to manage flows with another set of allocation rules. This includes the typical idea that maximum unrestricted flow to customers can be no more than typically 80 percent of expected capacity of the water provider. If demand rises to more than 80 percent of expected capacity (based on exceedence) the provider usually then starts to impose various type of restrictions, and changes in pricing in order to insure necessary, if not the desired waters for its customers. A difference between electricity reserves versus water reserves, is that electricity is more easily pooled among regional utilities, thus reducing the reserve margin required from any single utility. However, since water is not as easily pooled and moved between regions, and Utah water districts often must act as stand-alone entities, the reserves required to operate safely within the flow requirements are higher than if pooling were more possible. The only way to pool water between some regions is to build large pipelines. This would benefit water users in the long run, by allowing risks to be spread among the regions of the state, but these pipelines are not in service at present.

Another interesting dimension to water supply is the fact that if there is a shortage, it may well be that everyone in a region experiences a reduction in the available supply, because water is easily divisible in terms of both flows, and non-flows (shortages). This is an important point: When we teach economics

[8] North American Reliability Corporation (www.nerc.com), *Key Players; Regional Entities; Standards; Compliance; Assessments and Trends.*

we often teach about shortages using examples of discreet goods, wherein some quantity of demand goes un-served, and some consumers come away from the market empty handed. But in the case of water, a shortage may also arise if every customer in the market is able to get some water for use, even more than needed for subsistence, but not the full amount they desire at the prevailing price. A shortage of water does not necessarily mean that some households and firms are actually "dry." Thus, a binding constraint on water, given the supply volatilities and demand probabilities, becomes an expected value equal to the exceedence values minus the probability of absorbing that capacity through demand patterns and growth, with an increasing effect as the 80 percent of the exceedence value is attained. A simplified approach for computing is provided in the tables below which embeds the notion that exceedence values which define capacity at a baseline, combined with likely demand of those baseline waters in an interactive way as the economy moves in dynamic ways, thus generating consolidated shortage probabilities that may be used for planning purposes. This consolidated shortage should be conceived as the interaction between supply (dependent on exceedence and reserve capacity rules) and demand growth, which may increase due to population growth, changing use patterns among commercial and industrial users, as well as offsets due to conservation and transfers from agricultural to municipal and industrial use. The scenarios provided below assume that a maximum tolerable shortage probability would be approximately .16, or that shortages, in spite of the best management efforts of water managers, will likely occur 16% of the time. This number corresponds to the probability of low flows in the Virgin River system which correspond to severe drought conditions.

2) The answer to the second question depends on the shadow value of water to the regional economy. Shadow value, or shadow price as it is sometimes called, is an important concept in economics. For a public good like water, shadow value is equal to the change in incomes and non-monetary benefits in a region due to relaxing a binding constraint by one unit. For a region-wide shadow value, as opposed to the shadow value of a constraint for a single profit-seeking firm, it is important to focus on more than the change in profit. When water either enters a region (or is removed from it) at the margin, incomes change, firms make more (or less) profit in certain sectors, particularly those that depend on water, such as Ag, housing construction, or other activities needing water and/or water hook ups to support their activities, and higher (or lower) incomes are paid to workers as well. Profits accrue to the owners of the firm, but when looking at broad social benefits in a region, all increases (or decreases) in incomes paid due to the water change become part of the change in social welfare for the region. This gross income payment funds numerous spinoff activities that work their way through the multiplier in the region, including tax payments for public services, schools, etc. The shadow value of an increase in water should not be misconstrued into stating that water causes growth, but the notion of a shadow value is based on what happens to an economic system when there is a binding constraint. In that case it provides an estimate of what additional benefits a regional economy could obtain if water were not constrained.

More precisely, the regionally captured shadow value of water used in the hypothetical scenario provided below is $110,800 per acre foot. This number is based upon approximations of the probability adjusted value of weighted construction values that are actually created and captured regionally, agricultural production values per acre foot, and the regional capture of additional household incomes

that are sustained due to a change in water at the margin (see Table 2 below). The computation of the construction capture number assumes that only the actual regional markup for building materials should be included, as well as regional labor incomes received, and construction company profits. In addition to construction related new income, there is also ongoing resident income once new dwellings and commercial spaces are occupied. These flows of net new income would be made possible if the constraint on water were relaxed. Finally, after computing all of the possible unique regional income flows possible, the sum of those income flows are adjusted to only 40% of that value, to reflect the reality that much of what households and firms purchased is sourced from outside the region. These numbers change over time, and in the present slowdown condition, these numbers are lower than they have been in the past. However, for the sake of a hypothetical analysis these are sufficient at this time.

A resource that is not a binding constraint always has a shadow value of zero. The reason is that if you already have a surplus of something, and then add one more unit to the surplus, you do nothing to increase productive output. The shadow value, being the change in social welfare due to a one unit change in the water constraint (either positive or negative), includes both the impacts on sustaining economic growth including housing, employment, and sustaining ongoing population and income increases. Additionally, within the context of the strategic goal of relatively stable prices and smoothed, uninterrupted water supplies the change in one unit of water also includes the impact of maintaining price stability in the case of adding supply, or reducing that stability in the case where additional supplies are not allowed or constrained for other reasons.

An estimate of shadow value is computed by first computing the probability-adjusted shortage for each future year in a planning horizon, and then multiplying that shortage by the economic values associated with each acre foot of water to generate a time series of shadow values for each coming year I the planning horizon. This process is demonstrated with a hypothetical example provided in Tables 1, 2 and 3 below. For simplicity, this method combines ongoing shadow value effects with one-time construction effects that would correlated to a positive shadow value associated with water.

Table 1.

Estimating shortage probability
in Washington County as an intermediate step in shadow value estimation

Hypothetical Shortage Probability Computation						
Year	p(Starting Shortage)	(PopGrowth)	(Ag to Culinary Transfer Effect)	(Conservation Effect)	Capacity Creation Effect	Total p(Shortage within 12 months)
2012	0.100	0.025	-0.010	-0.0050	0	0.1100
2013	0.110	0.028	-0.011	-0.0055	0	0.1210
2014	0.121	0.030	-0.012	-0.0060	0	0.1330
2015	0.133	0.033	-0.013	-0.0065	0	0.1460
2016	0.146	0.035	-0.014	-0.0070	0	0.1600
2017	0.160	0.038	-0.015	-0.0075	0	0.1750
2018	0.175	0.040	-0.016	-0.0080	0	0.1910
2019	0.191	0.043	-0.017	-0.0085	0	0.2080
2020	0.208	0.045	-0.018	-0.0090	0	0.2260

This process acknowledges that conservation, driven by program efforts, prices or other means reduces the probability of shortages and helps offset the impacts of growing demand due to population increases. Further, this hypothetical analysis assumes that we begin with an annual shortage probability of only .10, which is fairly low historically for the region. The baseline probability of shortage occurred quite dramatically in the 1989-91 drought. During that drought, the reservoirs were drained. Those water flows drove the region nearly to the point of rationing. The probability of watershed flows at that level are about 16 percent of all observed years in the past. This probability is derived using the flow data from the Virgin River for the period 1910 to 1991, wherein the probability of flows is less than or equal to the flows during the drought of 1989-1991. The developed water flows in the region have been increased since that time due to Sand Hollow Reservoir, but also there was significant population growth as well. This same overall probability of shortage level is used to compute shadow values in the following tables in this report.

In Table 1, the starting .10 probability of a general shortage is fairly low in this scenario compared to the past history in Washington County. This is due to fairly recent construction of Sand Hollow Reservoir, and the recent slowdown in population growth, although this hypothetical analysis assumes that population growth rates will increase as the economic recovery continues and the St. George area remains a popular retirement and recreation area. The Ag transfer column assumes that 40 percent of

new growth can and will be offset by transfers of water from the Agricultural sector. Finally, this hypothetical analysis assumes that no additional capacity will be created during the modeling period. If that were not the case, the probability of a shortage would decline, as new capacity comes online.

Baseline shadow value price computation per Acre Foot is provided in Table 2 below. The assumptions behind this include the idea that if additional water is available beyond a binding constraint at some point in time, this typically means that those wanting water hookups can get them and thus build their buildings, and additional households and their associated jobs can then be sustained in the long run. Only regionally captured payments made during the construction process are included in shadow value. Those payments made for materials that are sourced outside the region are not included, but potential markups above the sourcing costs are included, as are regional labor, regional proprietor profits, and ongoing household income supported, as well as other recreation and other incomes generated due to releasing the constraint on additional waters. When gross regional incomes and payments are computed, it is assumed that only 40% of these gross income dollars are actually retained and used within the county, and that the remaining 60% flows out of the region in the form of tax payments, charitable contributions, payments to entities outside of the region for financing contracts, etc.

Table 2.

Baseline shadow value computation

Baseline Shadow Value Per Constrained Acre Foot

Assuming $350,000 weighted gross construction value per AF
and $40,000 in ongoing household income

Allocated Regional Construction Contributions:

Labor Income	$	140,000
Regional Materials Markup	$	50,000
Local Materials Production	$	10,000
Proprietor Profits	$	35,000
Ongoing Resident Income:	$	40,000
Other Income Benefits (Recreation, etc.):	$	2,000
Total Unadjusted Shadow Value:	$	277,000
Regionally Captured Shadow Value (40%):	**$**	**110,800**

Table 3 below shows how this computed shortage probability can be used to understand the implied aggregate shadow value expressed in 2012 present value dollars. The aggregate shadow value is computed using that portion of computed total shortage probability above .16 given in Table 1, and then multiplying it times the Regionally Captured Shadow Value computed in Table 2 to derive an Aggregated Shadow Value expressed in 2012 dollars.

Table 3.

Hypothetical aggregated shadow value per probability-adjusted Acre Feet of shortage waters beyond a maximum allowable probability of.16

Hypothetical Aggregate Shadow Value Computation*

Assuming demand beyond current exceedence capacity

Year	Probability of shortage above .16	AF Impacted on Base of 72,000 AF	Aggregate 2012 shadow value per AF
2012	0.000	0	$0
2013	0.000	0	$0
2014	0.000	0	$0
2015	0.000	0	$0
2016	0.000	0	$0
2017	0.015	1080	$119,664,000
2018	0.031	2232	$247,305,600
2019	0.048	3456	$382,924,800
2020	0.066	4752	$526,521,600
Imputed 2012 Shadow Value Per AF:			$110,800

*Expressed in constant 2012 $

As mentioned above this aggregated approach uses an estimated 2012 shadow value per acre foot of $110,800 which is then multiplied times the shortage AF impacted to come up with the aggregate annual numbers. As noted this shadow value includes one time construction-related benefits, as well as ongoing sustained household income benefits made possible by additional units of water. Again, shadow values do not assume that the constrained water is driving growth, but to the contrary. Growth, absorbs the constrained resource, and then shadow prices become positive. This is an approximated

value, and should be viewed as something close to a median outcome within a distribution of true shadow values of water, which depend of course on the mix of commercial and industrial activities both by type and levels within an economy, as well as household preferences and other factors that drive the desire for water. This assumed level is based on the proportion of water to households as a gross number based on approximately 1.4 acre feet per household in the area. This includes not just waters for the household, but also for affiliated commercial structures as well as municipal and state buildings, churches, which are all constructed in fairly predictable and fixed proportions with housing. For the purposes of this hypothetical it is a sufficient number, although if all nonmonetary benefits associated with additional waters in a broader social context were to be included as well, the number would be higher.

A primary reason why the social shadow value of water is likely higher than the cost of an individual water right, is that water, being a public good, can be used by a community over and over several times sequentially, and it generates simultaneous benefits as well both materially, and aesthetically. Thus, the private right to use one increment of water one time per year, and the possible net benefit value it creates for a single private entity is much less than the value of this very important public good when summed across the entire economy in the region.

As stated earlier, there need not be households that are "dry" for there to be an actual shortage. Given the uncertainties of the precipitation cycle, and population growth, and other changes, it is likely that the probability of a shortage for all future years is greater than zero, and rising over time. Those probabilities fall when new water hedging facilities such as reservoirs are created but even then, because of population growth in the area, along with new firms of a diversified economic base entering the area, the region will grow into the surplus and will absorb it, and shortage probabilities will once again rise in the context of the strategic goals.

Probability adjusted shortage values for each year in a time series into the future are the best way to plan in water management. This is the approach used in most utility planning. This approach is the best way to model the idea of a constrained resource when you have several variables moving simultaneously in this context. It is likely true that these probability values will increase over time unless there are unusual conditions. However, increasing the capacity of developed waters will provide relief to accumulating probabilities to the extent that the facility has sufficient scale to address the problem.

In the more desertous regions of Utah for any future year, there is a portion of existing and future regional economic value at risk due to the possibility of water shortage. In some years, that value-at-risk is lower than others, and sometimes zero, but always, the probability associated with a shortage exists, due to the reasons listed above. Value at risk is an important corollary to the idea of a shadow value. Value at risk in finance is a measure of a portfolio under management that is at risk of non performance. This idea correlates to the idea of a shadow value, or possible loss of economic value, associated with a shortage, or non-performance of the water system.

Conclusions.

Price signals are important in helping customers make appropriate use choices. The fact that water customers are paying for water in a split payment between water rates, property taxes, and impact fees makes for good financing mechanisms by providing a diversified portfolio of funding pools, but it does not lend itself to clarity in price signaling without effort. But the effort needed to provide a consolidated statement to the water user is merely an administrative issue, and does not justify undoing of the entire funding portfolio approach that has served us so well here in Utah, when other states have been experiencing increasing defaults because their similar entities were forced away from this diversified portfolio approach which helped reduce repayment risks. It is much better to retain the portfolio approach for funding, and then work administratively to correct the price signaling problem administratively by creating consolidated statements which show contributions through property taxes in addition to the amount due in current water rates.

It is advisable to be very careful when applying full competitive market assumptions onto the water situation. Water is different, in that multiple groups have a claim on the exact same amount of water flow, but at different points along the water system. The complex nature of these relationships makes it difficult to effectively move water toward similarity with any other kind of commodity market. The nuances of how the water flows meander through various channels, and then re-converge, only to separate again, to a wide variety of downstream users, who then also must provide return flow, is a complicated system, but only one complication among many.

The water management practices that have been established in Utah have served us well. There has been a consensus strategy of having stable prices, and uninterruptible flows, even if we have surplus that we will eventually grow into. There has been an understanding historically that water developments must lead population growth, not lag behind it, and thus expose our citizens to higher risks.

It is fully appropriate to view water as a basic building block of both economic and social development within a region. Pricing stability has economic value, in that a stable economic environment that has sufficient resources is a much better place to build and grow firms, households, and communities. Any rethinking of this issue needs to consider what it means to destabilize prices in the name of trying to impose a full market framework where frankly it does not fit very well. Yes, prices are important, and they can be particularly useful during times of drought to discourage waste, along with other forms of conservation efforts.

However, most believe it is not the role of government to re-engineer the private lives of citizens through refusing to develop new waters even though they are available in a cost effective manner, simply to create an artificial and purposeful constraint based on some ideological reasons. The vast majority of citizens prefer their current watering and growing practices in Utah, and would like to continue in those practices as long as they are meeting or exceeding environmental needs for aquatic habitat and riparian ecosystems. Based upon all reports from wildlife and environmental agencies, this

is indeed the case. Water Districts have been very sensitive to these habitat needs, and have worked cooperatively with environmental groups and other agencies to insure that this is the case.

In summary, the issues surrounding water are not growing any less complicated. Water is unique among goods both for its properties and the way it moves and is reused over and over, as well as how important it is to sustaining life. These realities are made more complex by wide distributions of probability of receiving water, and coupled with the need for protecting wildlife, human life, economic growth, and recreation. Policy makers and managers of water are truly at the center of what is most important here in Utah, and particularly in Washington County. In the end, given the probabilities and risks involved, I believe most would prefer that we err on the side of too much water rather than too little. It was good to question how we spend our money and plan for resources during the recession, and general economic downturn. But the recession is now over, and the downturn is ending as well. A wave of baby boomers has been stalling their retirement during this time, and many will be coming to Utah for quality of life, family relationships, natural environment, among other things. We will have more people here. Many more. In particular, the Southwestern part of the state will continue to be among the most popular places to live in the country. Any surplus housing that has accumulated in the St. George area will be absorbed shortly, and has been absorbing during the past year at a much higher rate.

All of this implies that people drive growth, not water, but water planners must accommodate it. For most, planning for, and providing water in an efficient and cost effective manner is exactly what we want our water officials to be doing. There must be foresight to look beyond current dark clouds economically and see the long term growth path. Virtually every measure from every planning entity in the state has predicted that Washington County will continue to grow, and will need major sources of new water. It is important for the entire state that these waters are secured, and that we are ready when the people come, as they surely will.